

The Trafalgar School at Downton

Knowledge Organiser

Year 11: Terms 3 and 4

2022/2023



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

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Using a Knowledge Organiser well

What is a Knowledge Organiser?

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

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

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

How should I use my Knowledge Organiser?

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

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

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

Why is a Knowledge Organiser important?

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





WHAT WE EXPECT FROM YOU

BE ON **TIME** ●

BE **EQUIPPED** ●

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

LISTEN TO STAFF AND **ALWAYS**
COOPERATE ●

DO NOT INTERRUPT **LEARNING** TIME ●

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

SHOW **RESPECT** ●

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

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

Being Trafalgar

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

To help yourself you should:

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

Learning the knowledge in the organiser

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

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

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

How do I remember? Activating your memory

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

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

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



alliteration:

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



anecdote:

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



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

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

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



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

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

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



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



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

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

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



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

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

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

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

The dog knocked over the vase with a crash!



Dancing on the water, the sun shone endlessly.

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

COMMON MISTAKES

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

I will lay the bone here.

I laid the bone down.

I'm laying all of my bones down here.



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

I am going for a lie down.

I think I will lay down.

I have lain here all day.

I'm still lying in bed!



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

THE CORRECT EXPRESSIONS ARE

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



AND THEY ARE CONTRACTIONS OF

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





Use fronted adverbials:

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

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

Use a two and then three word sentence:

It hurt. I was dying!

Snow fell. Flakes floated precariously.

Use anaphora:

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

Use epiphora (epistrophe)

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

Use a range of sentence structures:

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

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

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

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

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

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

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

Use a tricolon (tripartite list):

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

Snap! Crackle! Pop! (Rice Krispies slogan)

Use a conditional sentence:

When people smoke cigarettes, their health suffers.

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

Use paired adjectives to describe a noun:

Take a look at this **bright red** spider.

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

Use anadiplosis (yoked sentence):

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

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

Use different sentence types:

The wind is blowing. (declarative)

Put your pen down. (imperative)

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

Pollution is killing us! (exclamation)

Use discourse markers to begin paragraphs and start/link some sentences:

First of all, To begin with, Firstly,

Therefore, Consequently, Hence, As a result,

Furthermore, In addition, Additionally, Moreover,

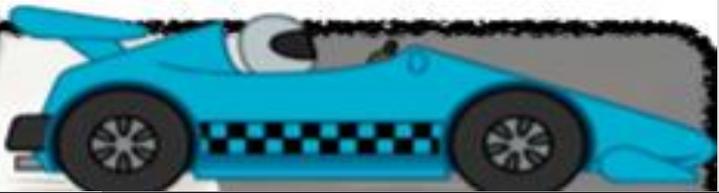
Meanwhile, Later that day, Seconds later, Subsequently, That afternoon,

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

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

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

PUNCTUATION PIT STOP



Full Stop

Full stops are used to:

1) mark the end of a sentence. 😊

Carefully, he kicked the ball into the goal.

2) show when a word has been abbreviated.

Saint Peter's Road is on the High Street.

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

COMMAS

Commas are used to separate: 🗨️

1) items in a list. 🗨️

Bert, Ernie and Elmo are my three pet rats.

2) **dependent clauses and phrases.**

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

Quotation Marks

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

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

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

Question Mark

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

What is your favourite food? 🗨️

How do you feel today? 🗨️

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

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

Exclamation Mark

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

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

They're also used for most interjections: 🗨️

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

'Oh! When are you going?' 🗨️

Semi-colon

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

It was winter; the snow was falling heavily.

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

Colon

Colons are used to: 🗨️

1) begin a list. 🗨️

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

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

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

Apostrophe

An apostrophe is used to show: 🗨️

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

does not → doesn't I am → I'm

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

Dash —

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

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

Brackets

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

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

Tigers are carnivores (meat eaters)!

Ellipsis

Ellipsis is used to: 🗨️ 🗨️ 🗨️

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

I don't know ... I'm not sure.

2) build tension or show that something is unfinished.

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

PUNCTUATION PIT STOP



Writing the text for a leaflet

Stay Safe and Sound Online

clear/apt/original title

subtitles

Manage your online reputation

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

effectively/fluently sequenced paragraphs

Privacy Matters

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

....

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

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'

Article

Andy Murray's Appliance of Science

clear/apt/original title

By Jim White

by-line

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

strapline

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

Sample Check

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

Daily Diet

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

sub-headings

fluently sequenced paragraphs

introductory (overview) paragraph

fluently sequenced paragraphs

Writing in the Essay Form

clear title

Zoos Should be Banned

effective introduction

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

effectively/fluently linked paragraphs to sequence a range of ideas

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

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

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

convincing conclusion

Writing a formal letter

221B Bakers Street
London
NW1 6XE

reader's
address

Writing
Forms

writer's
address

35 Hibiscus Crescent
Andover
Hants
SP10 3WE

date

20th February, 2020

Dear Sir or Madam

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

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

Of course, there is another side to this case: uniforms breed uniformity. We are a culturally diverse nation and all dress the same, this encourages us to be the same. At Brinsley High, we are encouraged to express our individuality, yet this seems to be in contradiction of the message enforced uniform sends to us.

fluently sequenced paragraphs

fluently sequenced paragraphs

Furthermore, ...

Yours faithfully
Boris Johnson

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

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

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

"Kuno!"

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

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

His image faded.

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

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

Journey Description

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

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

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

Description of Place

spatial discourse markers

adjectives

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

Metaphor, simile, personification

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

sensory description

sensory description

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

spatial discourse markers

sensory description

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

adjectives

Climax (problem at its worst)

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

Fail to Plan
Plan to Fail!

Rising Action (build up/conflict)

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

Falling Action (fix problem)

- Character/s solving conflict/dilemma/ problem.

Exposition (introduction)

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

Resolution/Dénouement (ending)

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

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

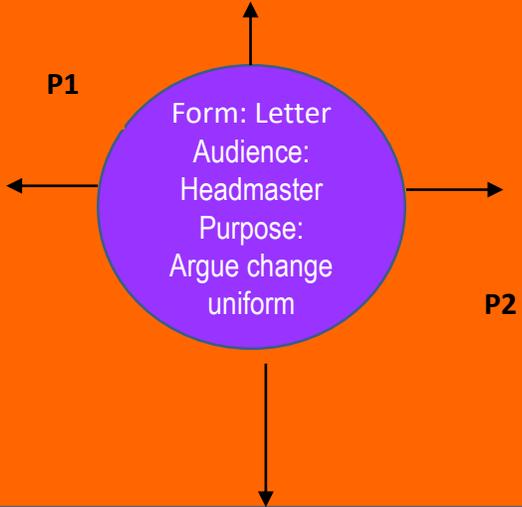
Conclusion:
To conclude,
repeat RQ,
Yes.

Yours
Sincerely

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

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

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



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

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

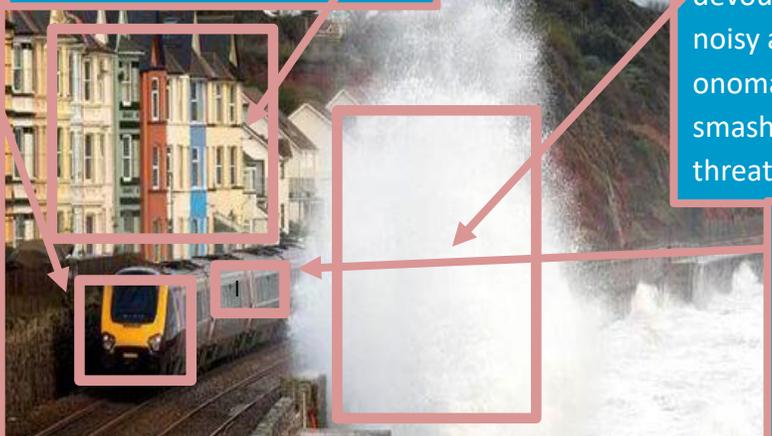
Personify train - a victim moving along railway line, past houses, towards destination - metaphor: caterpillar train sways and pitches precariously along the track to its daily destination. Snatching bites, the sea salt nips at its metal skin as it passes, gnawing at it, killing it. Rattles. Will it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

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

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

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

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

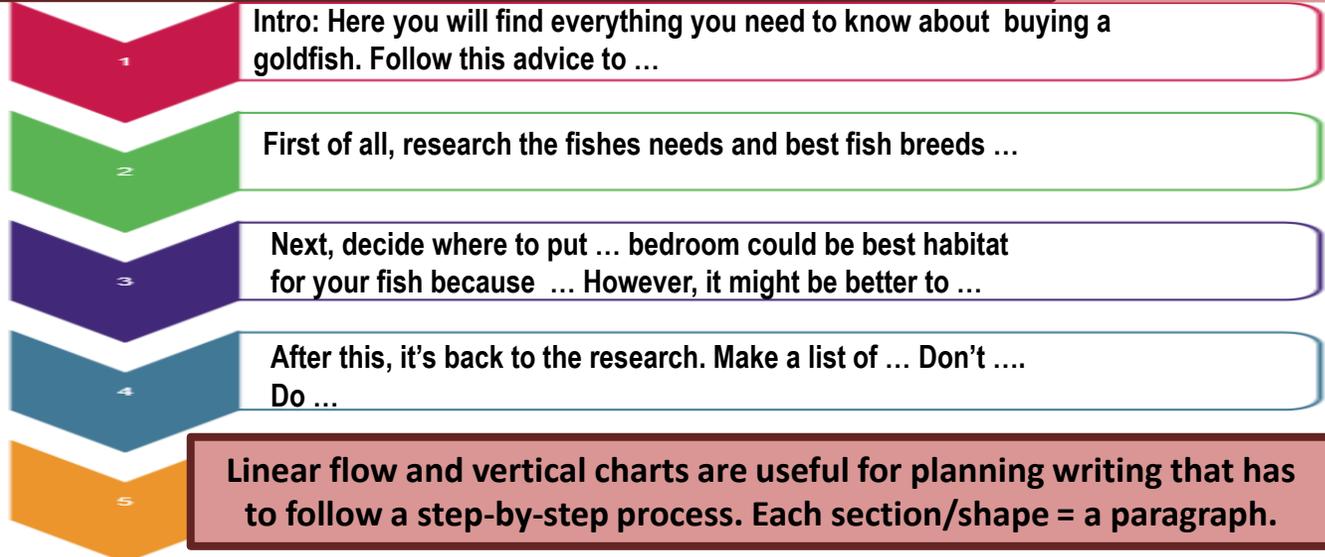


The Grid Plan is good for making sure you include lots of different methods, or to compare two/more things side-by-side. Each row/column = a paragraph.

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

**Fail to Plan
Plan to Fail!**

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



Writing Purposes

Key Language/Structural methods

Chocolate Model!



Most Often

Mis spelled
words

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

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

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

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

Explain: tell the reader how and why.

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

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

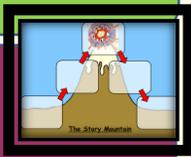
Describe: help the reader to picture it and imagine the experience.

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

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

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

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



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

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

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

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

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

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

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

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

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

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

Q3: 1 text only(text B) so do Q3 before Q2. Language focus = quote! [12 marks = 16 minutes]

The examiners are actually looking for comments on language **&/or structure** which really means **which persuasive techniques have they used and how do they work?** Learn terminology and definitions so comments are purposeful – avoid generalisations and never use techniques you don't understand.

“Judicious range...” = actually means short embedded quotations

Band 4 = explanations which suggest alternative interpretations

Q4: Comparison...always focus on CONTRAST [16 marks = 24 minutes]

Education...Patriarchy...Class...Poverty...equality – the 19thC text will probably be on one of these themes so a good general awareness of the 19thC will really enrich answers here.

Simply identify what aspect you are being asked to compare – highlight this in the question

What does the writer of extract A say about this? – pick out as many examples as you can find

Each example will also have used a persuasive technique – make sure you identify this

Link with an appropriate discourse marker:

‘whereas...similarly...on the other hand’

Q2: Summarise texts A & B – but also need to ‘infer’! [8 marks = 12 minutes]

Always start with the following sentence: **“There are similar things about _____ in the two extracts but they have a different emphasis.”** This will fit any Q and get you started.

Learn a range of discourse markers to highlight **CONTRAST** – this is the number 1/most important – in all good writing/extracts so it will be here: **Whereas...In contrast...on the other hand.**

Make good use of **‘this suggests that.../this implies that...’** = frames inference explicitly.

For top marks - try to find the less obvious differences or link up several under the same point

Highlight key words in the Q

Start with **“There are similar things about _____ in the two extracts but they have a different emphasis.”**

Quote from the older text first and explain using **“so”** or **“which suggests/implies”**

Connective: **while...whereas...in contrast...on the other hand...**

How is it different in the next extract?

Quote from the other extract...(as point 3)

Rank the differences and use the main one first then work down to the least important

Keep finding differences until you run out of time [12minutes]

Don't bother with a conclusion

YR 11 ENGLISH LANGUAGE PAPER 2 SECTION A - HINTS AND TIPS

PAPER 2 LANGUAGE - READING - 60 mins (25% GCSE) – Two Literary Non-fiction texts. 4 Qs.
REMEMBER YOU SHOULD HAVE ALREADY DONE Q5 - you are going to answer the questions in this order: 5,3,4,2,1. BEFORE YOU BEGIN
LOOK AT THE SUMMARY INFORMATION ABOUT BOTH TEXTS – THEY GIVE YOU CLUES.

QUESTION THREE
 How does the writer use **LANGUAGE** to..." in one source only

12 marks = 20 mins (max)
 One text
 AO2 – Language (not structure)

- Read and highlight key words in the question
- Read and highlight text
- Start mini essay with an **overview sentence**, then answer the question using **short quotes**, naming the **device** and stating specific **effects**.
- E.g. "Henry uses lots of emotive language ... QUOTE..... in his letter to attempt to influence his father to remove him and his brother from Cotherstone Academy."
- Analyse as many quotes as you can, analysing a technique used by the writer and discussing the multiple effects for the audience.
- Write **a lot about a little** - e.g. "The writer uses personification in this phrase, 'Death stood at my bedside,' to create an intense feeling of fear for the reader, suggesting the writer felt death was imminent; it was a threatening being, about to take his life."
- Track** through each text, space your quotes out throughout the whole text.

QUESTION FOUR
 Compare **DIFFERENCES** in **LANGUAGE** in how the two **writers** present/convey/convince/persuade... in Source A and B

16marks = 25mins (max)
 Two texts
 AO3 – compare language (not structure)

- Read and highlight key words in the question
- Start mini essay with an **overview sentence** stating the main **difference** in the language. E.g. The writer of Source A believes that education really is the job of parents and not schools, whereas the writer of Source B has sent both his boys off to a boarding school where he has little control and knows nothing about the conditions for his children, or the standard of education they are receiving.
- Then compare the differences in the **writers' viewpoints** using **short quotes** and stating **specific effects**. E.g. For example, the writer of Source A explains using expert opinion ... QUOTE.....to demonstrate that..., however, the writer of Source B uses statistics QUOTE.....to back up their argument. The effect on the audience is similar as both add weight to the arguments the writers are putting forward and convince their audience of their standpoint.

DO CALL THE WRITERS BY THEIR SURNAMES

- REFER TO BOTH WRITERS THROUGHOUT.
- YOU CAN REPEAT QUOTES & EFFECTS FROM EARLIER QUESTIONS.
- Go back and forth between the texts. Use **comparison words or phrases** = Likewise, Similarly, In the same way, Different to..., UnlikeB, In contrast.....,However, etc.

MAKE SURE YOU HAVE SOME HIGHLIGHTERS! USE A DIFFERENT COLOUR TO HIGHLIGHT THE

STRETCH YOURSELF
Paradox/oxymoron
Irony
Onomatopoeia
Euphemism
Pun
Fronted adverbials or conjunctions
Simple/compound/complex sentences
Relative or conditional clauses
Noun/verb phrases
Writing for purpose/audience/type of text
Anaphora/epistrophe
Tone/Register
Narrative perspective

PAPER 2 LANGUAGE - READING - 60 mins (25% GCSE) – Two Literary Non-fiction texts (. 4 Qs.

REMEMBER YOU SHOULD HAVE ALREADY DONE Q5 - you are going to answer the questions in this order: 5,3,4,2,1

<p>QUESTION TWO Write a SUMMARY of the DIFFERENCES between Source A and B <input type="checkbox"/> 8 marks = 10mins <input type="checkbox"/> Two texts <input type="checkbox"/> AO1 – summarise differences</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Read and highlight key words in the question <input type="checkbox"/> Start mini essay with an overview sentence stating main difference then your summary of differences using short quotes and stating specific effects. <input type="checkbox"/> E.g. “Firstly, the differences between Eddie and Henry are vast as Henry’s experience of school is much harsher than Eddie’s; we can see this when Henry complains about not being able to write freely as Mr. Smith, ‘would flog me if he knew it.’ This is contrast to...” <input type="checkbox"/> Track through each text; space your quotes out throughout the whole text.
<p>QUESTION ONE CHOOSE four true or false statements from a list of 8. <input type="checkbox"/> 4 marks = 5 mins (4 boxes shaded) <input type="checkbox"/> Named lines <input type="checkbox"/> AO1 – find & inference</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Only look at lines named in question to in order to find answers. <input type="checkbox"/> Only shade 4 boxes (1 box = 1 mark) - this is not a trick question – it is easy. <input type="checkbox"/> Follow the instruction on the paper if you shade the wrong box.

POSSIBLE LAYOUTS/TYPES OF TEXT/FORMATS

Letter	<ul style="list-style-type: none"> <input type="checkbox"/> the use of addresses & date <input type="checkbox"/> a formal mode of address e.g. Dear Sir/Madam or a named recipient <input type="checkbox"/> effectively/fluent sequenced paragraphs <input type="checkbox"/> an appropriate mode of signing off: Yours sincerely/faithfully. 	Speech (text only)	<ul style="list-style-type: none"> <input type="checkbox"/> a clear address to an audience <input type="checkbox"/> effective/fluent linked sections to indicate sequence <input type="checkbox"/> rhetorical indicators that an audience is being addressed <input type="checkbox"/> a clear sign off e.g. ‘Thank you for listening’.
Article	<ul style="list-style-type: none"> <input type="checkbox"/> Broadsheet = formal/Local or tabloid = informal <input type="checkbox"/> a clear/apt/original title <input type="checkbox"/> a strapline & subheadings <input type="checkbox"/> an introductory (overview) paragraph <input type="checkbox"/> effectively/fluent sequenced paragraphs. 	Essay	<ul style="list-style-type: none"> <input type="checkbox"/> an effective introduction and convincing conclusion <input type="checkbox"/> effectively/fluent linked paragraphs to sequence a range of ideas.
Leaflet (text only)	<ul style="list-style-type: none"> <input type="checkbox"/> a clear/apt/original title <input type="checkbox"/> organisational devices such as inventive subheadings or boxes <input type="checkbox"/> bullet points <input type="checkbox"/> effectively/fluent sequenced paragraphs. 		<p><i>STRETCH YOURSELF</i> - Take a bold standpoint: hook/tone/style. Also consider cohesive devices: adverbials/pronouns/reference chains/synonyms/rhetorical questions/discourse markers.</p>

THE BASICS

- Capital letters
- Full stops
- Question marks
- Commas
- Apostrophes
- Consistent tense
- Paragraphs
- Homophone spellings
- Connectives
- Semi-colons
- Colons
- Hyphens
- Parenthesis (...)
- Topic sentences
- Vary sentence starts/lengths
- Vary paragraph lengths

APE FOR REST

- ANECDOTE
- PERSONAL PRONOUNS
- EMOTIVE LANGUAGE
- FACTS
- OPINIONS
- RHETORICAL QUESTS
- REPETITION
- EXPERTS
- STATISTICS
- TRIPLETS

IF TIME AT THE END OF THE EXAM, ALWAYS CHECK YOUR Q5 RESPONSE

FIRST FOR

MAD FATHERS CROCH (NOT TRAFALGAR'S NMENONIC!)

- METAPHOR
- ALLITERATION
- DIRECT ADDRESS
- FACTS
- ANECDOTE
- TRIPLET
- HYPERBOLE
- EMOTIVE LANGUAGE
- RHETORICAL QUESTS
- S
- C
- R
- OPINIONS
- C
- H

WE RECOMMEND THE FOLLOWING ON YOUTUBE:

- MR BRUFF
- MR SALLES
- STACEY REAY
- MRS WHELAN

SUBSCRIBE!

BE AMBITIOUS WITH YOUR VOCABULARY!

DO Q5 FIRST!

THE EXAM

**45 minutes - 1 task - 40 marks
NO CHOICE OF TASK – EVERYONE DOES THE SAME ONE.**

Step one: read & highlight key words in question (including PURPOSE, AUDIENCE, LANGUAGE & FORM)

Step two: Ensure you engage with PURPOSE, AUDIENCE, LANGUAGE & FORM. Write yourself a note about these so you do not do the wrong thing!

Step three: Plan 6 -8 things you can include, then put them in order (Steps 1 to 3 = 10 mins)

Step four: Write it' (Step 4 = 30 mins)

- Should be lots of crossing out to show 'crafting'
- Should be 2 sides approx

An audience your age:

- References to modern culture.
- Frequent use of direct address.
- Use of humour and sarcasm.
- Affronted conjunctions (So...)

An older audience:

- Keep it formal. BUT remember they're not the Queen! (One is outraged my good sir)
- Avoid references to modern culture, humour and sarcasm.
- Avoid using contractions (do not instead of don't)

Q5: DO THIS QUESTION FIRST! [40 marks = 45 minutes]

Learn & use 15 techniques in **MAD FATHERS CROCH** or **APE FOR REST**.

Outline the issue – begin with an **ANECDOTE**

Argument – **Create an enemy** – find something to attack - **HYPERBOLE**

Counter argument [as many 'rounds' of this as you can but at least two]

Concluding argument = Long term/future consequences (Big Picture) + call to action – imperative verbs.

WRITING NON-FICTION

Content
<ul style="list-style-type: none"> <input type="checkbox"/> Register is convincing and compelling for audience <input type="checkbox"/> Assuredly matched to purpose <input type="checkbox"/> Extensive and ambitious vocabulary with sustained crafting of linguistic devices
Organisation
<ul style="list-style-type: none"> <input type="checkbox"/> Varied and inventive use of structural features <input type="checkbox"/> Writing is compelling, incorporating a range of convincing and complex ideas <input type="checkbox"/> Fluently linked paragraphs with seamlessly integrated discourse markers
Technical accuracy
<ul style="list-style-type: none"> <input type="checkbox"/> Wide range of punctuation is used with a high level of accuracy <input type="checkbox"/> Uses a full range of appropriate sentence forms for effect <input type="checkbox"/> Uses Standard English consistently and appropriately with secure control of complex grammatical structures <input type="checkbox"/> High level of accuracy in spelling, including ambitious vocabulary <input type="checkbox"/> Extensive and ambitious use of vocabulary



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



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



Stave 4: The Last of the Three Spirits

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

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

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

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

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

Stave 5: The End of It

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

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

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

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



THE CHARACTERS



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

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

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

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



Context key idea (AO3)

Why is this significant?

Philanthropy and Dickens' Sense of Social Justice



Although now in Britain we have what is known as the welfare state (which includes support for the neediest including the NHS, social housing, unemployment benefits and more), there is was little government support for the poorest in society during the Victorian era.

Many wealthy Victorians who were socially conscious (meaning they felt a responsibility to help those who could not help themselves) became heavily involved in philanthropy. They used their own money to give to charities and to set up their own charities to help those that needed help.

Charles Dickens was one such person and he used his own money to help others, as well as working with wealthy benefactors to make changes in society, too. Dickens was philanthropic advisor to Angela Burdett-Coutts (1814-1906), known as 'the richest heiress in all England'. Dickens used her wealth to give to social causes as well. In 1847 her money was used to create Urania Cottage for homeless women. Under his guidance she also supported the Ragged School Union, which was founded in 1844 to provide free education to poor children by Lord Shaftesbury.

Moreover, Dickens used his writing to act as a social commentator – bringing to the attentions of his middle and upper class readers the need for social upheaval. Some of his characters play a positive philanthropic role, such as Mr Brownlow in Oliver Twist, the Cheeryble brothers in Nicholas Nickleby, and Mr and Mrs Garland in The Old Curiosity Shop.

Victorian Deprivation



Workhouses existed well before the Victorian era, but the 1834 Poor Law Amendment Act meant it a legal requirement for all able-bodied people to work in workhouses to get their 'poor relief' (financial support). Before this time the poorest in society had to rely on charity and hand outs to survive. However, Victorians saw poverty as a kind of illness or disease in society that needed to be eradicated. Governments were keen to move the poorest indoors, away from everyone. However, those in charge of the country made workhouses places to be feared in order to prevent 'lazy' citizens thinking it was an easy option instead of going out to find work.

Workhouses meant the poorest would work for food and a place to sleep, but many people saw it as a form of slavery. Workhouses also took in orphans, abandoned children, the mentally ill, the disabled, unmarried mothers and the elderly. Despite their age or abilities, all were required to work long and demanding hours.

Whenever someone entered a workhouse they were stripped, bathed whilst being supervised and then provided with a uniform. This uniform separated them from the rest of society. If those from workhouses were out in the streets everyone else would instantly know they were in a workhouse. Often children were 'hired out' to wealthy business men and made to work in awful places such as mines. You were not allowed to try to contact your family and doing so could result in being punished. The standard of education provided was awful and would not help those within the workhouses get out of them. The food given to those in the workhouses was of a poor quality, simple and the same every day. Food was seen as a tool to keep you working, not as something to be enjoyed.

Year 11 Maths

Simplify

Simplify the given expression.



Simplify fully

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



Factorise

Insert brackets by taking out common factors.



Factorise fully

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



Expand

Remove brackets.



Expand and simplify

Remove brackets and then collect like terms.



Command Words in Maths questions

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

TECHNICAL VOCABULARY

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

Calculate

A calculator and some working will be needed.



Find

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



Work out

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



Explain

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



Describe

Write a sentence that gives the features of the situation.



Complete

Fill in missing values.

x	y
-1	-3
0	1
2	5

Give a reason

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

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

Express

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



Justify

Show all working and/or give a written explanation.



Solve

Find the solution of an equation or inequality.



Solve algebraically

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



Prove

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



Prove algebraically

Use algebra in the proof.



Draw

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



Draw a sketch of... Sketch

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



Change

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



Show

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



Websites to help you with understanding and revision

SparxMaths.com

CorbettMaths.com

Trafalgar Maths Site

Mathsgenie.co.uk

Maths Bot

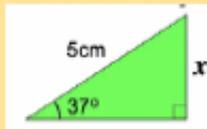


Trigonometry

$$S \frac{O}{H} C \frac{A}{H} T \frac{O}{A}$$

Example – finding a side:

$$\sin 37^\circ = \frac{x}{5}$$



$$x = 5 \times \sin 37^\circ$$

Example – finding an angle:

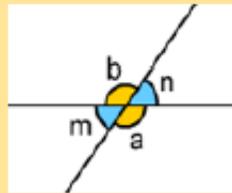
$$\tan y = \frac{3.2}{7.1}$$



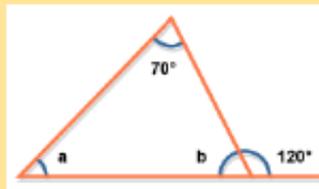
$$y = \tan^{-1} \left(\frac{3.2}{7.1} \right)$$

Sparx Maths: U605 U283, U545

Angle Facts



Vertically opposite angles are equal: $a=b$ and $m=n$

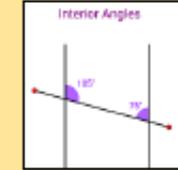
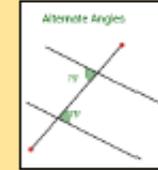
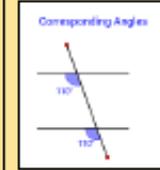


Angles in a triangle sum to 180° .

Angles on a straight line sum to 180° .
E.G: $b=60^\circ$ so $a = 50^\circ$

Sparx Maths: U730, U628

Angles in parallel lines



Corresponding angles are equal

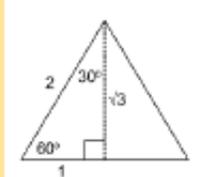
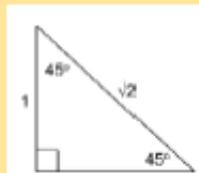
Alternate angles are equal

Co-interior angles are equal

Sparx Maths: U826

Exact Trig values

Angle (θ)	$\sin(\theta)$	$\cos(\theta)$	$\tan(\theta)$
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	undefined



Simple vector notation

$$\begin{pmatrix} a \\ b \end{pmatrix}$$

a : movement along the x-axis (left or right)
 b : movement along the y-axis (up or down)

$-a$: movement left

$-b$: movement down

Operations with vectors

$$\begin{pmatrix} 2 \\ 1 \end{pmatrix} + \begin{pmatrix} 7 \\ -2 \end{pmatrix} = \begin{pmatrix} 9 \\ 1 \end{pmatrix}$$

Sparx Maths: U632, U903

If $b = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$, then $3b = \begin{pmatrix} 12 \\ -6 \end{pmatrix}$

Volume & surface area

Volume = area of cross section x length

Surface area = area of all the faces of a 3D shape

Learn the cylinder

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

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

Sparx Maths: U915, U464

Types of triangles

- Right angled
- Isosceles
- Equilateral
- Scalene

Types of quadrilaterals

- Square
- Rectangle
- Parallelogram
- Rhombus
- Trapezium
- Kite

Sparx Maths: U121

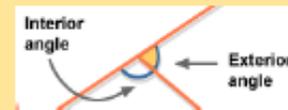
Area of key shapes

Triangle: $A = \frac{b \times h}{2}$ (h = perpendicular height)

Parallelogram: $A = b \times h$ (h = perpendicular height)

Trapezium: $A = \left(\frac{a+b}{2} \right) \times h$ (add together the parallel sides, divide the total by 2, and then multiply by the perpendicular height between the parallel sides)

Angles in regular polygons



n = number of sides

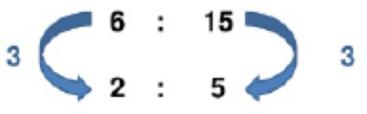
Interior angle + exterior angle = 180°

$$\text{Exterior angle} = \frac{360}{n}$$

$$n = \frac{360}{\text{Exterior angle}}$$

Sparx Maths: U427

<p>Estimate Round each value to one significant figure</p>
<p>Standard form $a \times 10^n$, where $1 \leq a < 10$</p>
<p>Reciprocal Reciprocal of 7 is $\frac{1}{7}$, reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$ etc</p>
<p>Sequences Fibonacci sequence: 1, 1, 2, 3, 5, 8, 13, 21 Geometric Sequence: each term is multiplied but he same constant to get the next number. E.g. 3, 12, 48, 191, (x by 4 each time)</p>
<p>Squares and Cubes Square numbers: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225 etc Cube numbers: 1, 8, 27, 64, 125, 216, 343, 512, etc</p>
<p>Sharing in a given Ratio A Add the ratio parts D Divide the amount by the total parts A and M Multiply the ratio by the value of one part e.g. share £420 in the ratio 2:5 $2 + 5 = 7$ $420 \div 7 = £60$ 2: 5 (x60) (x60) £120 : £300</p>

<p>Simplifying Ratio Divide both sides by the highest common factor</p>  <p>Sparx Maths: M885</p>
<p>Simplifying Ratio 1:n Divide both sides by the highest factor of the left hand side</p> <p>2m: 180cm 200cm: 180cm 2:1.8 1: 0.9</p> <p>Sparx Maths: M543</p>
<p>Fractions Add and Subtract – ensure the fractions have the same denominator before adding numerators</p> $\frac{4}{5} - \frac{1}{3} = \frac{12}{15} - \frac{5}{15} = \frac{7}{15}$ <p>Multiply – multiply numerators and denominators</p> $\frac{4}{5} \times \frac{1}{3} = \frac{4}{15}$ <p>Divide – take reciprocal of the second fraction and then multiply the new numerators and denominators</p> $\frac{4}{5} \div \frac{1}{3} = \frac{4}{5} \times \frac{3}{1} = \frac{12}{5} = 2\frac{2}{5}$

<p>Percentages Finding percentages of an amount 1% $\div 100$ 5% $\div 20$ 20% $\div 5$ 25% $\div 4$ 50% $\div 2$</p> <p>Sparx Maths: M437, U554</p> <p>Multipliers: To find the multiplier for a percentage, divide by 100 Use multipliers on a calculator paper e.g. 35% of 370 = 0.35×370</p> <p>Increasing and decreasing a given amount Calculator: <i>Original Amount x multiplier = new amount</i> Non-calculator: find the increase or decrease and add to the original amount</p> <p>Finding percentage increase or decrease (profit/loss) $\frac{\text{value of increase/decrease}}{\text{Original}} \times 100$</p> <p>Writing an amount as a percentage of the original $\frac{\text{Amount}}{\text{Original}} \times 100$</p> <p>Reverse Percentage – finding the original amount $\text{Original Amount} = \frac{\text{New Amount}}{\text{multiplier}}$</p> <p>Sparx Maths: U554, U439, U671, U773</p>

Growth & Decay / Compound interest

$$\text{original amount} \times \text{multiplier}^{\text{time}}$$

Where the multiplier is the percentage, increase or decrease from 100%, converted to a decimal.

e.g.

30% decrease is 70% = 0.7

30% increase is 130% = 1.3

Sparx Maths: U332

Dividing by decimals:

1. Write the calculation as a fraction
2. Form an equivalent fraction to makes integers (multiply by powers of 10)
3. Use short division (bus stop) to calculate

e.g. $460 \div 0.4 = \frac{460}{0.4} = \frac{4600}{4} = 1150$

Sparx Maths: U868

Conversions

10 millimetres = 1 centimetre 15 minutes = 0.25 hours

100 centimetres = 1 metre 30 minutes = 0.5 hours

1000 metres = 1 kilometre 45 minutes = 0.75 hours

1000cm³ = 1 litre

1000g = 1 kilogram

1000ml = 1 litre

1000kg = 1 tonne

Compound Units

Sparx Maths: U527, U910

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Area} = \frac{\text{Force}}{\text{Pressure}}$$

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Error Intervals

least possible value $\leq x <$ greatest possible value

e.g. A fence is 30 m long to the nearest 10 m.

$$25 \text{ m} \leq l < 35 \text{ m}$$

Truncation

Truncation is a method of approximating a decimal number by dropping all decimal places past a certain point without rounding.

e.g. Truncate 3.14159265 to 4 decimal places.

$$= 3.1415$$

Negative numbers

Adding and subtracting: (vertical number lines help)

$$-3 - 5 = -8$$

$$-3 + 5 = 2$$

$$-3 - -5 = -3 + 5 = 2$$

$$-3 + 5 = -3 - 5 = -8$$

$$-3 + -5 = -3 - 5 = -8$$

Multiplying and dividing:

Different signs – answer will be negative

$$+x - = -, -x + = -$$

Same signs – answer will be positive

$$-x - = +$$

Ordering fractions

Calc: use division to write each fraction as a decimal

Non-calc: write fractions with common denominators

Sparx Maths: U746

Order of operations

Sparx Maths: U976, U206

Bracket

Indices

Division and Multiplication

Addition and Subtraction

Rounding to significant figures

Start from the first **non-zero** number and round as normal, but ensure the place value is correct

e.g. 345,635 to 2SF = 350,000

0.0060821 to 3SF = 0.00608

Index Laws

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

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

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

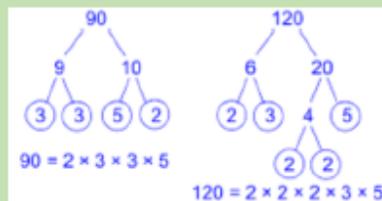
$$a^0 = 1$$

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

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

Sparx Maths: U662

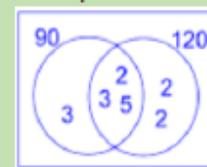
Prime Factorisation



HCF and LCM of 90 and 120 (Factor Tree & Venn Diagram)

HCF is the product of common factors

LCM is the product of common factors and remaining factors.



HCF: 2x3x5

LCM: 2³x3²x5

Sparx Maths: U739, U529, U250

Averages

Mode: most common piece of data

Mean: Sum of the data ÷ total frequency

Median: order the data and find the middle value

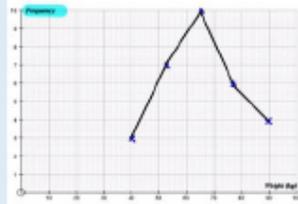
Range: Highest value – lowest value

Sparx Maths:
U260, U526

Frequency Polygons

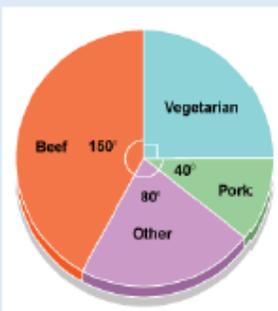
1. Plot frequency at the mid-point
2. Join with straight lines

Weight w (kg)	Frequency
$30 \leq w < 50$	3
$50 \leq w < 55$	7
$55 \leq w < 75$	10
$75 \leq w < 80$	6
$80 \leq w < 100$	4



Sparx Maths:
U840

Reading and Drawing Pie Charts



Find the fraction of the total

1000 people were surveyed

Beef: $\frac{150}{360} \times 1000$

Vegetarian: $\frac{90}{360} \times 1000$

Sparx Maths: U508, U172, U854

Hair colour	People
Blonde	8
Brown	12
Red	3
Grey	2
Black	6

Find the fraction of the full circle.

Size of Blonde sector: $\frac{8}{31} \times 360^\circ$

Averages from a frequency table

Mean: $\frac{\sum fw}{\sum f}$; where, w is the midpoint of the group.

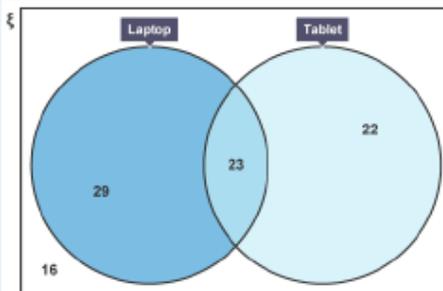
Median group: find which group the $\frac{n+1}{2}$ th value lies. Where, n is the total frequency.

E.G. in this table 51.5th value which lies in group $8 < w \leq 12$ (using the cumulative frequency)

Weight of box (w kg)	Frequency
$0 < w \leq 4$	11
$4 < w \leq 8$	16
$8 < w \leq 12$	29
$12 < w \leq 16$	26
$16 < w \leq 20$	20

Sparx Maths:
U569, U877

Venn Diagrams



Information given:
90 pupils were surveyed
52 said they owned a laptop.
45 said they owned a tablet.
23 said they owned both.

Expected outcomes

Expected outcome = probability x number of trials

E.g. A biased spinner is spun 800 times. The probabilities it lands on each colour is below. The probability of it landing on red is the same as the probability of it landing on green. How many times would you expect yellow to come up.

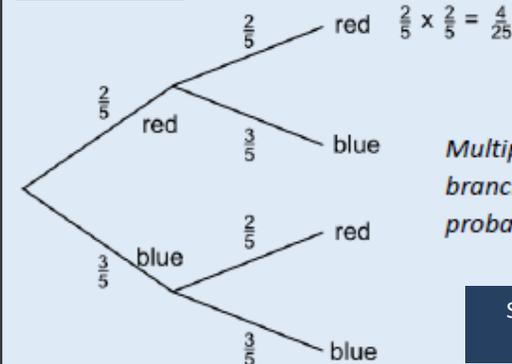
Result	Red	Green	Brown	Yellow
Probability		0.48	0.2	

$P(Y) = (1 - 0.48 - 0.2) \div 2 = 0.32 \div 2 = 0.16$

Expected yellow = $0.16 \times 800 = 128$

Sparx Maths: U166, U580

Tree diagrams



Multiply along the branches to find each probability.

Sparx Maths:
U558

1. Probability that a red counter is picked both times $P(RR) = \frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$

2. Probability that the counters are different colours = $P(RB) + P(BR) = \frac{2}{5} \times \frac{3}{5} + \frac{3}{5} \times \frac{2}{5} = \frac{12}{25}$

Probability Definitions

Total probability: adds to 1

Relative frequency: *frequency ÷ total trials*

Independent events: one event doesn't impact the other

Sparx Maths: U405, U510, U683

Notation

$ab = a \times b$
 $a^2 = a \times a$
 $(2a)^3 = 2a \times 2a \times 2a$
 $(a + b)^2 = (a + b)(a + b)$

Sparx Maths: U613

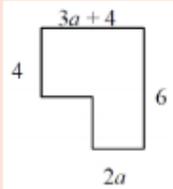
Definitions

Expression – no equal signs e.g. $2x + 3$, $2y$, $(3x - 2)^2$
 Equations – equal signs, can be solved, e.g. $y + 4 = 10$
 Identities – identical/equivalent to e.g. $2(y + 4) \equiv 2y + 8$
 Formulae – equal signs, more than one unknown e.g. $A = \frac{1}{2}bh$

Simplifying expressions by collecting like terms

Always circle the sign IN FRONT of the term to avoid errors.

$$3x - 7b - x + 9b \equiv 2x + 2b$$

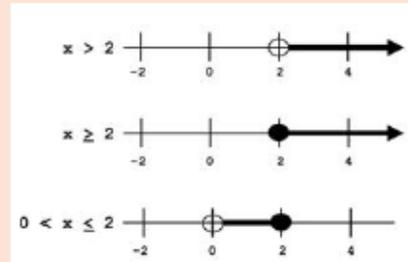


Typical Exam Q: Create an expression for the perimeter of the shape by adding and collecting like terms.
 If the perimeter is given as 20cm, for example, you can create an equation:
 $4 + 3a + 4 + 6 + 2a = 20$
 $5a + 14 = 20$

Simplifying expressions multiplication and division

$$2ma^2 \times 7ma = 14m^2a^3 \qquad \frac{18b^6}{3ab^2} = \frac{6b^4}{a}$$

Inequalities

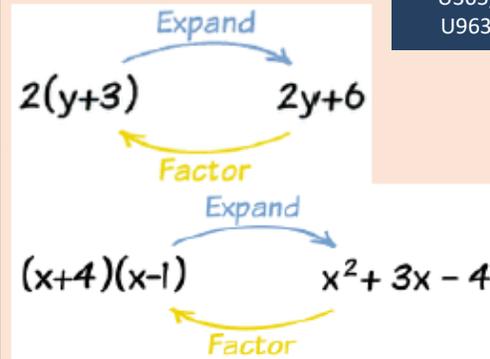


Open circle: $</ >$
 Closed circle: \leq / \geq

Sparx Maths: U509, U759, U738, U145

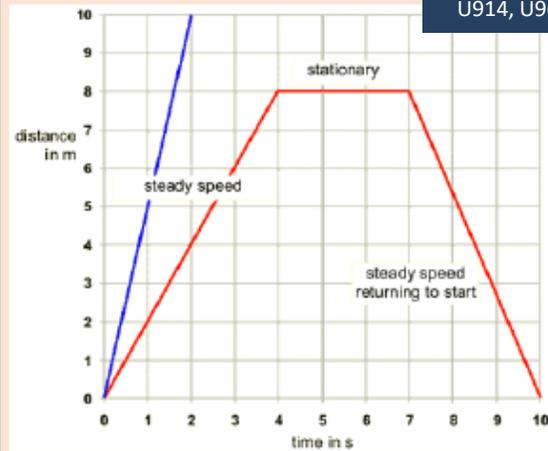
Factorising and expanding

Sparx Maths: U365, U178, U963, U858



Distance / Time Graphs

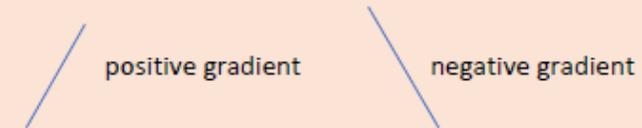
Sparx Maths: U914, U966



Straight line graphs

Sparx Maths: U741, U351, U669, U477, U848, U377, U898

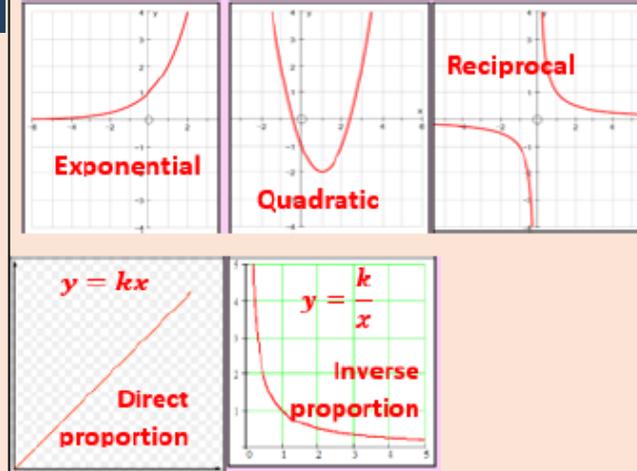
$y = mx + c$
 $m = \text{gradient}$
 $c = y - \text{intercept}$



$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{change in } y}{\text{change in } x}$$

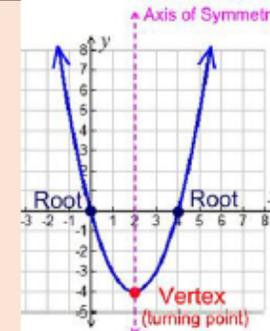
Parallel lines – have equal gradients

Graphs that need to be recognised



Turning point and roots of a quadratic equation

Sparx Maths: U667



Finding the nth term of a linear sequence

5, 7, 9, 11, 13,

1. Find the common difference: 2
2. This is the coefficient of n: 2n
3. Find the difference between the coefficient of n and the first term $5 - 2 = 3$
4. Add this to the amount of n

$$2n + 3$$

Sparx Maths: U213, U498

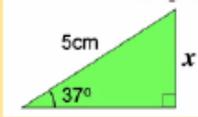
Trigonometry

$$S \frac{O}{H} C \frac{A}{H} T \frac{O}{A}$$

Example – finding a side:

$$\sin 37^\circ = \frac{x}{5}$$

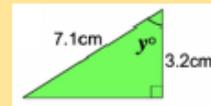
$$x = 5 \times \sin 37^\circ$$



Example – finding a side:

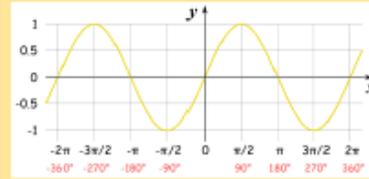
$$\tan y = \frac{3.2}{7.1}$$

$$y = \tan^{-1}\left(\frac{3.2}{7.1}\right)$$

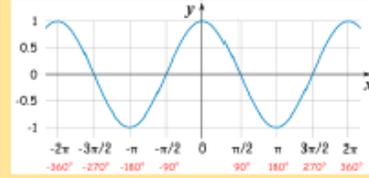


Sparx Maths:
U605, U283,
U545, U967,
U627

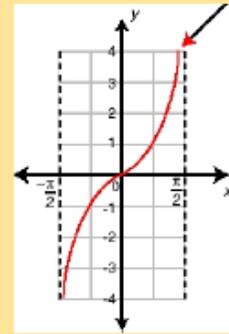
Sine Curve



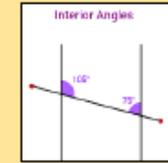
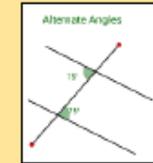
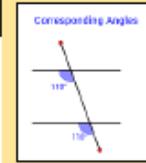
Cosine Curve



Tangent Curve



Angles in parallel lines



Corresponding angles are equal

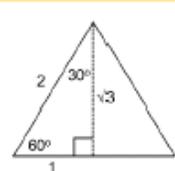
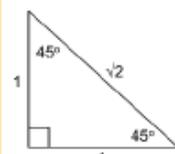
Alternate angles are equal

Co-interior angles are equal

Sparx Maths: U826

Exact Trig values

Angle (θ)	$\sin(\theta)$	$\cos(\theta)$	$\tan(\theta)$
0°	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{3}}$
45°	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	undefined



Sparx Maths: U450, U627

Simple vector notation

$$\begin{pmatrix} a \\ b \end{pmatrix}$$

a : movement along the x-axis (left or right)

b : movement along the y-axis (up or down)

$-a$: movement left

$-b$: movement down

Operations with vectors

$$\begin{pmatrix} 2 \\ 6 \end{pmatrix} + \begin{pmatrix} 7 \\ -3 \end{pmatrix} = \begin{pmatrix} 9 \\ 3 \end{pmatrix}$$

Sparx Maths: U632, U903, U564

If $b = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$, then $3b = \begin{pmatrix} 12 \\ -6 \end{pmatrix}$

Volume & surface area

Learn the cylinder

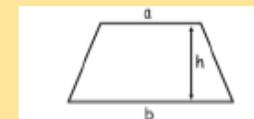
$$V = \pi r^2 h$$

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

Sparx Maths: U915, U464

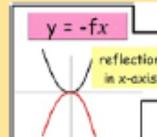
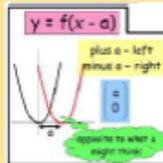
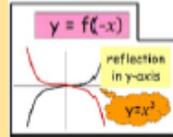
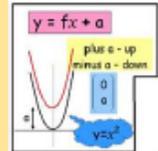
Area of a trapezium

$$A = \frac{1}{2}(a + b)h$$



Sparx Maths: U265

Transformation of a graph

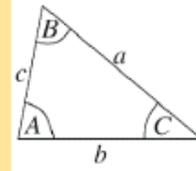


Sparx Maths: U450, U627

Sine rule

angles: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

sides: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$



Cosine rule

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

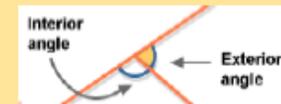
Area of a triangle

$$\frac{1}{2} ab \sin C$$

Sparx Maths:
U592, U952, U591

Angles in regular polygons

n = number of sides



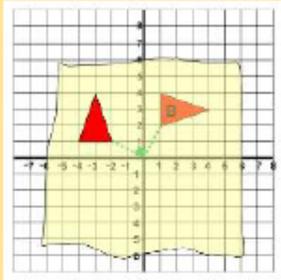
Interior angle + exterior angle = 180°

$$\text{Exterior angle} = \frac{360}{n}$$

$$n = \frac{360}{\text{Exterior angle}}$$

Sparx Maths: U427

Transformations – rotation – describing:



Always use tracing paper.
Describe:

1. It's a rotation
2. Size of rotation in degrees
3. Orientations: clockwise or anticlockwise
4. Centre of rotation given as a coordinate (x,y)

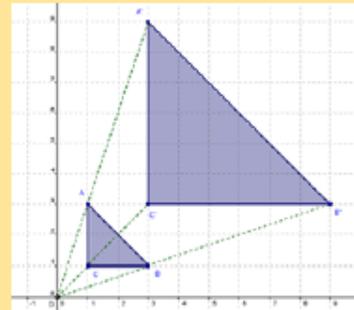
Transformation – translation

Vector $\begin{pmatrix} 6 \\ -4 \end{pmatrix}$ 6 right, 4 down

Sparx Maths:
U351, U993

Transformations – enlargement - describing:

1. It's an enlargement
2. The scale factor (if the image is smaller than the object the scale factor is fractional e.g. $\frac{1}{2}$)
3. The centre of enlargement given as a coordinate



Sparx Maths:
U519, U135

Congruent triangles

<p>SSS (Side – Side – Side)</p> <p>3 sides are respectively equal</p>	<p>SAS (Side – Angle – Side)</p> <p>2 sides and the included angle are respectively equal</p>
<p>ASA (Angle – Side – Angle)</p> <p>2 angles and the included side are respectively equal</p>	<p>RHS (Right angle – Hypotenuse – Side)</p> <p>Hypotenuse and one side are respectively equal</p>

Similar shapes

Same shape, different sides
The ratio of the lengths of corresponding sides are equal

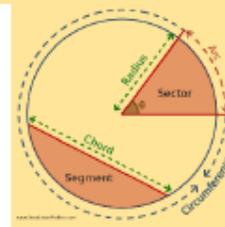
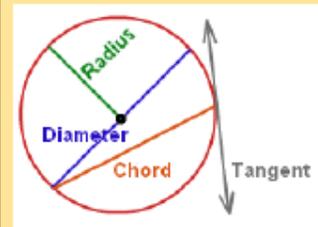
Length scale factor = x

Area scale factor = x^2

Volume scale factor = x^3

Sparx Maths: U578, U630, U110

Circles



Area = πr^2

Circumference = πd

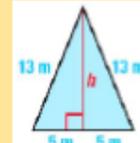
Sector Area = $\frac{\theta}{360} \pi r^2$

Arc length = $\frac{\theta}{360} \pi d$

Pythagoras' Theorem

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

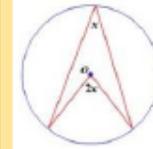
Only applies to right angled triangles.
Can be used to find the height of an isosceles triangle



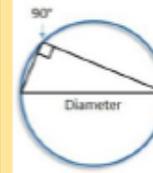
Can be used to find the length distance between two coordinates

Sparx Maths: U385, U541

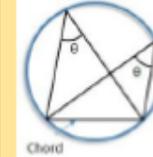
Circle Theorems



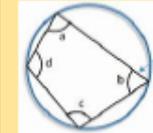
Angle at the centre is twice the angle at the circumference



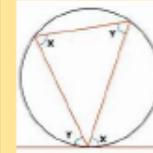
Angles in a semicircle are 90° .



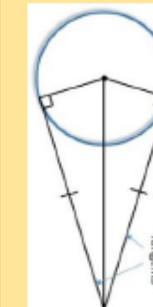
Angles in the same segment are equal.



Opposite angles of a cyclic quadrilateral add up to 180).



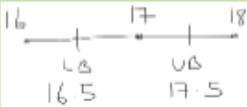
Alternate segment theorem.



Tangents from an external point are equal in length.

The tangent to a circle is perpendicular (90°) to the radius

Sparx Maths: U459, U251, U130, U489, U807

<p>Estimate Round each value to one significant figure</p> <p>Standard form $a \times 10^n$, where $1 \leq a < 10$</p> <p style="text-align: right;">Sparx Maths: U330, U534, U264</p>	<p>Recurring Decimals Form two equations where the digits following the decimal point are the same, and therefore can be cancelled</p>	<p>Percentages</p> <p>Finding percentages of an amount 1% ÷100 5% ÷20 20% ÷5 25% ÷4 50% ÷2</p>
<p>Reciprocal Reciprocal of 7 is $\frac{1}{7}$, reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$ etc</p> <p>Sequences Fibonacci sequence: 1, 1, 2, 3, 5, 8, 13, 21 Geometric Sequence: each term is multiplied but he same constant to get the next number. E.g. 3, 12, 48, 191, (x by 4 each time)</p>	<p>Upper and lower bounds Look at the value above and below for the same place value. LB and UB will be half way between these points</p> <p>e.g. 17 rounded to the nearest integer</p>  <p style="text-align: right;">Sparx Maths: U657, U587</p> <p>e.g. 24.6 rounded to one decimal place. LB = 24.55, UB = 24.65</p>	<p>Multipliers: To find the multiplier for a percentage, divide by 100 Use multipliers on a calculator paper e.g. 35% of 370 = 0.35 x 370</p>
<p>Simplifying Surds Find a factor that is a square number $\sqrt{96} = \sqrt{16 \times 6} = 4\sqrt{6}$</p> <p>Manipulating surds $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$ $\frac{\sqrt{a}}{\sqrt{b}} = \frac{\sqrt{a}}{\sqrt{b}}$</p> <p>Rationalising Surds Rationalise by removing any surds from the denominator E.G with surd. $\frac{2\sqrt{3}}{\sqrt{5}} = \frac{2\sqrt{3} \times \sqrt{5}}{\sqrt{5} \times \sqrt{5}} = \frac{2\sqrt{3 \times 5}}{\sqrt{5 \times 5}} = \frac{2\sqrt{15}}{\sqrt{25}} = \frac{2\sqrt{15}}{5}$ E.G with surd expressions multiply by top and bottom by the denominator with the opposite sign. $\frac{5}{3 + \sqrt{2}} = \frac{5 \times (3 - \sqrt{2})}{(3 + \sqrt{2}) \times (3 - \sqrt{2})} = \frac{5(3 - \sqrt{2})}{9 - \sqrt{4}} = \frac{5(3 - \sqrt{2})}{7}$</p> <p style="text-align: right;">Sparx Maths: U338, U299, U633</p>	<p>Fractions</p> <p>Add and Subtract – ensure the fractions have the same denominator before adding numerators $\frac{4}{5} - \frac{1}{3} = \frac{12}{15} - \frac{5}{15} = \frac{7}{15}$</p> <p>Multiply – multiply numerators and denominators $\frac{4}{5} \times \frac{1}{3} = \frac{4}{15}$</p> <p>Divide – take reciprocal of the second fraction and then multiply the new numerators and denominators $\frac{4}{5} \div \frac{1}{3} = \frac{4}{5} \times \frac{3}{1} = \frac{12}{5} = 2\frac{2}{5}$</p> <p style="text-align: right;">Sparx Maths: U736, U793, U475, U224, U544, U538</p>	<p>Increasing and decreasing a given amount Calculator: <i>Original Amount x multiplier = new amount</i></p> <p>Non-calculator: find the increase or decrease and add to the original amount</p> <p>Finding percentage increase or decrease (profit/loss) $\frac{\text{value of increase/decrease}}{\text{Original}} \times 100$</p> <p>Writing an amount as a percentage of the original $\frac{\text{Amount}}{\text{Original}} \times 100$</p> <p>Reverse Percentage – finding the original amount $\text{Original Amount} = \frac{\text{New Amount}}{\text{multiplier}}$</p> <p style="text-align: right;">Sparx Maths: U554, U773, U349, U671, U286, U278</p>

Growth & Decay / Compound interest

$$\text{original amount} \times \text{multiplier}^{\text{time}}$$

Where the multiplier is the percentage, increase or decrease from 100%, converted to a decimal.

e.g.

30% decrease is 70% = 0.7

30% increase is 130% = 1.3

Sparx Maths: U332

Dividing by decimals:

1. Write the calculation as a fraction
2. Form an equivalent fraction to makes integers (multiply by powers of 10)
3. Use short division (bus stop) to calculate

$$\text{e.g. } 460 \div 0.4 = \frac{460}{0.4} = \frac{4600}{4} = 1150$$

Sparx Maths: U868, U293

Conversions

10 millimetres = 1 centimetre	15 minutes = 0.25 hours
100 centimetres = 1 metre	30 minutes = 0.5 hours
1000 metres = 1 kilometre	45 minutes = 0.75 hours
1000cm ³ = 1 litre	1000g = 1 kilogram
1000ml = 1 litre	1000kg = 1 tonne

Compound Units (rearrange as necessary)

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Area} = \frac{\text{Force}}{\text{Pressure}}$$

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Sparx Maths: U151, U910

Error Intervals

least possible value $\leq x <$ greatest possible value

e.g. A fence is 30 m long to the nearest 10 m.
 $25 \text{ m} \leq l < 35 \text{ m}$

Truncation

Truncation is a method of approximating a decimal number by dropping all decimal places past a certain point **without** rounding.

e.g. Truncate 3.14159265 to 4 decimal places.
 = 3.1415

Negative numbers

Adding and subtracting: (vertical number lines help)

- 3 - 5 = -8
- 3 + 5 = 2
- 3 - -5 = -3 + 5 = 2
- 3 - +5 = -3 - 5 = -8
- 3 + -5 = -3 - 5 = -8

Multiplying and dividing:

- Different signs – answer will be negative
- + x - = -, - x + = -
- Same signs – answer will be positive
- x - = +

Product rule

If there are *m* ways to do one thing and *n* ways to do another, then there are *m* x *n* ways to do **both**

Sparx Maths: U639

Order of operations

- Bracket
- Indices
- Division and Multiplication
- Addition and Subtraction

Sparx Maths: U976, U206

Rounding to significant figures

Start from the first **non-zero** number and round as normal, but ensure the place value is correct
 e.g. 345,635 to 2SF = 350,000
 0.0060821 to 3SF = 0.00608

Index Laws

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

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

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

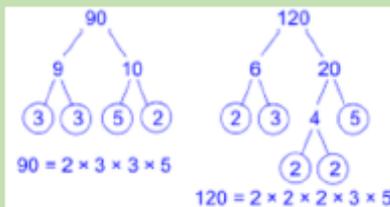
$$a^0 = 1$$

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

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

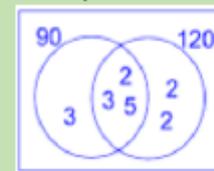
Sparx Maths: U662

Prime Factorisation



HCF and LCM of 90 and 120 (Factor Tree & Venn Diagram)

HCF is the product of common factors
 LCM is the product of common factors and remaining factors.



HCF: 2x3x5
 LCM: 2³x3²x5

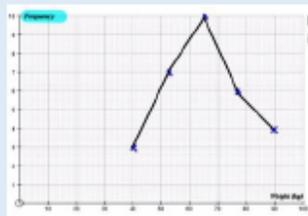
Sparx Maths: U739, U529, U250

Frequency Polygons

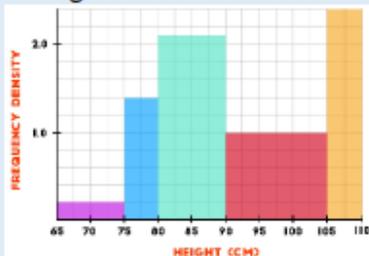
Sparx Maths: U840

- Plot frequency at the mid-point
- Join with straight lines

Weight w (kg)	Frequency
$30 \leq w < 50$	3
$50 \leq w < 55$	7
$55 \leq w < 75$	10
$75 \leq w < 80$	6
$80 \leq w < 100$	4



Histograms

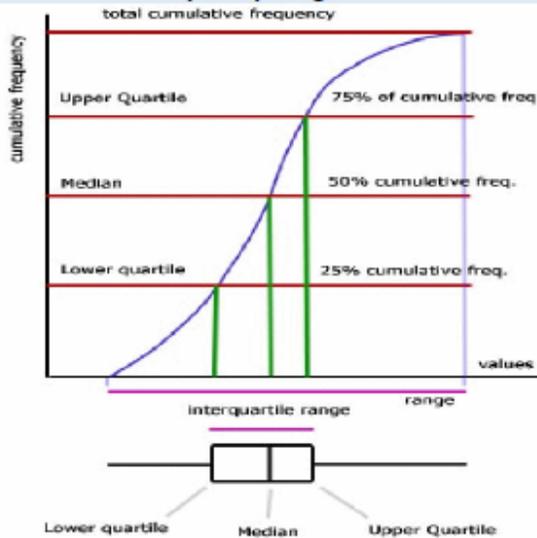


FD = Frequency density

$$FD = \frac{\text{Frequency}}{\text{Class Width}}$$

Sparx Maths: U983

Cumulative Frequency Diagrams and Box Plots



Averages from a frequency table

Mean: $\frac{\sum fw}{\sum f}$; where, w is the midpoint of the group.

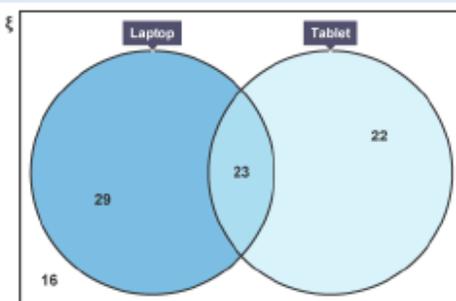
Median group: find which group the $\frac{n+1}{2}$ th value lies. Where, n is the total frequency.

E.G. in this table 51.5th value which lies in group $8 < w \leq 12$ (using the cumulative frequency)

Weight of box (w kg)	Frequency
$0 < w \leq 4$	11
$4 < w \leq 8$	16
$8 < w \leq 12$	29
$12 < w \leq 16$	26
$16 < w \leq 20$	20

Sparx Maths: U877

Venn Diagrams



Information given:
 90 pupils were surveyed
 52 said they owned a laptop.
 45 said they owned a tablet.
 23 said they owned both.

Sparx Maths: U476, U748

Notation

- A – all elements in A
- A' – all elements not in A
- B – all elements in B
- B' – all elements not in B
- A U B – all the elements in A or B or both
- A ∩ B – all the elements in both A and B

Expected outcomes

Relative frequency: $\text{frequency} \div \text{total trials}$

Expected outcome = probability x number of trials

E.g. A biased spinner is spun 800 times. The probabilities is lands on each colour is below. The probability of it landing on red is the same as the probability of it landing on green. How many times would you expect yellow to come up.

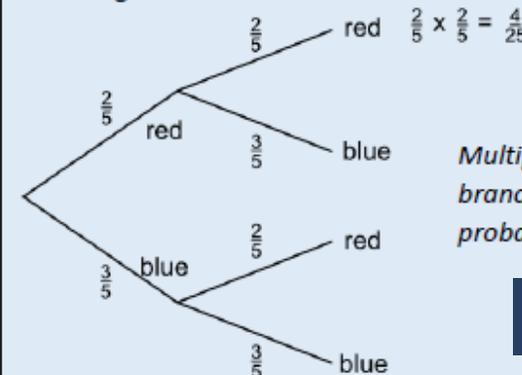
Result	Red	Green	Brown	Yellow
Probability		0.48	0.2	

$$P(Y) = (1 - 0.48 - 0.2) \div 2 = 0.32 \div 2 = 0.16$$

Expected yellow = $0.16 \times 800 = 128$

Sparx Maths: U166,U580

Tree diagrams



Multiply along the branches to find each probability.

Sparx Maths: U558,U729

- Probability that a red counter is picked both times

$$P(RR) = \frac{2}{5} \times \frac{2}{5} = \frac{4}{25}$$

- Probability that the counters are different colours

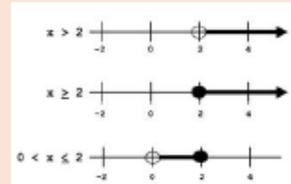
$$\text{colours} = P(RB) + P(BR) = \frac{2}{5} \times \frac{3}{5} + \frac{3}{5} \times \frac{2}{5} = \frac{12}{25}$$

Quadratic Formula

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

Sparx Maths: U665

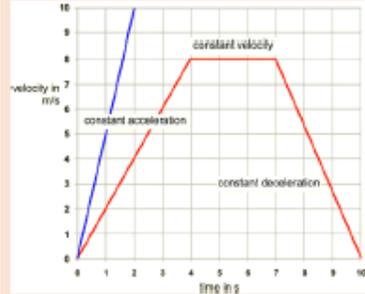
Linear Inequalities



Open circle: $</>$

Closed circle: \leq/\geq

Velocity / Time Graphs



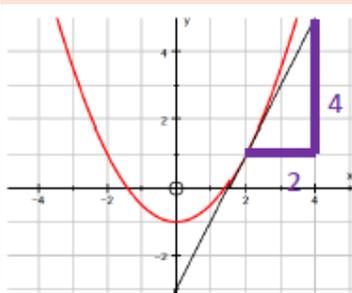
Gradient = acceleration
Area = distance travelled

Sparx Maths: U562

Iteration – showing a root lies between 2 points:

If there is a change in sign for y for two particular values of x then we can say there is a root between these values of x and we can say that the equation $f(x) = 0$ will have a solution between these two values of x .

Gradients of curves



Gradient of a curve at a point = gradient of the tangent at the point

Sparx Maths: U800

Algebraic proof – toolkit

Even numbers: $2n, 2n+2, 2n+4, \dots$
 Odd numbers: $2n+1, 2n+3, 2n+5, \dots$
 Sum: add
 Product: multiply
 Difference: subtract
 Show it's a multiple: factorise
 Show it's even: show it's a multiple of 2
 Show it's odd: show it's a multiple of 2, plus 1

Completing the square

Sparx Maths: U397

Quadratic expression factorised by completing the square:

$$(x + a)^2 + b$$

Turning point of graph occurs at $(-a, b)$

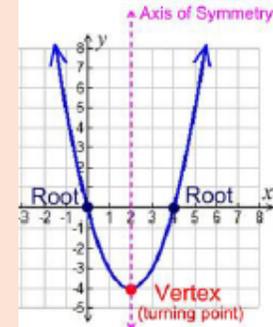
Solve quadratic inequalities

e.g solve $x^2 + 5x - 24 \geq 0$

- Factorise: $(x + 8)(x - 3) \geq 0$
- Solve: $x = -8, x = 3$
- Sketch the graph
- Values that satisfy the inequality $x \leq -8, x \geq 3$

Sparx Maths: U133

Turning point and roots of a quadratic equation



Sparx Maths: U667

Straight line graphs

$$y = mx + c$$

$m = \text{gradient}$

Sparx Maths: U741, U315, U669

$$c = y - \text{intercept}$$



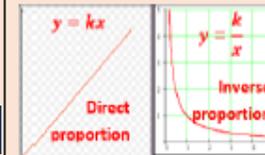
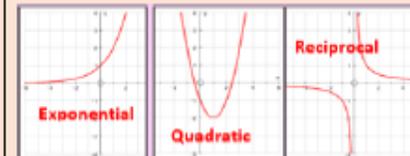
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{change in } y}{\text{change in } x}$$

Parallel lines – have equal gradients

Perpendicular lines – If L_1 and L_2 are perpendicular then

$$m_2 = -\frac{1}{m_1}$$

Graphs that need to be recognised:



Sparx Maths: U980, U593, U229

Equation of a circle centre $(0, 0)$

$$x^2 + y^2 = r^2$$

Functions

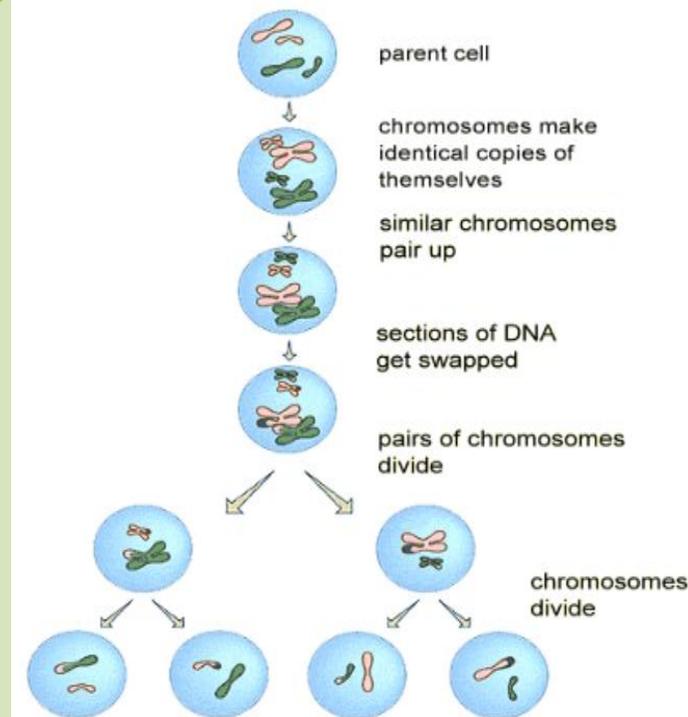
$f(4)$: Substitute 4 into the function

$f(g(x))$: Substitute $g(x)$ into $f(x)$ i.e. replace all values of x in $f(x)$ with the entire function $g(x)$

e.g. $f(x) = 2x + 3, g(x) = x - 3, fg(x) = 2(x-3) + 3$

KS4 Biology: B13 Reproduction

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



Meiosis

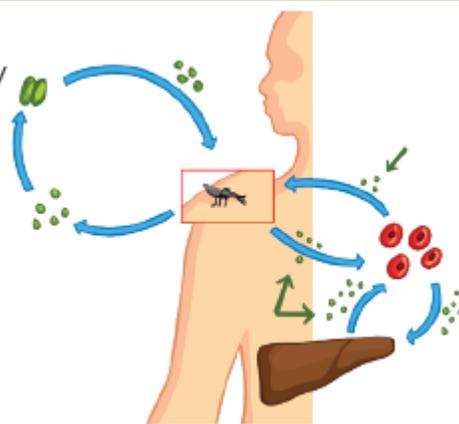
1. Copies of genetic information are made.

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

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

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

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



Twinkl

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



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

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



Advantages of sexual reproduction

Produces variation in offspring.

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

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

Advantages of asexual reproduction

Only one parent needed.

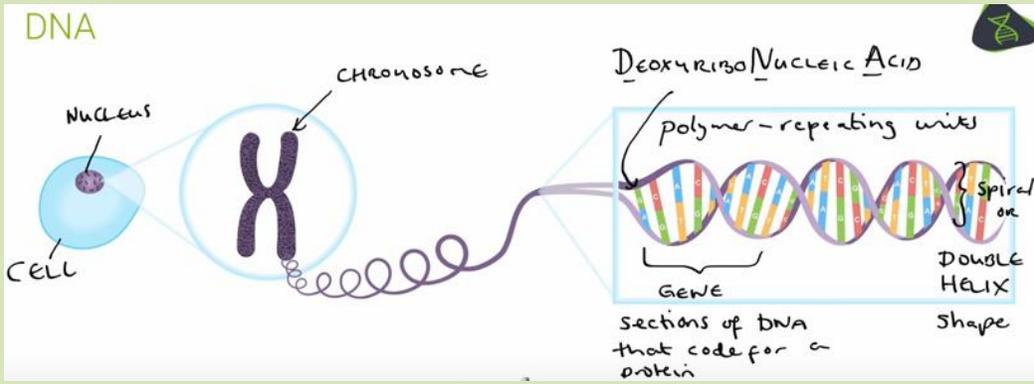
More time and energy efficient as do not need to find a mate.

Many identical offspring can be produced when conditions are favourable.

Faster than sexual reproduction.

KS4 Biology: B13 Reproduction

DNA

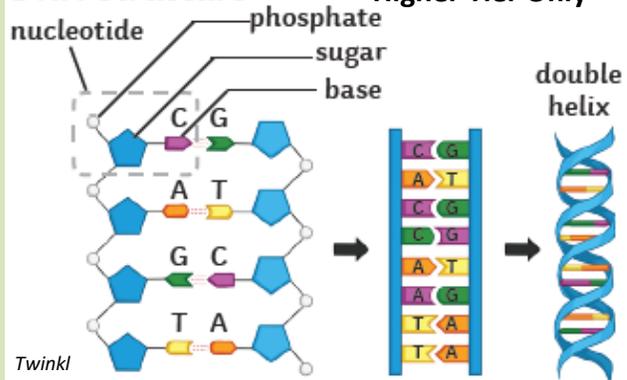


Key word	Definition
DNA	The molecule of inheritance. A polymer made up of two strands forming a double helix. DNA is contained in structures called chromosomes .
Gene	A small section of DNA on a chromosome . Each gene codes for a particular sequence of amino acids to make a specific protein .
Chromosome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

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

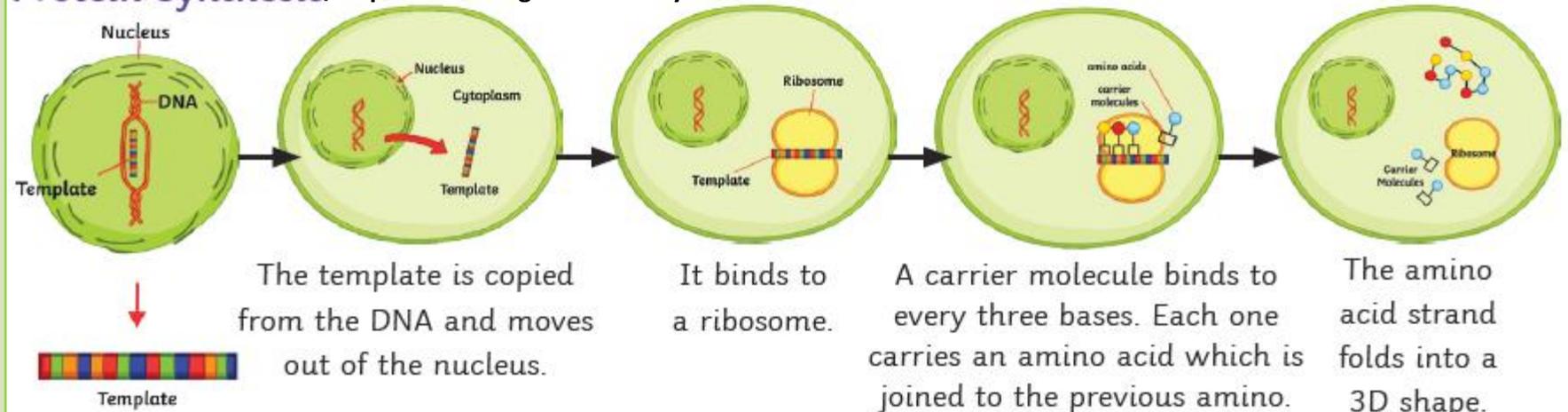
- The genes linked to different types of disease
- Understanding the treatment of inherited disorders
- Use in tracing human migration patterns from the past

DNA Structure Higher Tier Only



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

Protein Synthesis/ Expression Higher Tier Only



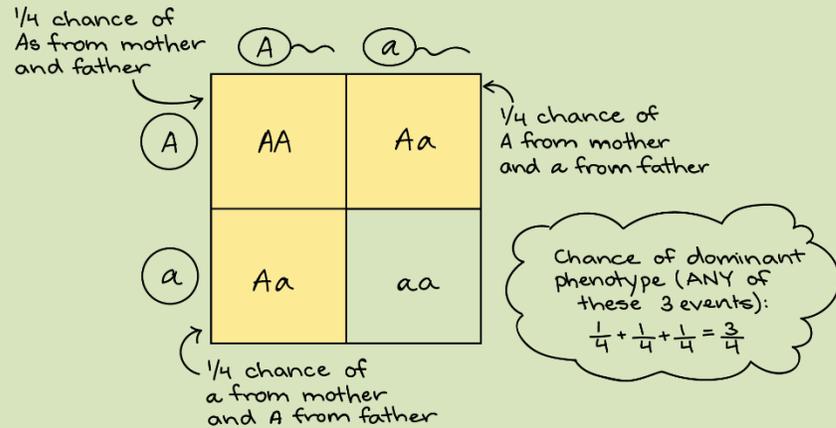
Twinkl

KS4 Biology: B13 Reproduction

Higher Tier Only

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

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



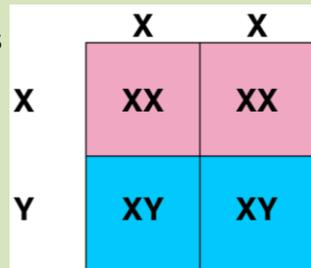
You must also write the **phenotypes** in each box

Sex determination: Male or female?

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

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

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



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

Inherited disorders

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

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

PROS:

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

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

CONS:

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

Screening is expensive.

Difficult emotional/religious choices to terminate.

KS4 Biology: B14 Variation and evolution

Key word	Definition
Phenotype	The physical appearance/biochemistry of an individual for a particular characteristic e.g. eye colour - brown eyes
Gene	A small section of DNA on a chromosome . Each gene codes for a particular sequence of amino acids to make a specific protein .
Genome	The entire genetic material of that organism.
Species	Organisms that have similar characteristics that can breed together and produce fertile offspring.
Mutation	A change in the genetic material of an organism.
Variation	Differences in the characteristics of individuals in a population.
Evolution	A change in the inherited characteristics of a population over time through a process of natural selection .
Theory of evolution by natural selection	States that all species of living things have evolved from simple life forms that first developed three billion years ago . Developed by Charles Darwin.
Selective breeding	The process where humans breed plants and animals for particular genetic characteristics from a mixed population. They are bred together. From the offspring those with desired characteristics are bred together. This is done over many generations until all offspring have desired characteristics.

Variation in a population may be due to differences in:

- The **genes** they have inherited e.g. eye colour
- **Environmental** conditions e.g. scars from accidents
- A combination of **genes and environment** e.g. skin colour

There is usually extensive genetic variation within a population species. Variation arises from **mutations**: most **mutations** have no effect on the **phenotype**; some influence the **phenotype**; very few change the **phenotype**. Mutations occur continuously. If a **mutation changes the phenotype and the phenotype is suited to an environment change it can change the population of a species rapidly**.

Theory of evolution by natural selection:

- Variation in the population due to mutation.
- Those individuals best suited to the environment are more likely to **survive, reproduce and pass on their genes**.

Selective breeding

- Has been done for thousands of years to breed food crops and domesticated animals.
- Choose characteristics for:
 - Disease resistance in food crops
 - Animals that produce more meat or milk
 - Domestic dogs with a gentle nature
 - Large or unusual flowers

- Selective breeding can lead to 'inbreeding' where some breeds are particularly prone to disease or inherited defects e.g. brain swelling in pugs



Genetic engineering

Genes 'cut out' from chromosomes of other organisms and transferred to cells of other organisms.

Benefits:

- Bacterial cells have been genetically engineered to produce useful substances eg human insulin to treat diabetes.
- Plant crops have been genetically engineered to be resistant to diseases or to produce bigger better fruits (**GM crops**).
- Modern medical research is exploring the possibility of genetic modification to overcome some inherited disorders.

Potential risks:

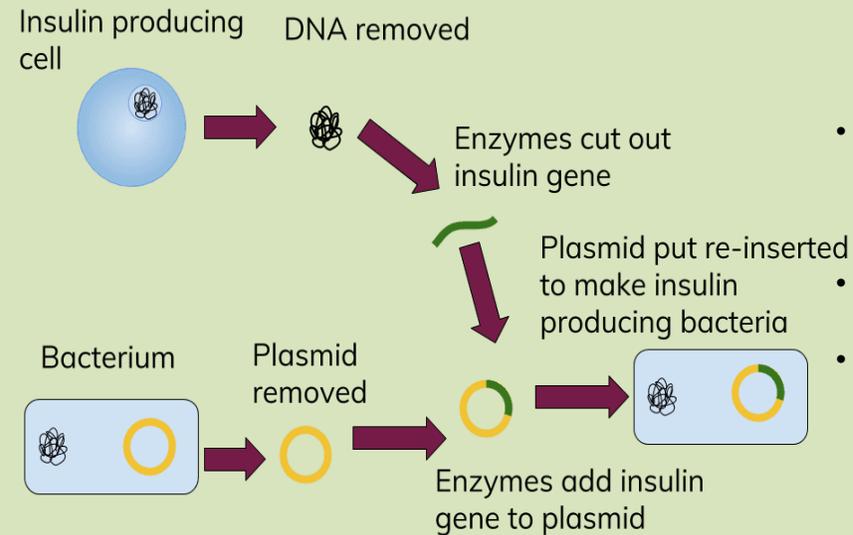
- **GM crops**, some concerns about the effect on populations of wild flowers and insects.
- Some people feel the effects of eating **GM crops** on human health have not been fully explored.

Cloning plants

Tissue culture: Used for preserving rare plant species or commercially in plant nurseries.

Cuttings: an older, but simple, method used by gardeners to produce many identical new plants from a parent plant.

Plant hormones can be used in both of these processes (see B11 KO)

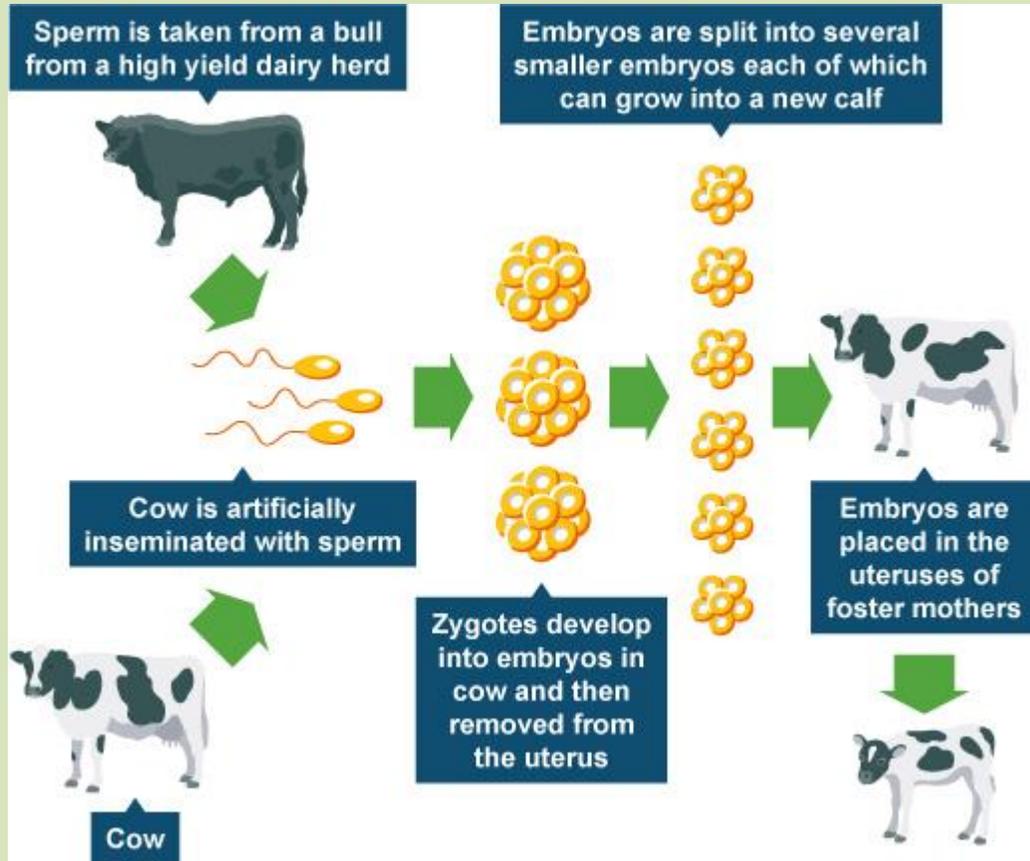


Higher Tier Only

- Enzymes are used to isolate the required gene; this gene is inserted into a vector, usually a bacterial plasmid or a virus.
- The vector is used to insert the gene into the required cells.
- Genes are transferred to the cells of animals, plants or microorganisms at **an early stage of development** so that they develop the desired characteristics.

Key word	Definition
Genetic engineering	Modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic.
GM crops	Genetically modified crops that have generally increased yield as they can be resistant to insect attack or to herbicides.
Yield	How much product that is made usually in terms of being sold for profit.
Tissue culture	Using small groups of cells from a plant to grow identical new plants
Clone	An individual that has been produced asexually (see B13 KO) and is genetically identical to the parent.
Embryo cloning	Splitting apart cells from a developing animal embryo before they become specialised, then transplanting the identical embryos into host mothers (surrogates).
Adult cell cloning	Using adult cell nuclei and donor egg cells with the nucleus removed to generate embryos ready to implant into a host mother.

Embryo cloning

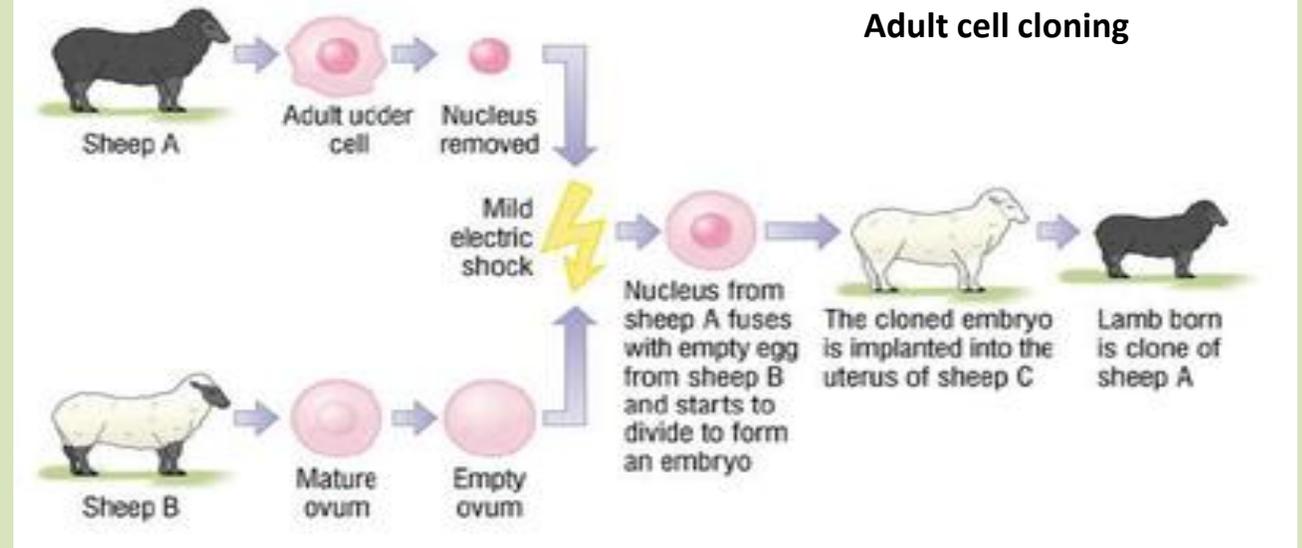


Offspring are clones of each other, not the parents.

Cloning cattle embryos is expensive and skilled work but it is worth it because a top quality cow may only produce 8-10 calves naturally in her life. Using embryo cloning the same cow can produce the embryos for 30 or more calves in a single year.

High quality embryos can be transported around the world to breed high milk and meat production into local populations.

Adult cell cloning



- The nucleus is removed from an unfertilised egg cell.
- The nucleus from an adult body cell, such as a skin cell, is inserted into the egg cell.
- An electric shock stimulates the egg cell to divide to form an embryo.
- These embryo cells contain the same genetic information as the adult skin cell.
- When the embryo has developed into a ball of cells, it is inserted into the uterus of an adult female to continue its development.

PROS: possibly clone genetically modified animals with beneficial characteristics.

- Could save animals from extinction.

CONS: Fears that some people may want to clone themselves.

- Cloning reduces variety in the population so the population is less able to survive changes in the environment in the future.

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

<https://www.youtube.com/watch?v=99nEQd2k6k4&safe=active>

<https://www.youtube.com/watch?v=gu9T91GJXDo&safe=active>

<https://www.youtube.com/watch?v=QekStThHD2M&safe=active>

KS4 Biology: B15 Genetics and evolution

Separate Science Only

Key word	Definition
Species	A group of organisms which can breed to produce fertile offspring.
Inheritance	Passing characteristics from one generation to another.
Genes	'Units' of inheritance – parts of a chromosome that code for a protein.
Fossil	The 'remains' of organisms from millions of years ago, which are found in rocks.
Extinction	When there are no remaining individuals of a species still alive.
Mutation	Change in DNA.
Antibiotic Resistance	Bacteria that have evolved and mutated so they are no longer killed by antibiotics.
Classification	Placing organisms in groups based on structure, characteristics, and biochemistry.

Extinction: When there are no remaining individuals of a species still alive.

Biological factors for extinction: New predators; New diseases; New competition.

Environmental factors for extinction: Climate change e.g. ice age

Large scale extinction: Colossal volcanic eruption; collision of giant asteroids with Earth – fires, dust clouds, tsunamis, earthquakes.



The idea behind the theory of evolution through the process of natural selection is that all species of living things have evolved from simple life forms over a period of time.

The accepted theory of evolution explains that it happens by natural selection. Natural selection is a process where organisms that are better adapted to an environment will survive and have more offspring. This means their genes are passed on to the future generations.

Evidence for evolution

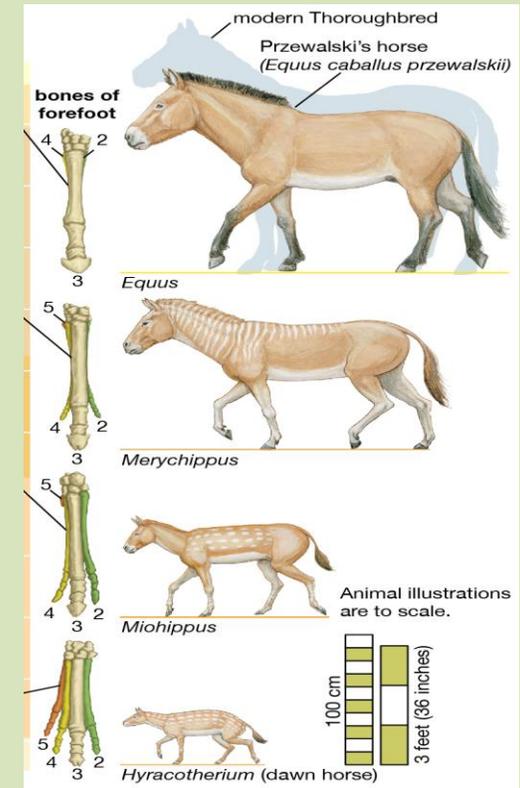
1. Characteristics passed on in genes.
2. Fossil record.
3. Evolution of antibiotic resistance in bacteria.

Fossils could be:

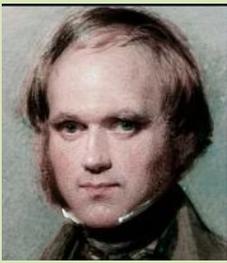
- The actual remains of an organism that has not decayed.
- **Mineralised** forms of the harder parts of an organism, such as bone.
- **Traces** of organisms such as footprints or burrows.

Many early life forms were soft-bodied so have left few traces behind as they have decayed.

We can learn from the fossil record how much or little organisms have changed over time e.g. evolution of the modern horse.



Encyclopaedia Britannica



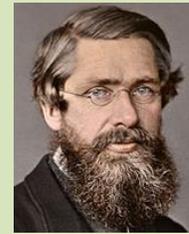
Charles Darwin: **theory of evolution due to natural selection.**

- Variation in a population due to mutation.
- Those with characteristics best suited to the environment are more likely to survive, reproduce and pass on their genes.

Darwin published his ideas in 1859 but they weren't accepted straight away:

- Challenged the idea that God made all organisms on Earth.
- Not enough evidence.
- The mechanism of inheritance was not known until 50 years after Darwin published his theory.

Lamarck gave a different theory – changes occurred to an organism during its lifetime which can then be inherited. This theory is incorrect.



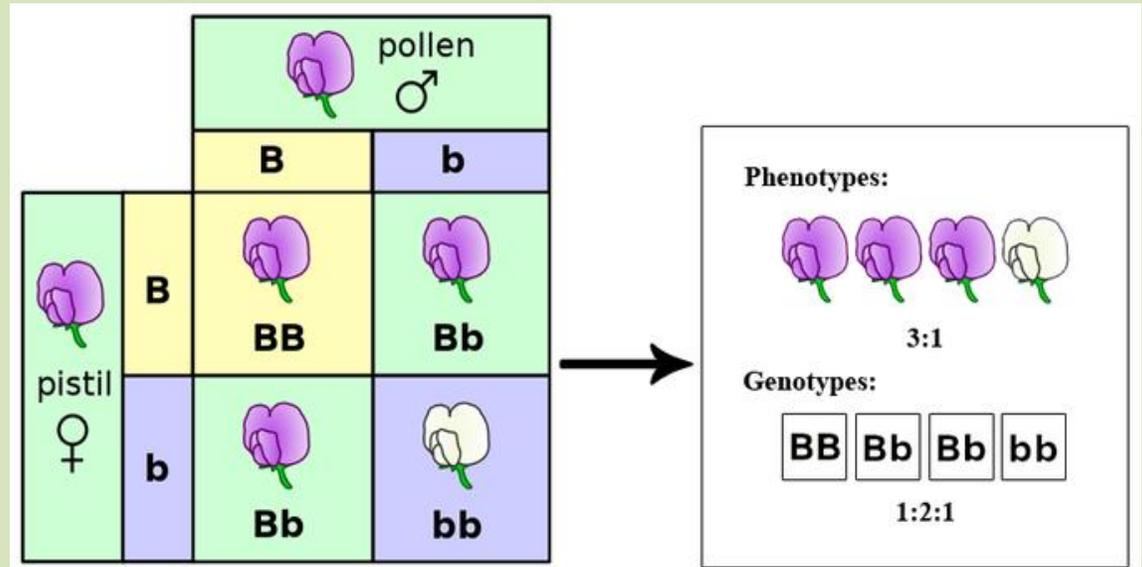
Alfred Wallace also developed the theory of natural selection and worked with Darwin in 1858, but Darwin published first.

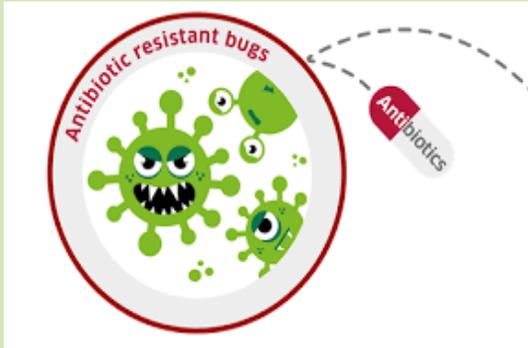
Wallace went on to collect evidence for evolution around the world, he worked on **speciation**:

- Two populations of a species become separated e.g. mountain, river etc.
- There is variation in the populations due to mutation.
- Those with characteristics best suited to the environment are more likely to survive, reproduce and pass on their genes.
- If the new environments are different the populations may change enough to become new **species** – can no longer breed to make fertile offspring.

1850s Gregor Mendel was breeding pea plants. He observed that the inheritance of each characteristic is determined by 'units' in regular ratio patterns we now call these genes and understand there are dominant and recessive alleles.

Finally in 1953 Watson, Crick and Franklin discovered the structure of DNA so Mendel, Darwin and Wallace finally had a mechanism!





THIS IS JUST THE EVOLUTION ANSWER AGAIN!!!

Variation in the population of bacteria due to mutation. Some mutations may lead to antibiotic resistance so they are not killed.

They survive, reproduce and pass on the antibiotic resistance. The resistance strain will spread as people are not immune to it and there is no treatment.

MRSA is resistant to antibiotics.

To reduce the rate of development of antibiotic resistance strains:

- Doctors should not prescribe antibiotics for non-serious or viral infections.
- Patients should complete the course of antibiotics so all bacteria are killed and none survive to mutate.
- The restrict the use of antibiotics in agriculture.

It's expensive and slow to produce now antibiotics.

Classification

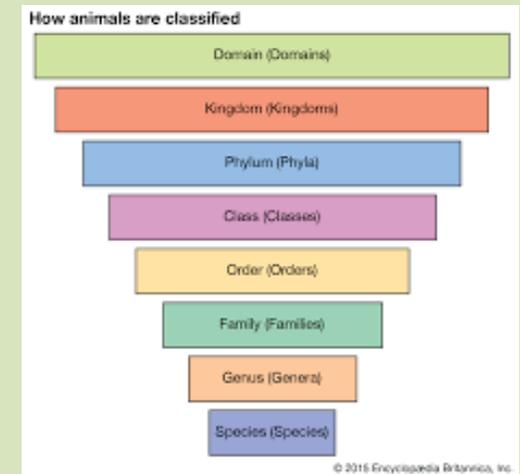
Linnaeus classified living things into:

Kingdom, phylum, class, order, family, genus and species.

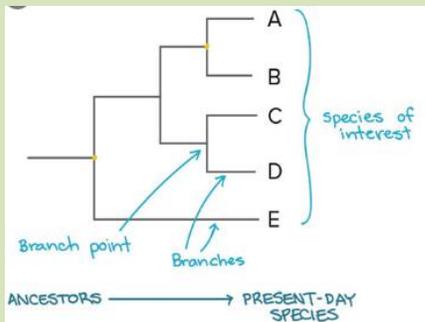
King Philip came over for grilled steak

Organisms are named by the binomial system of *Genus and species* e.g. *Felis domesticus* (house cat).

Carl Woese used new evidence from biochemistry and microscopy to develop the 'three domain system'



DOMAIN	Bacteria	Arachea	Eukaryote			
KINGDOM	Eubacteria	Archaeobacteria	Protista	Fungi	Plant	Animal



Evolutionary trees:

Evolutionary trees are used to represent the relationships between organisms. Branches show places where speciation has occurred, and a new species has evolved.

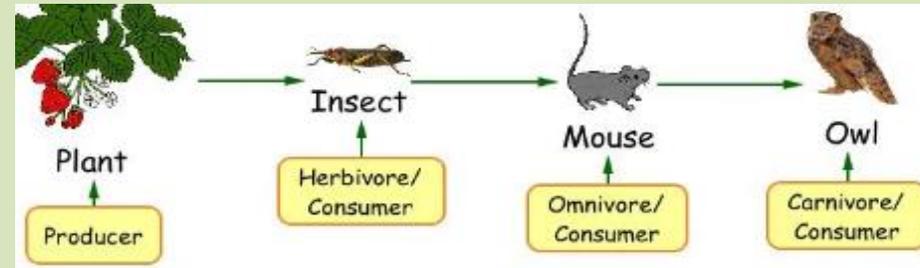
Each branch point is **speciation of a population**.

If a branch doesn't make it to the present day, the organism is extinct.

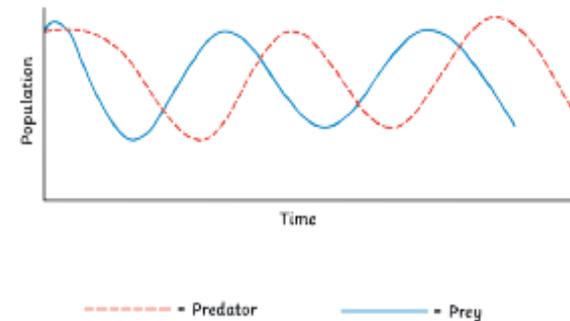
KS4 Biology: B17 Organising an Ecosystem

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

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



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



The decay cycle

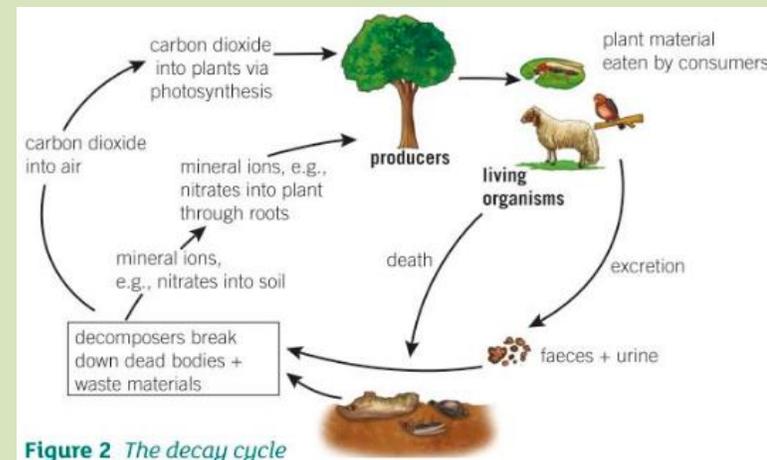
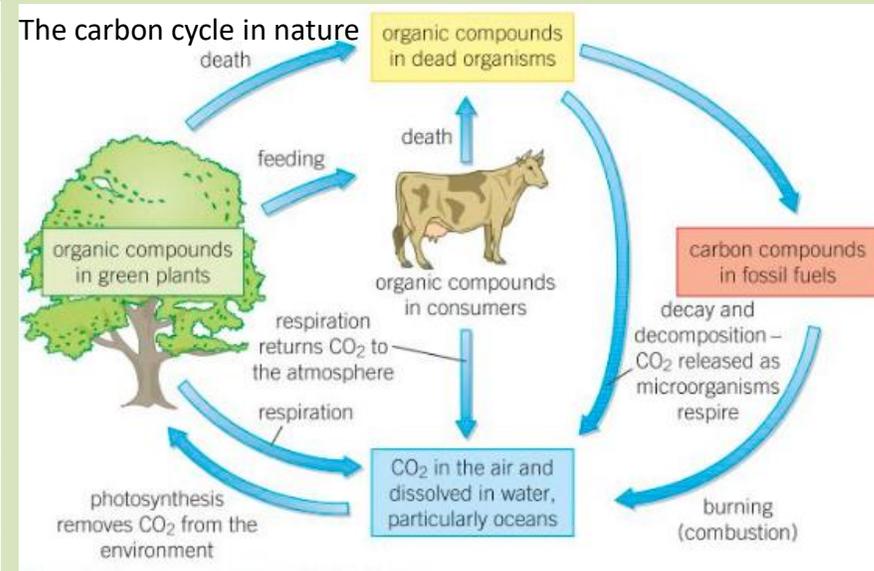


Figure 2 The decay cycle

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



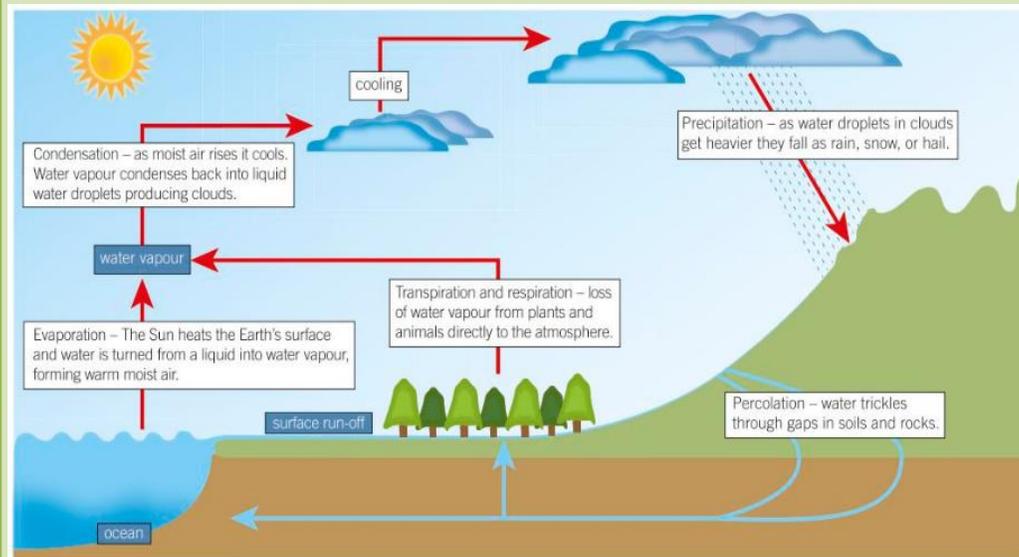
Separate science - Biology only Rates of decomposition

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

REQUIRED PRACTICAL

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

The water cycle



Further resources

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

KS4 Biology: B18 Biodiversity and Ecosystems

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

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

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

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

Human Population Growth

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

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

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

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

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

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

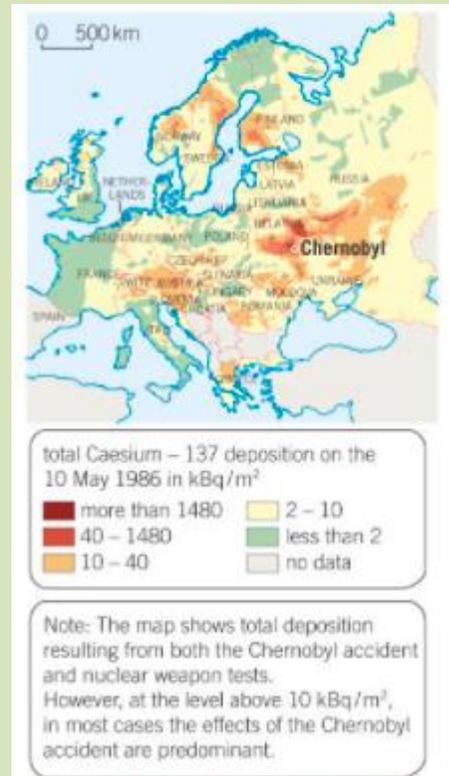
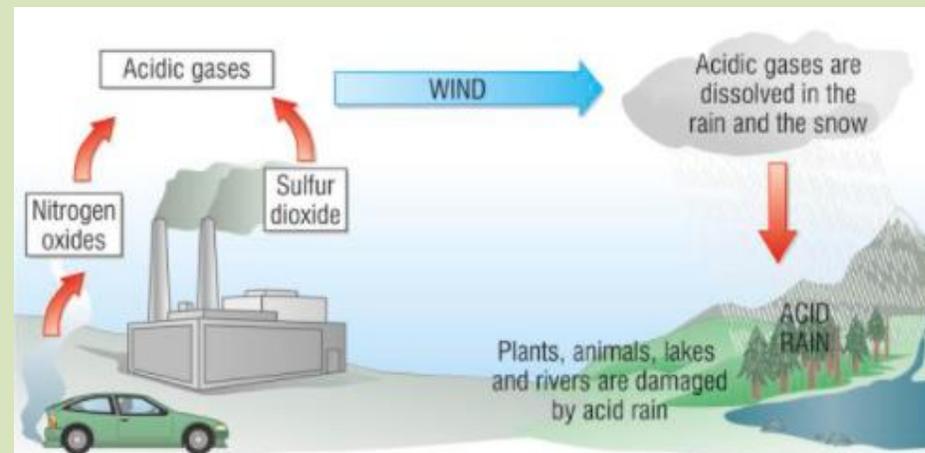


Figure 1 The accident at Chernobyl nuclear power plant polluted the land a long way away – including areas of the UK



Air Pollution

A major source is burning fossil fuels:

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

Deforestation

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

Main reasons:

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

It increases the concentration of carbon dioxide in the atmosphere in two ways:

1. Burning the trees
2. Dead vegetation decomposes and the microorganisms use up oxygen and release carbon dioxide as they respire
3. Reduces the rate at which carbon dioxide is removed from the atmosphere

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

Peat Bog Destruction

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

Acts as a massive carbon store.

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

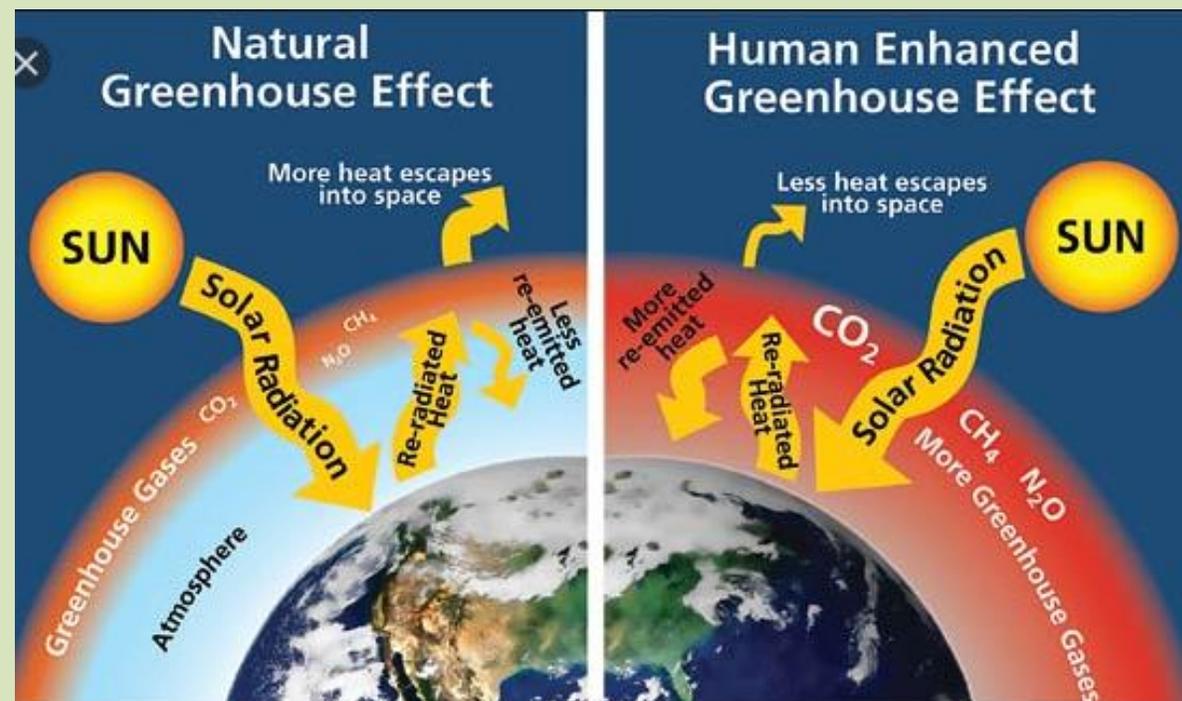
Greenhouse effect is a natural process where some of the Sun's radiation is trapped within the insulating layer of **carbon dioxide** in the atmosphere. Most of the radiation from the Sun is absorbed by the Earth, the rest is reflected into the atmosphere and re-emitted in all directions.

Humans are increasing carbon dioxide and methane which trap more heat around the Earth.

Leads to melting ice caps, rising sea levels, flooding, changes to climate, changes in migration patterns, changes in species distribution, reduction in biodiversity.

Maintaining Ecosystems and Biodiversity

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



Higher Tier Only

Impact of environmental change

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

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

Trophic levels

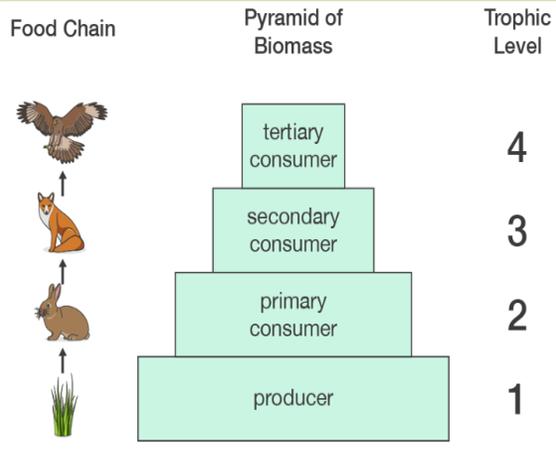
- **Level 1: Plants** and **algae** make their own food (by photosynthesis) and are called **producers**.
- **Level 2: Herbivores** eat plants/algae and are called **primary consumers**.
- **Level 3: Carnivores** that eat herbivores and are called **secondary consumers**.
- **Level 4: Carnivores** that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

Pyramid of biomass:

Symmetrical

Label each trophic level

Producer at the bottom



TRANSFER OF BIOMASS

Producers transfer about 1% of the incident energy from light for photosynthesis.

Only ~10% of the biomass from each level is transferred due to:

Not all the ingested material is absorbed – some lost in **faeces**.

Some absorbed material lost as **carbon dioxide** and **water in respiration** and **water and urea in urine**.

Large amounts of glucose are used in **respiration** to **move** or **keep warm**.

FOOD PRODUCTION

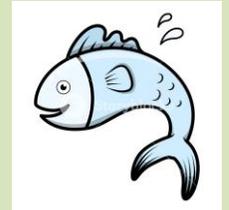
Biological factors affecting food security:

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



Farming techniques (battery farms)

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



Sustainable fisheries

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

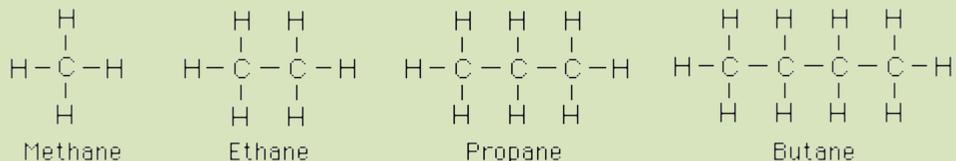
Biotechnology

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

KS4 Science – C9 Crude Oil and Fuels

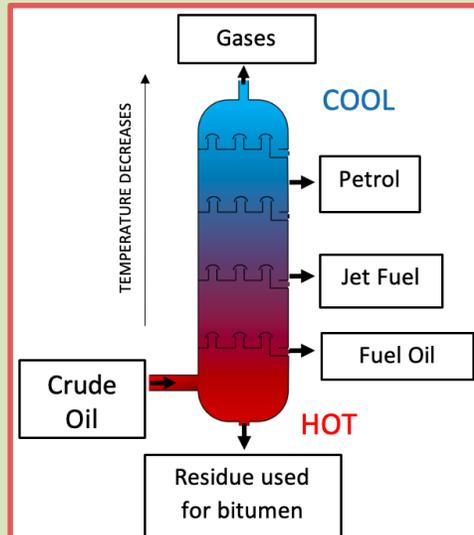
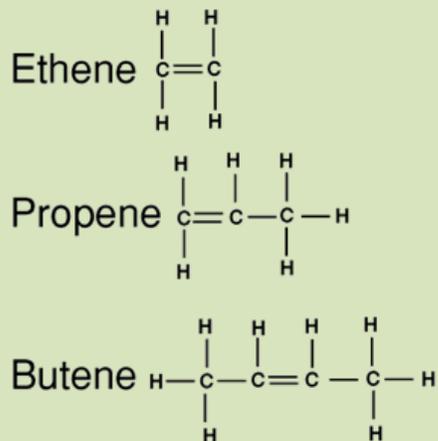
Crude oil is a mixture of hydrocarbon fractions with different boiling points.

The first 4 alkanes look like this:



You need to learn their names..

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



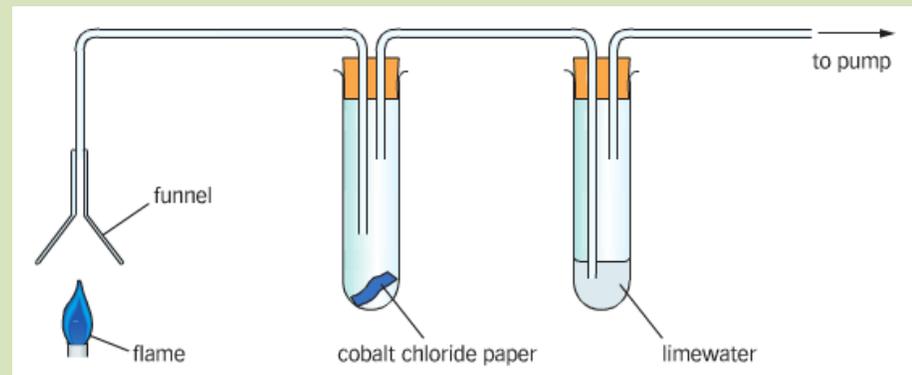
The fractions are separated using the process of FRACTIONAL DISTILLATION. Each fraction has a different boiling point. The crude oil is HEATED until all the fractions are vaporised. Then each fraction CONDENSES at its boiling point. It is cooler at the top of the column.

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

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

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

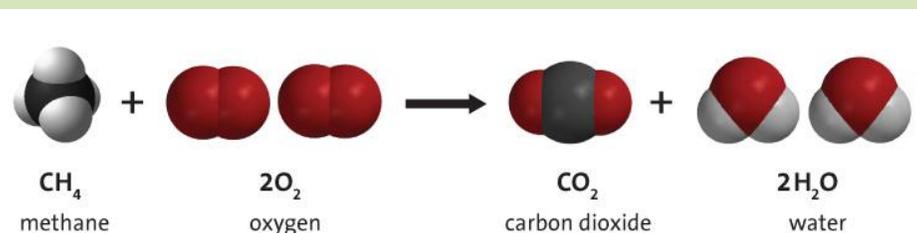
You can test for the products of combustion using the apparatus below:



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

Complete Combustion

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



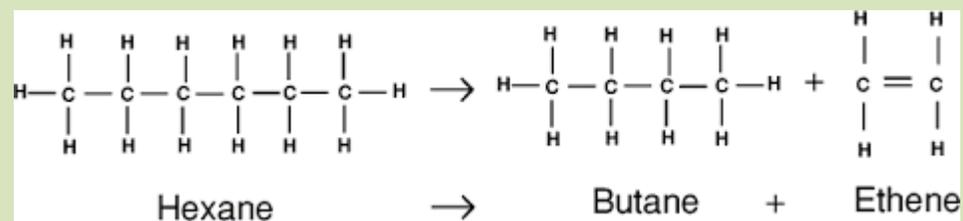
Cracking

This is the process used to break large hydrocarbon molecules into smaller, more useful ones. Thermal decomposition is used in an oil refinery to split the large molecules into smaller ones. A heavy fraction is heated and vaporised. It is then either:

- 1 – Passed over a hot catalyst OR
- 2 – mixed with steam and heated to a very high temperature

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

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



Incomplete Combustion

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



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



Other Useful Links:

<https://www.youtube.com/watch?v=CX21YVggEBc>
<https://www.bbc.co.uk/bitesize/guides/zshw6f/test>
<https://www.bbc.co.uk/bitesize/guides/zyc6fr/revision/1>

KS4 Chemistry: C10 Chemical analysis

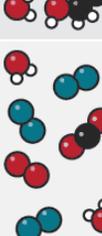
Pure substances

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

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

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

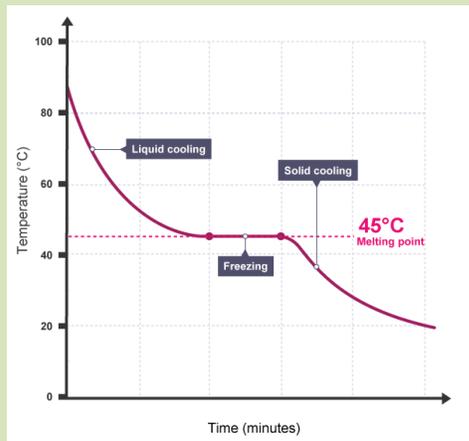
Examples of pure and impure substances:

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

Distinguishing between pure substances and mixtures;

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

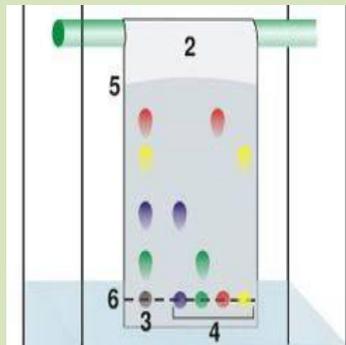
The horizontal part of the graph shows that the salol has a sharp melting point, so it is pure.



Paper chromatography

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

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



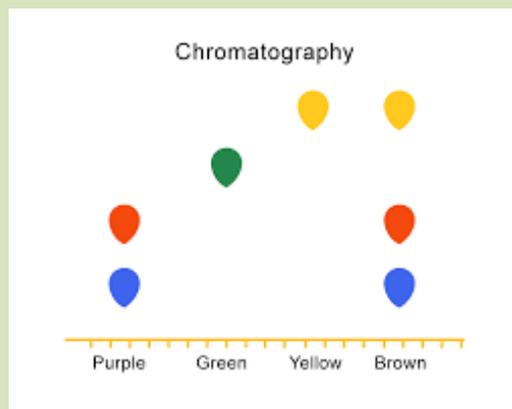
Keyword	Definition
Pure substance	Consists of only one element or one compound
Mixture	Consists of two or more different substances, not chemically joined together
Formulation	Is a mixture which has been designed as a useful product, e.g. medicines, fuels and foods
Soluble	A substance able to dissolve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

Interpreting a chromatogram

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

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

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



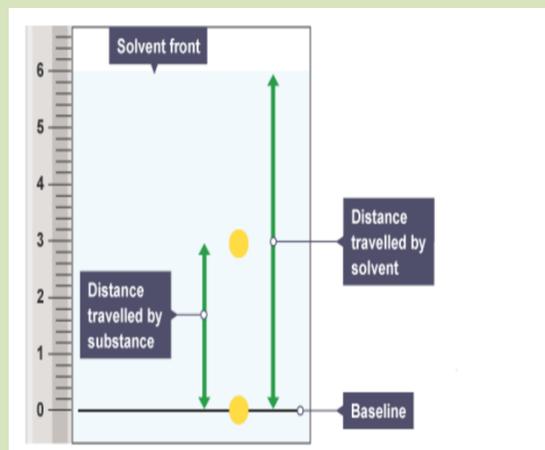
R_f values

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

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

The R_f value of a spot is calculated using:

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



Required practical – investigating the composition of inks

Aim

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

Method

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

Risks, Hazards and precautions

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

Example risk assessment;

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

KS4 Chemistry: C11 organic reactions

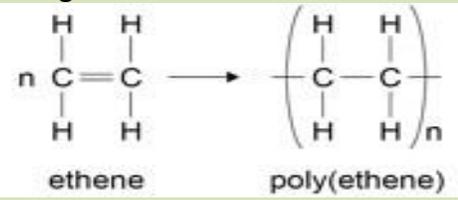
Further reading
<https://www.bbc.co.uk/bitesize/guides/zyfgmnb/revision/1>
https://www.youtube.com/watch?v=zS_RK8Hniaw&safe=active

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

Addition polymerisation

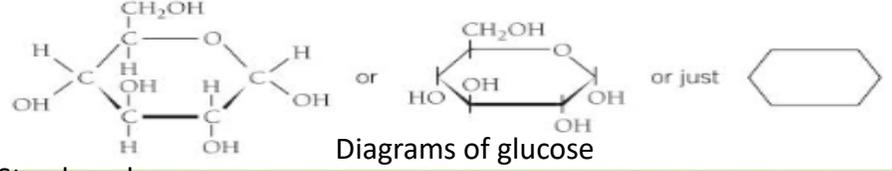
Alkenes are great to make polymers such as poly(ethene) (durable and transparent for drinks bottles) and poly(propene) (strong and is used to make ropes) by addition polymerisation.

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

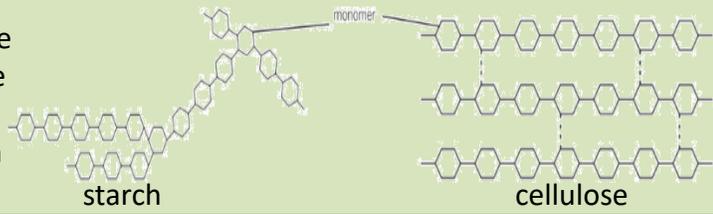


Natural polymers

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

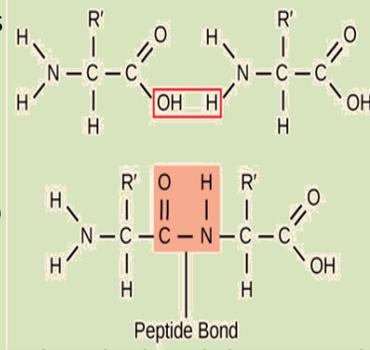


Starch and cellulose can be used as storage for glucose to later be broken down



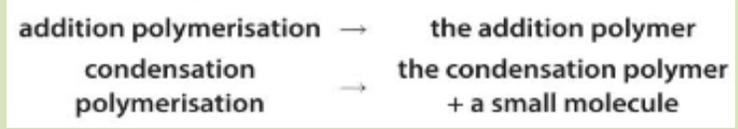
HT only- making polypeptides from amino acids

Polypeptides are the building blocks for protein and the monomers for polypeptides are called amino acids. They are named as such as they have a amine (NH₂) group at one end and a carboxylic acid group (-COOH) at the other end, meaning both an acid an base are in the same molecule. This reaction is a condensation polymerisation reaction, but the bond that extends the polymer is called a peptide bond as a peptide is made

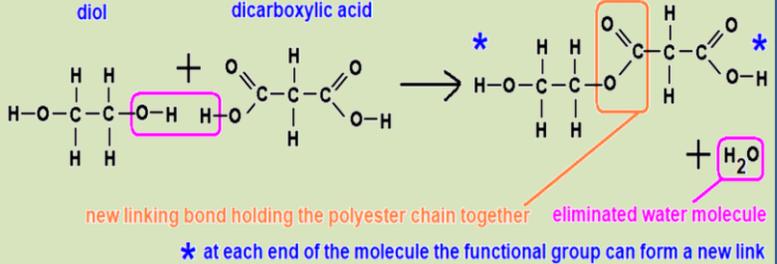


Higher Tier only- condensation polymerisation

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

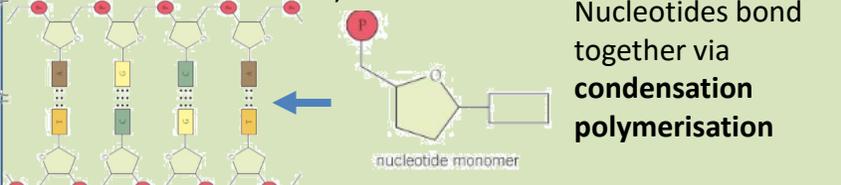


For this reaction, we do not need a C=C bond, instead we use a diol (molecule with a alcohol functional group at each end) and a dicarboxylic acid (molecule with a carboxylic acid functional group at each end)



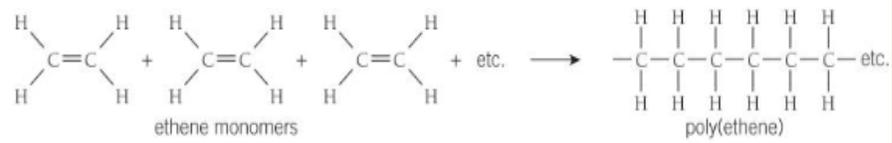
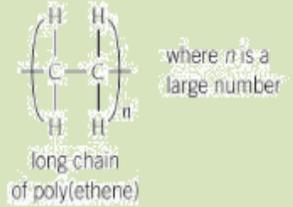
DNA

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



Polymers

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



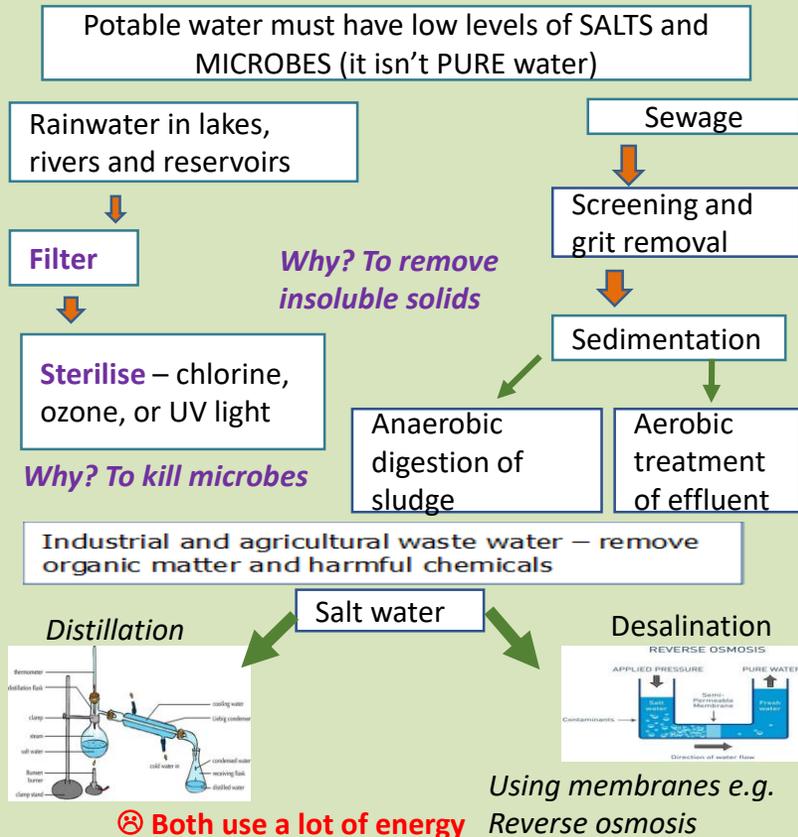
KS4 Chemistry C12 – The Earth's Resources

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

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

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

Making water safe to drink



Finite and Renewable Resources

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

Finite resources are processed to get us

- Energy
- materials

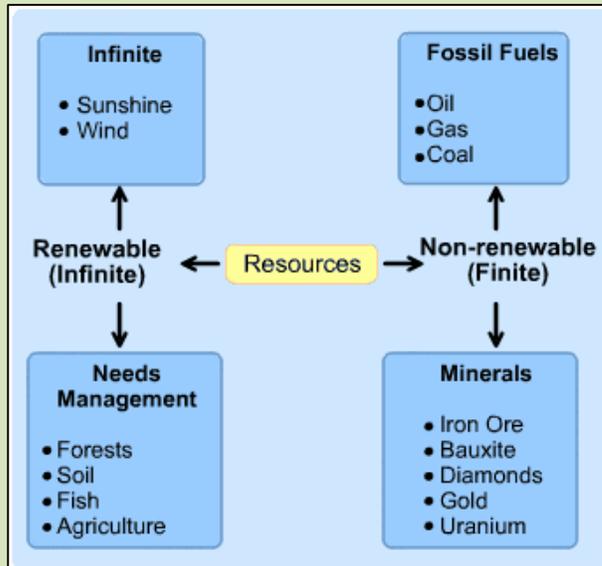


'Natural resources' + agriculture provides:

- Food
- Timber
- Clothes

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

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



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

Alternative Metal Extraction

Why bother? Running out of high grade metal ores

Phytomining

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

Copper comes from a rock called malachite



Electrolysis only works on molten or dissolved ions

Copper sulphate solution (aq)



Life Cycle Assessments

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



Reducing use of resources

Reduce...use of limited resources

Reduce...use of energy resources

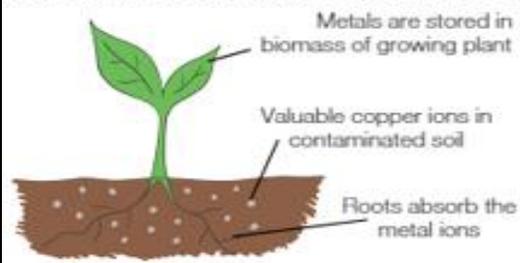
Reduce...waste and environmental impacts



Links to Further Reading:

- <https://www.bbc.co.uk/bitesize/guides/zg6cfcw/revision/3>
- <https://www.bbc.co.uk/bitesize/guides/zgqhcj6/revision/2>
- <https://www.youtube.com/watch?v=KyVf2bVLI08&safe=active>

HOW IS ALUMINIUM RECYCLED?



Bioleaching

Bacteria feed on metal ore

'leachate solution' contains copper compounds

How to get the copper from the compound

Displacement using scrap iron Electrolysis

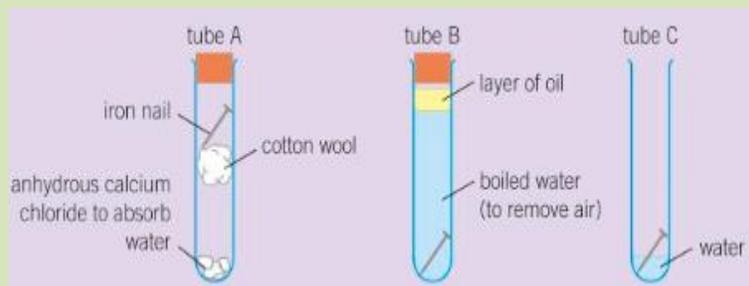
KS4 Chemistry: C15 using our resources

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

Rusting

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

The reaction can be summarised as:



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

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

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

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

Polymers

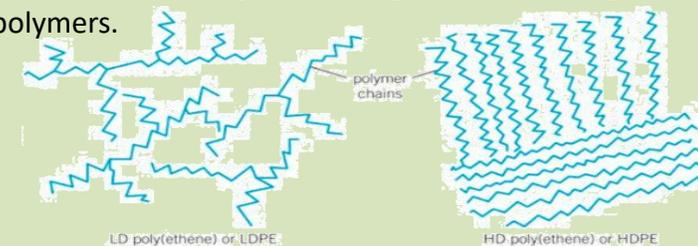
Polymers are derived from crude oil. The properties of polymers depend on:

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

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

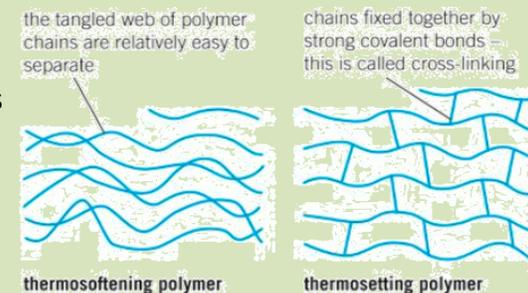
There are 2 types of polyethene: high density (HD) and low density (LD) as they are formed under different conditions.
LD – made under very high pressure with O₂ = randomly branched → low density

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



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

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

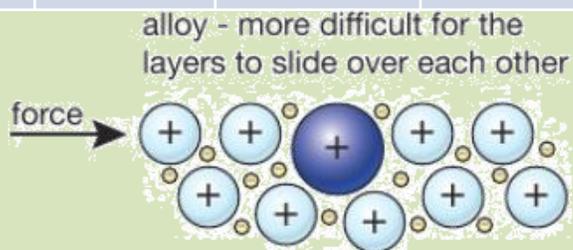


Alloys

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

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

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

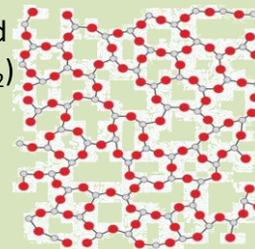


Glass, ceramics and composites

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

Glass

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



Ceramics

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

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

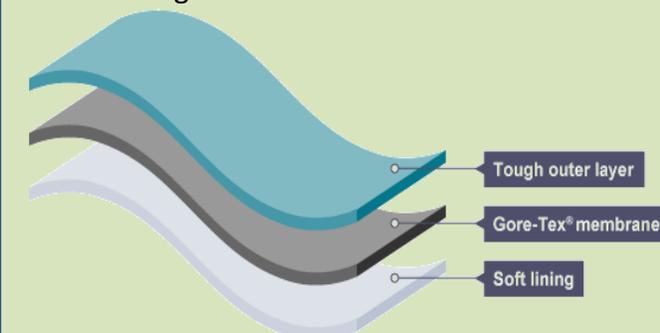


Composites

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

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

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



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



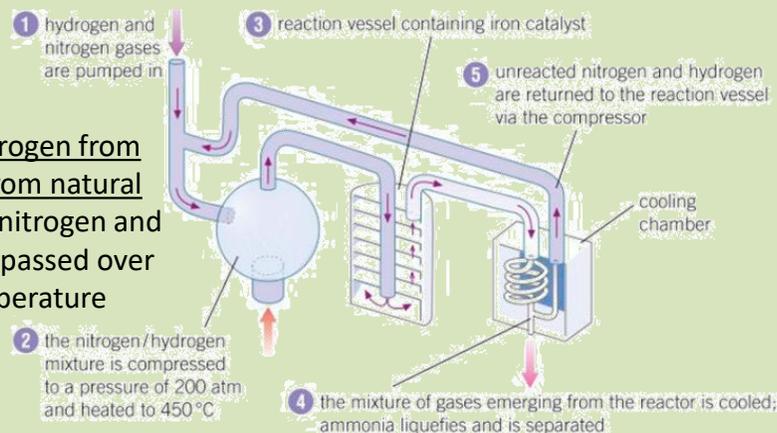
Making ammonia-the Haber process

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

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

The Haber process

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



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



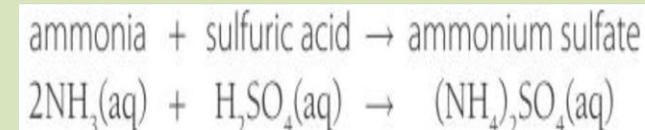
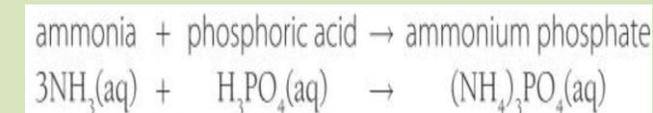
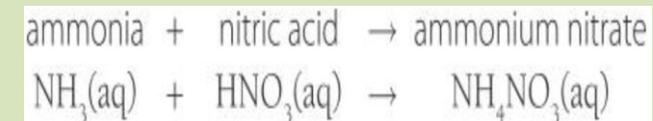
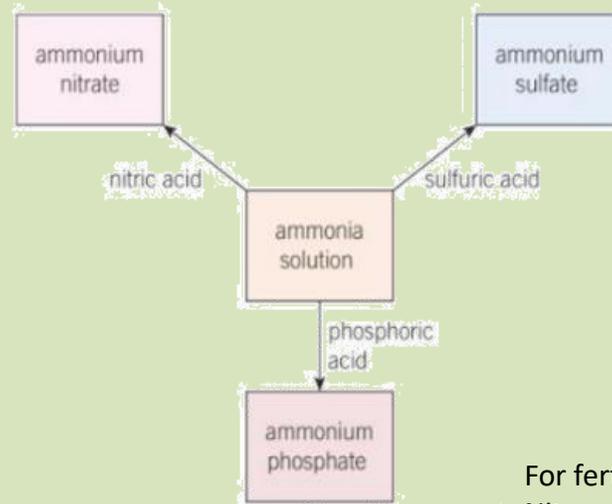
The conditions needed for the Haber process are a compromise, a higher yield could be achieved but increasing the pressure (as there are more gas molecules on the reactants than products- think Le chatelier's principle) but this is too costly to do.

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

Making fertilisers

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

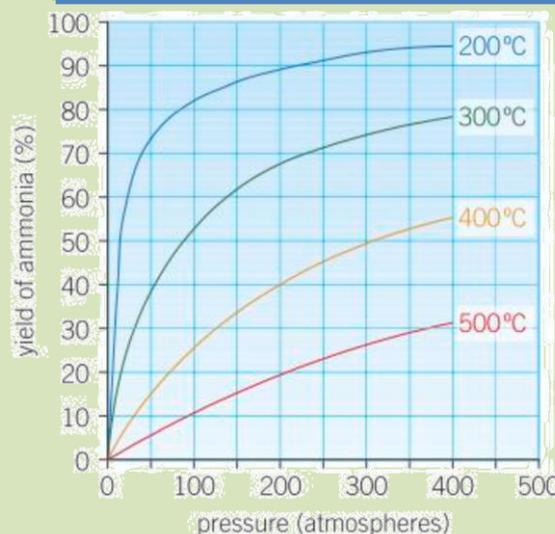
Most of the ammonia is reacted with an acid to make an ammonium salt fertilizer (in a neutralisation reaction)



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

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

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



Further reading

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

KS4 Science

P13 Electromagnetic waves

Key facts

- Electromagnetic waves are **transverse waves**
- They **transfer energy** from the source of the waves to an absorber e.g. from the sun to our skin
- They all travel at the **same velocity** (speed of light) through a vacuum (space) or air
- They form a **continuous spectrum**, with different wavelengths and frequencies

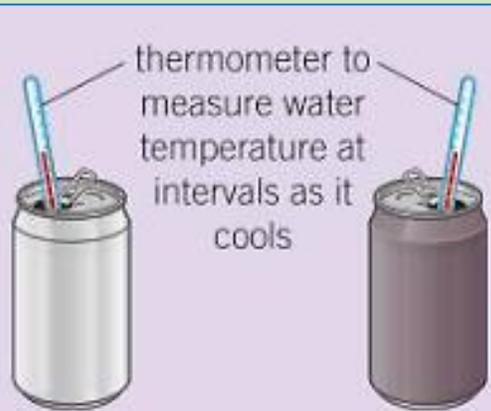
The speed of electromagnetic waves is $3.0 \times 10^8 \text{ m/s}$ (300 million m/s) through space and a vacuum.

Wave Speed equation

Wave speed = frequency x wavelength

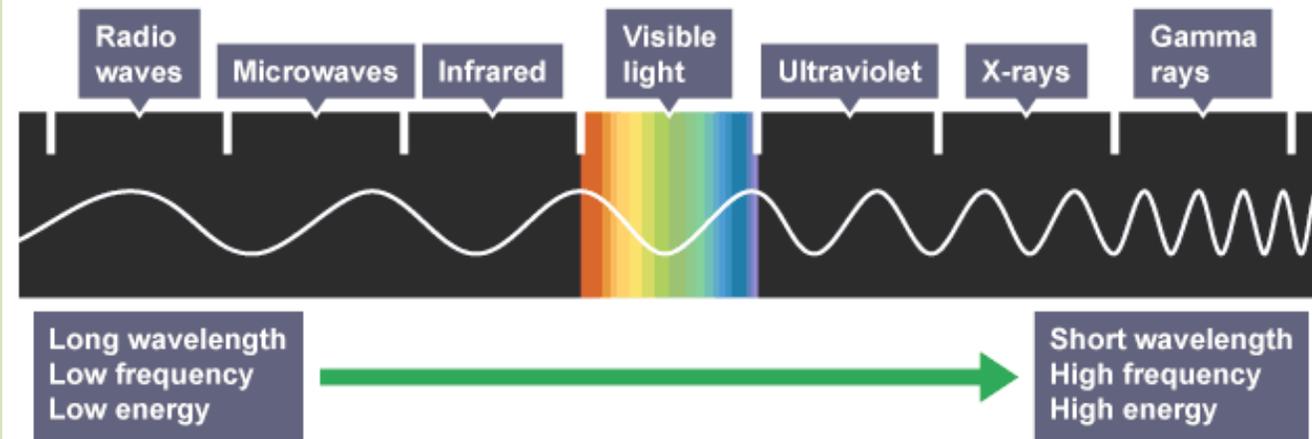
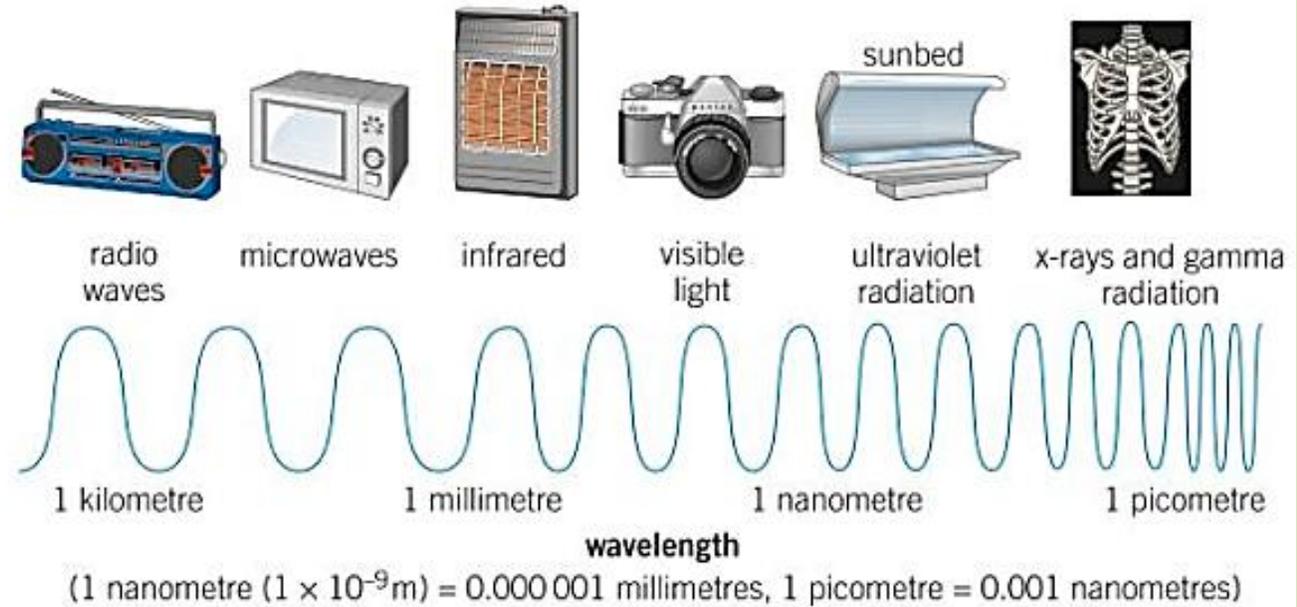
$$v \text{ (m/s)} = f \text{ (Hz)} \times \lambda \text{ (m)}$$

The human eye can only see visible light. The wavelength range is 400nm to just over 700nm.



To measure absorption rates, place two cans next to an IR lamp. Time how long water in the two cans takes to reach a certain temperature. **Dull, black** surfaces **absorb** more radiation than **shiny, light** coloured surfaces

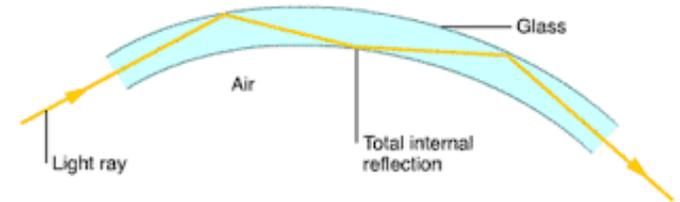
Measuring emission rates put hot water in the cans and see which cools down the fastest. **Dull, black** surfaces **emit** more radiation than **shiny, light** coloured surfaces so will cool quicker



KS4 Science P13 Electromagnetic waves

Optical fibres

Very thin transparent fibres used to transmit communication signals using light and infrared radiation.



HT Carrier waves

Waves that are used to carry information by varying their amplitude.



HT X-rays

X-rays used for therapy, such as destroying tumours, carry more energy than the X-rays used for imaging.

EM wave	Uses	Explanation
Radio waves	Television, radio	Low energy, not harmful
Microwaves	Satellite TV signals, cooking food	Travel in straight lines through the atmosphere Microwaves are absorbed by water molecules in food, causing it to heat up
Infrared	Electrical heaters, cooking food, infrared cameras, remote controls	Electrical heaters give off infrared radiation that is absorbed by the food Infrared cameras detect the infrared radiation given off by objects because of their temperature
Visible light	Fibre optic communications	Visible light travels down electrical fibres from one end to the other without being lost through the sides
Ultraviolet	Energy efficient lamps, sun tanning	UV waves produced by the gas in the bulb when excited by the current. UV waves absorbed by the coating of the bulb, which gives off visible light. Have a shorter wavelength than visible light.
X-rays	Medical imaging and treatments	X-rays are produced when high speed moving electrons are stopped and can penetrate soft tissues, but not bone. X-rays are ionising radiation and so can damage tissues as they pass through them.
Gamma rays	Medical imaging, treatment, kill harmful bacteria and sterilise food and equipment and kill cancer cells	Gamma rays are produced by radioactive substances when unstable nuclei produce energy.

Dangers

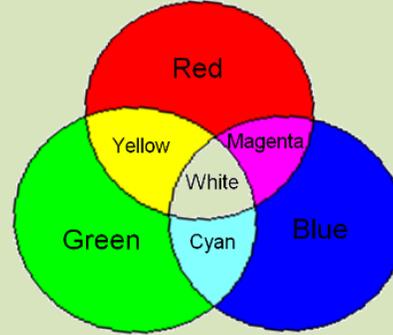
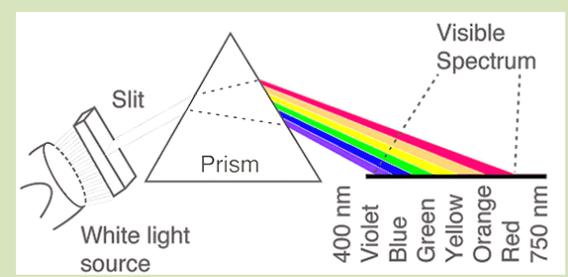
- Ultraviolet waves, X-rays and gamma rays have enough energy to have hazardous effects on the human body.
- The effects depend on the size of the dose.
 - Radiation dose (measured in **sieverts (Sv)**) is a measure of the risk of harm resulting from exposure to radiation.
- Ultraviolet waves can cause **skin to age prematurely** and **increase the risk of skin cancer**.
- X-rays and gamma rays are **ionising radiation** that can cause **mutation of genes and cancer**.

P14 Light Separate Science only

Word	Definition
plane mirror	flat mirror
real image	an image that <u>can</u> be formed on a screen
virtual image	an image that <u>cannot</u> be formed on a screen (because the rays of light do not actually meet at that point)
transparent	an object that transmits all the light that enters it e.g. piece of glass
translucent	an object that lets light pass through it but scatters the light inside it e.g. tracing paper (light is scattered or refracted)
opaque	an object that absorbs all the light that reaches it e.g. brick wall

Colour

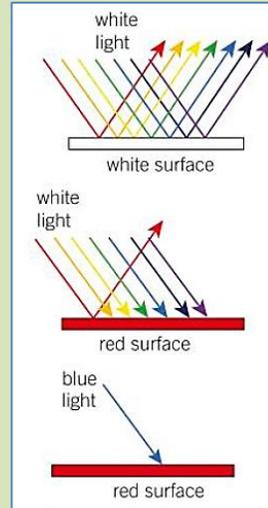
White light can be split into its spectrum (the colours of the rainbow), each with a different wavelength
 Red light has the longest wavelength
 Violet light has the shortest wavelength



- Stars and filament lamps emit a continuous spectrum of light (all wavelengths)
- Neon lights and lasers only emit a narrow range of wavelengths

Primary and secondary colours of light

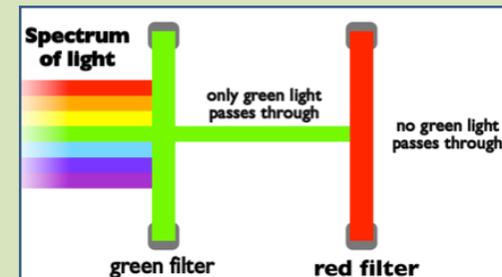
Red + yellow = green
 Green + blue = cyan
 Blue + red = magenta
 Green + blue + red = white



A white object looks white because it **reflects** all the wavelengths of visible light that reach it.

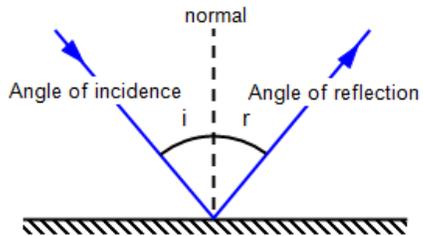
A red object looks red because it **absorbs** all the wavelengths of light except red. Only red light is **reflected**.

If only blue light is shone on a red surface it is **absorbed**, and no light is **reflected**, so the surface looks black



A green filter **absorbs** all colours except green, and **transmits** only green light

The law of reflection



Angle of incidence: the angle between incident ray and Normal line

Angle of reflection: the angle between reflected ray and Normal line

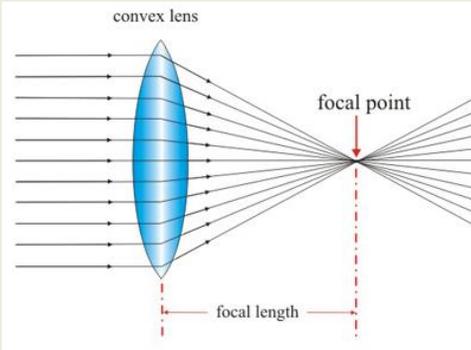
Specular reflection: reflection in a single direction from a smooth surface e.g. a mirror



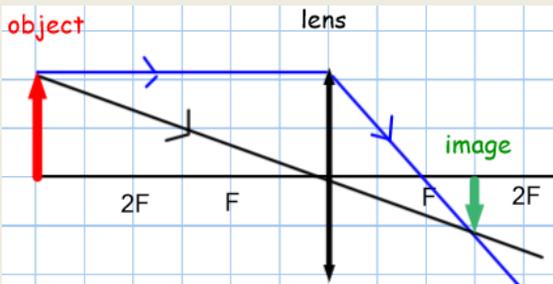
Diffuse reflection: reflection in different directions from a rough surface



Convex (converging) lens



makes parallel rays of light converge to meet at the **principal focus**.
Focal length = distance from centre of lens to principal focus

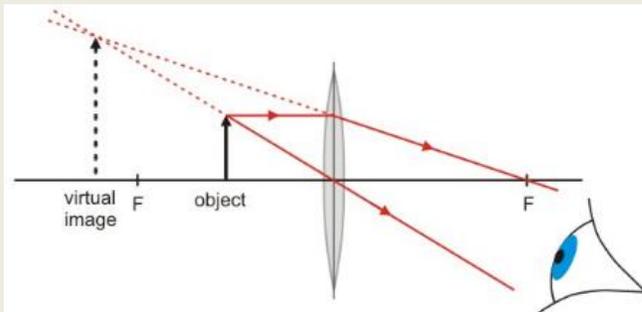


To draw a ray diagram:

- Draw two rays from the top of the object
- a) ray parallel to the principal axis, which is refracted through the principal focus
- b) Ray through the centre of the lens, which does not change direction

To create the image, draw an arrow from the principal axis to the point where the rays meet.

The image above is **inverted** (upside down), **diminished** (smaller than the object) and **real** (the rays of light pass through it).



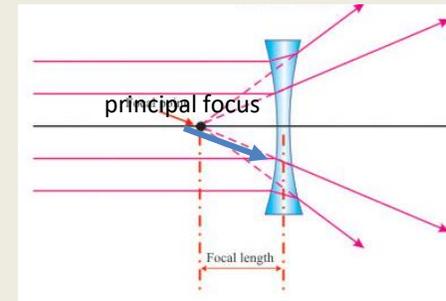
This image is

- **upright** (right way up),
- **magnified** (larger than the object)
- **virtual** (rays of light don't pass through it); represented by dotted lines

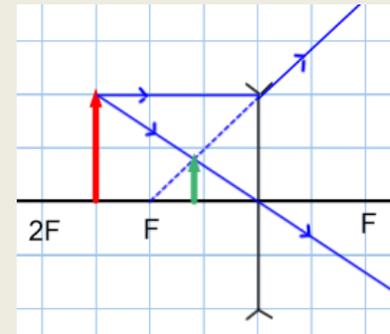
$$\text{magnification} = \frac{\text{image height}}{\text{object height}}$$

Convex lenses can produce **real** or **virtual** images.
Concave lenses always produce **virtual** images.

Concave (diverging) lens



A concave lens makes parallel rays of light diverge (spread out), as if they have come from the principal focus of the lens



To draw a ray diagram:

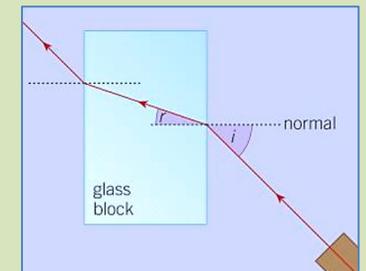
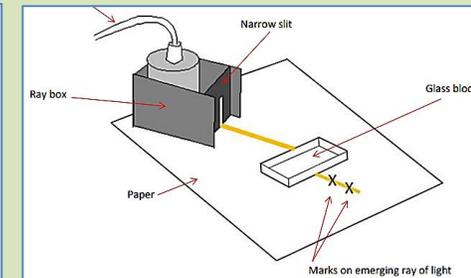
- Draw two rays from the top of the object
- a) ray parallel to the principal axis, which is refracted as if it came from the principal focus on the same side of the lens
- b) Ray through the centre of the lens, which does not change direction

To create the image, draw an arrow from the principal axis to the point where these rays appear to meet.

Required Practical: use different substances and surfaces to investigate refraction and reflection of light

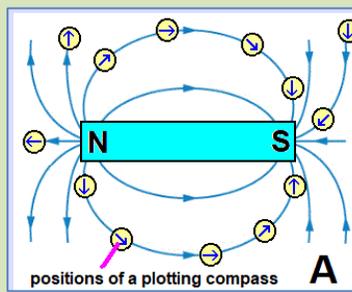
Refraction: Draw around your block, direct your light ray at the block. Mark the ray entering and leaving the block with crosses. Join up all the light rays with a ruler. Finally draw the normal line at 90 degrees to the block at the point at which the incident ray hits the block. Measure the angle of incidence and angle of refraction

Reflection: direct the light ray at the mirror, mark crosses, join with a ruler. Mark on the normal line 90 degrees to the mirror and measure the angle of incidence and angle of reflection.



P15 Electromagnetism

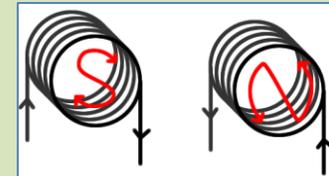
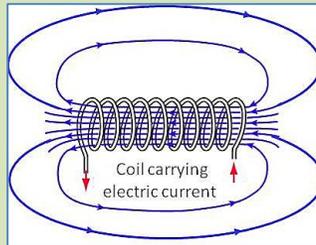
Word	Definition
Permanent magnet	Magnet which produces its own magnetic field
Induced magnet	Object which becomes a magnet when placed in a magnetic field. When removed from the magnetic field it loses its magnetism quickly
Magnetic field	Region around a magnet where a force acts on another magnet
Solenoid	a wire shaped into a cylindrical coil
Electromagnet	A solenoid with an iron core
Motor effect	When a conductor carrying a current is placed in a magnetic field, the magnet and the conductor exert a force on each other
Magnetic flux density	Density of magnetic field lines (measured in Tesla (T))



A plotting compass can be used to plot the shape of the magnetic field around a bar magnet.

The arrows point from north to south.

The closer the field lines the stronger the field.



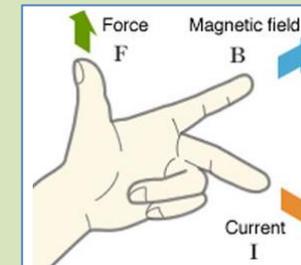
The magnetic field inside a solenoid is strong and uniform.

The magnetic field around a solenoid has a similar shape to that of a bar magnet.

A larger current produces a stronger magnetic field. The diagrams show which ends of the coil are south and north poles.

$$\text{Force (N)} = \text{magnetic (T)} \times \text{current (A)} \times \text{length of wire (m)} \times \text{flux density}$$

$$F = BIL$$

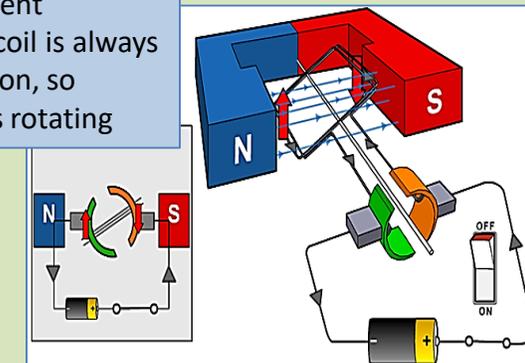


Fleming's left hand rule is used to find the direction of the force

Electric motor

A current-carrying coil in a magnetic field will rotate. On the left of the coil, current flows out of the page, so force is upwards. On the right of the coil, current flows into the page, so force is downwards.

Split-ring commutator ensures the current direction in the coil is always the same direction, so motor continues rotating



Magnetic materials

Iron
Cobalt
Steel
nickel

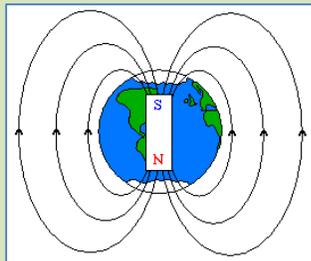
Opposite poles attract



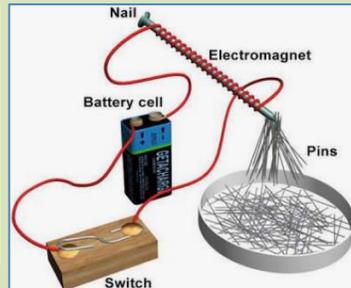
Same poles repel



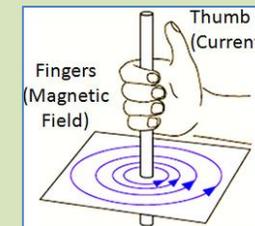
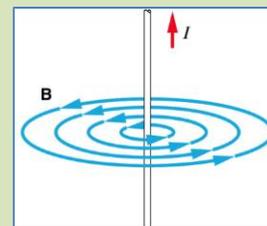
Opposite poles attract
Like poles repel



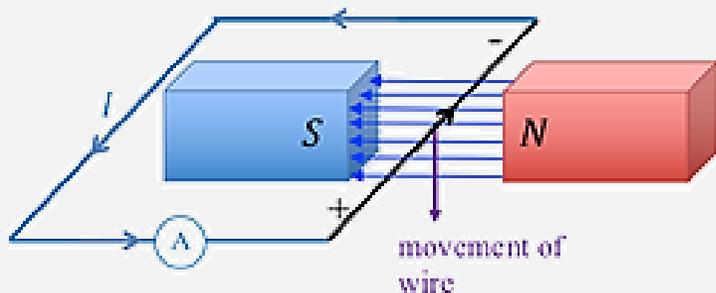
A compass needle always points north because the earth has a magnetic field.



Adding an **iron core** increases the strength of the magnetic field. An **electromagnet** is a **solenoid with an iron core**.



The magnetic field lines **around a wire carrying a current** are shaped as concentric circles. The circles are closer together near the wire, where the field is strongest. A larger current produces a stronger magnetic field. The right hand grip method shows the direction of the field lines.



Electromagnetic induction

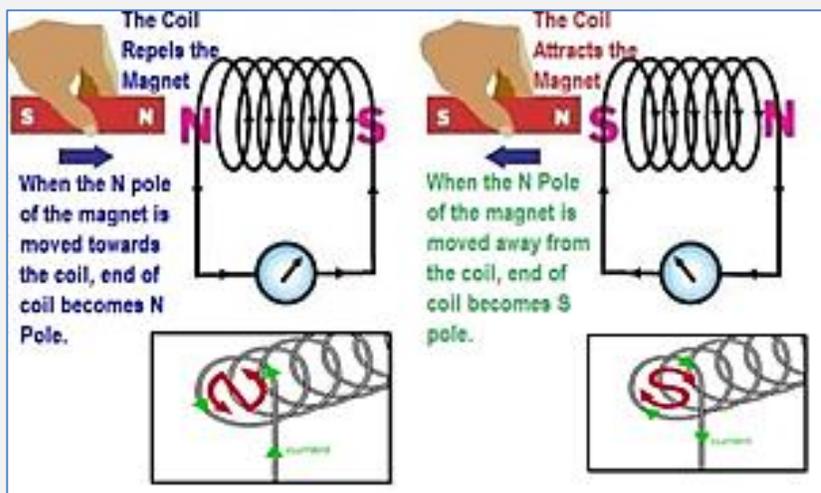
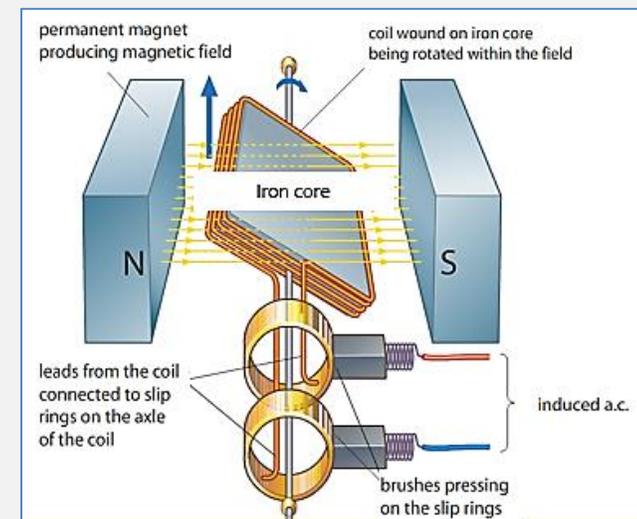
If a conductor moves relative to a magnetic field (cuts through magnetic field lines) or if there is a change in the magnetic field around a conductor, a potential difference is induced across the ends of the conductor.

Generator effect

a current is induced in the conductor if it is part of a complete circuit.

The generator effect is used to make Alternating current (using an alternator)

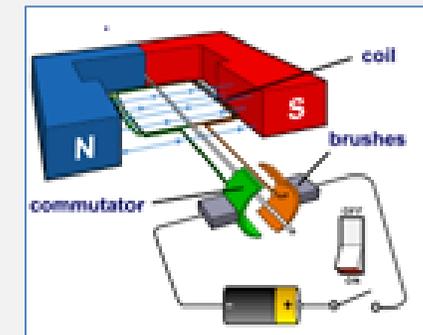
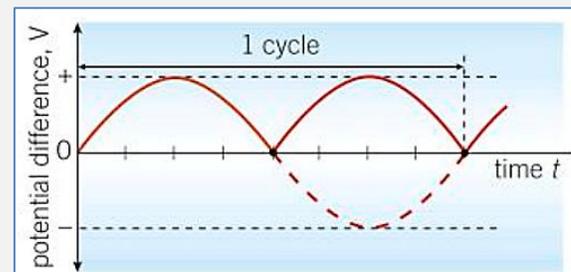
Slip rings connect the coil to the carbon brushes
The direction of the induced potential difference reverses every half turn – so current reverses.



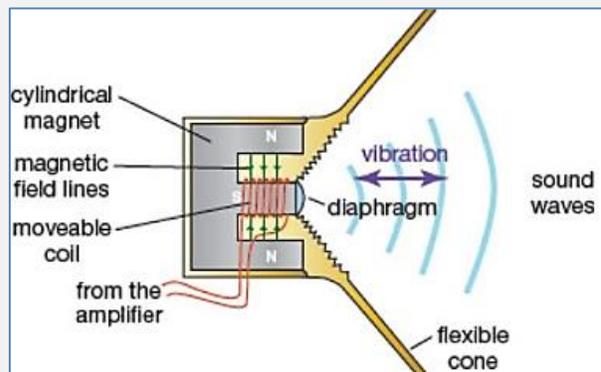
Lenz's law

The induced current flows in a direction such that it generates a magnetic field that opposes the change which produced it.

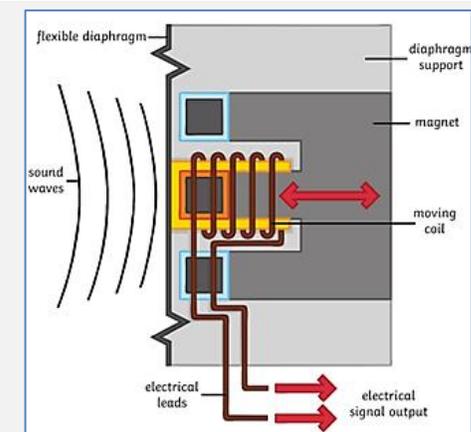
Direct current (using a dynamo)



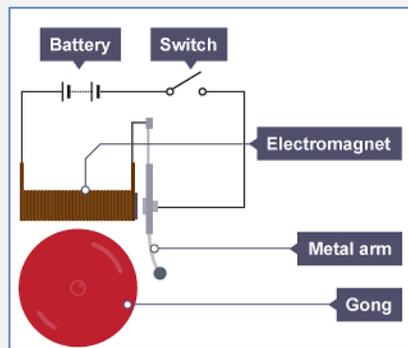
Split-ring commutator reverses the connections to the coil every half turn.
So induced potential difference never changes direction – current always flows in same direction.



Loudspeakers and headphones convert AC to sound waves. They use the **motor effect**. As current flows through the coil, the coil experiences a force (due to the motor effect). Because the current is alternating, the direction of the force alternates and the coil vibrates. This makes the speaker cone vibrate. This makes the air molecules move, which causes the pressure variations in the air needed for a sound wave.

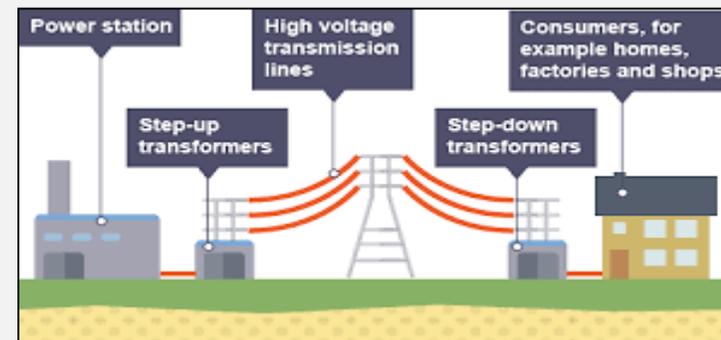


A **moving coil microphone** uses the **generator effect** to convert sound waves into electrical signals (AC). Sound waves hit a diaphragm and cause it to vibrate. The diaphragm and the coil vibrate in the magnetic field, so an alternating potential difference and current are induced in the coil.



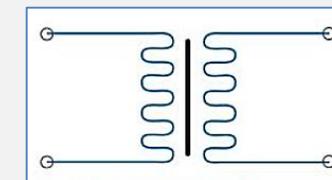
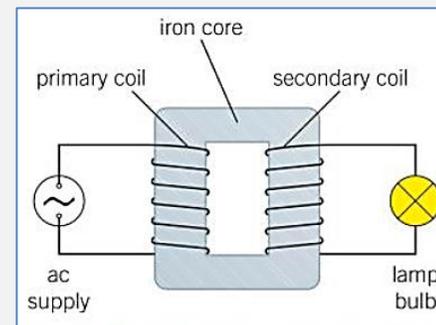
Devices like **electric bells** use **electromagnets**. When the switch is closed, the electromagnet is magnetised. The electromagnet attracts the armature (metal arm). The hammer strikes the gong and breaks the circuit. The armature springs back, completing the circuit again and remagnetising the electromagnet. Cycle repeats for as long as the switch is closed.

Step-up and step down transformers are used in the **National Grid** to increase and decrease alternating potential difference.



Transformers work by **electromagnetic induction**.

- The core is made of soft iron because this is easily magnetised.
- An alternating current flows through the primary coil.
- This produces an alternating magnetic field in the core.
- This induces an alternating potential difference in the secondary coil.
- If the secondary coil is part of a complete circuit, alternating current flows in secondary coil.



Because transformers are close to 100% efficient.

$$\frac{\text{Primary potential difference}}{\text{Secondary potential difference}} = \frac{\text{No. of turns on Primary coil}}{\text{No. of turns on Secondary coil}}$$

power input = power output

as $P = IV$

$$V_p \times I_p = V_s \times I_s$$

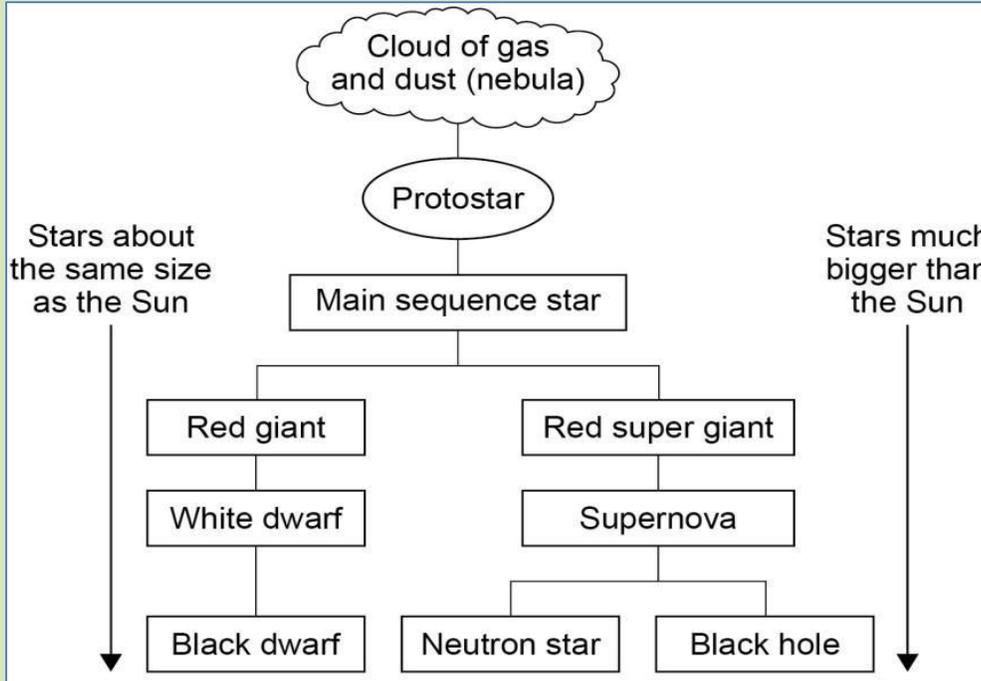
$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

Our solar system

Our solar system consists of:

- One star: the Sun;
- Eight planets, which orbit the Sun;
- Dwarf planets, such as Pluto, which also orbit the Sun;
- Natural satellites: the moons that orbit some of the planets (including our moon);
- Other objects like asteroids and comets.

Our solar system is a very small part of the Milky Way galaxy. Galaxies consist of millions of stars, held together by their gravitational attraction to one another.



Stars and their life cycle

Stars form when a huge cloud of gas and dust (a nebula) comes together thanks to the gravitational attraction between the particles from which it is made. The diagram outlines the stages a star goes through during its life cycle. The stages of the life cycle depend on the initial mass of the star.

Lower mass stars (like the Sun) end more discreetly than others with much larger masses.

Fusion processes in stars produce all of the naturally occurring elements.

Elements heavier than iron are produced in a supernova. The explosion of a massive star (supernova) distributes the elements throughout the universe.

Key Terms	Definitions
Star	A huge (compared to Earth) sphere of superhot gas (plasma) undergoing nuclear fusion reactions.
Planet	A spherical object much smaller than a star, made of rocky or gaseous material (or a combination), which orbits a star.
Dwarf planet	Small planets that have not cleared their orbit of other material. Like planets, they orbit a star.
Satellites	Object that orbit a planet. Natural satellites are not launched by humans – so moons are natural satellites. Ones that we launch are called artificial satellites.
Orbit	To follow a path around another object due to the gravitational attraction between the objects, while being physically separated. Orbits can be circular, or elliptical (oval shaped).
Galaxy	A giant cluster of stars held together by their gravitational attraction to one another. Our galaxy is called the Milky Way.
Nebula	A cloud of gas and dust in space.
Nuclear fusion	A nuclear (not chemical) reaction in which the nuclei of atoms are joined together to make larger nuclei, releasing energy. For example, hydrogen nuclei are fused to helium nuclei in the Sun and other stars. Thus, fusion processes cause the formation of new elements. This can only happen at immense pressures and temperatures, when gases have ionised to become plasma. Nuclear fusion allows nucleosynthesis - making new nuclei.



Key Terms	Definitions
Protostar	An early star – basically a big dense part of a nebula that is gathering mass but hasn't started nuclear fusion yet.
Main sequence	The stable stage of a star's life cycle, where inward and outward forces are in equilibrium.
Plasma	The 'fourth state of matter' – a superhot gas, where electrons are stripped from nuclei, leaving a sea of positive nuclei and negative electrons.
Red giant	The stage after the main sequence for stars with a similar mass to the Sun.
Red supergiant	The stage after the main sequence for stars much more massive than the Sun.
White dwarf	The collapsed core of a star like the Sun. Very dense (about 200 000 times more dense than Earth), but not as dense as neutron stars or black holes.
Black dwarf	When a white dwarf has fully cooled down, it no longer emits any radiation so it is a black dwarf. So in the universe, there aren't any black dwarves because it isn't old enough for white dwarves to have cooled off yet!
Supernova	The enormous explosion resulting from the collapse and resulting shock wave of a star much more massive than the Sun.
Neutron star	The collapsed core of a star after a supernova (but not of a star large enough to form a black hole).
Black hole	The collapsed core of really massive stars – about five or more times the mass of the Sun.

The Big Bang states that all space time and matter were created in 'The Big Bang; a rapid expansion from a single point.

Evidence for the Big bang include the **red shift** of distant galaxies and the **CMBR** (Cosmic microwave background radiation)

Red shift:

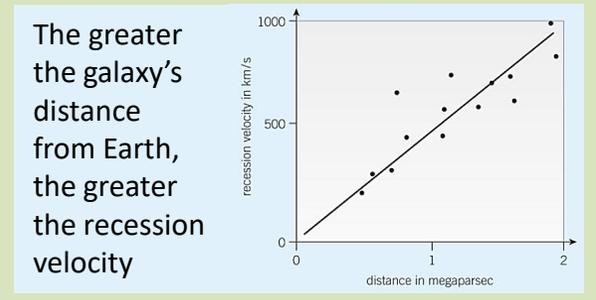
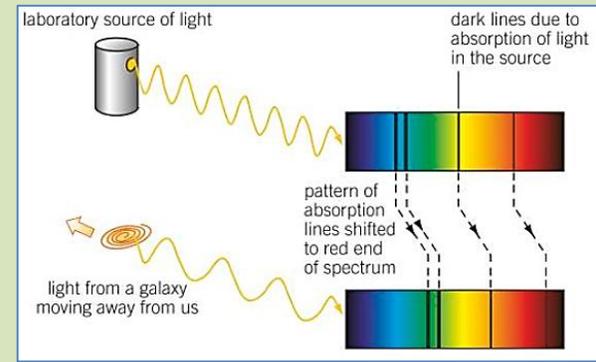
When a light emitting object moves towards you its wavelength compresses resulting in it appearing to have a shorter wavelength, this is called blue shift. When a light emitting object is moving away from you its wavelength gets stretched out resulting in it appearing to have a **longer wavelength**, this is called **red shift**.

All distant galaxies show red shift in their line spectra meaning they are all moving away from us and one another. This would suggest they must at one point started from a single point.

Cosmic microwave background radiation:

The Big Bang should have resulted in the release of high energy radiation. However this radiation will have been stretched out in the expanding universe and become lower energy radiation.

In 1965 scientists discovered microwave radiation coming from every part of space. This **Cosmic microwave background radiation** could only be explained by the big bang theory



Key Terms	Definitions
Instantaneous velocity	Velocity at a single moment (remember it is vector quantity, with both direction and magnitude).
Red shift	The observed increase in wavelength of light emitted by objects moving away (receding) from an observer.
Big Bang theory	The theory, which is by far the dominant scientific theory for the origin of the universe, that states that the whole universe originated from a tiny and very hot and dense.
Recessional velocity	How fast something (like a galaxy) is moving away from an observer.
Dark matter	Aka dark mass. A mysterious type of matter that is known to exist (from observations of other galaxies), but no-one knows what it is made of.
Dark energy	The name given to the mysterious energy driving the acceleration in the expansion of the universe.

CT – Software– Term 3

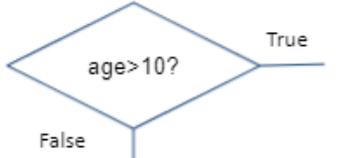
Device drivers (Babel fish) allow peripherals from different companies to talk to each other (it's a translator)

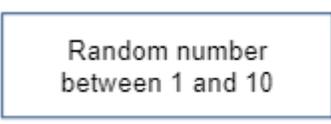
Systems software (utilities):

- Defragmentation
- Compression
- Encryption

File management: finds, stores, reads, writes files on secondary storage	Memory: fetches instructions and data from main memory to be executed in the CPU	User interface: allows a user to interact with the computer (CLI, WIMP, Menu)
CPU: allow computer to multi-task by controlling memory resources	Main functions of an OS	
Security: enables securing of the system through things like access levels, passwords and user accounts	Applications: provide a platform for different applications to run	Devices: Communicate with internal and external hardware via device drivers
Open source software has public source code. <ul style="list-style-type: none"> • Great for cost and modification • Bad for support and bugs 		Proprietary software has the source code locked securely away by the owner. <ul style="list-style-type: none"> • Great for support if something goes wrong and it's tested well to remove bugs • Bad for cost and there is no way you can modify it yourself

CT – Pseudocode – Term 3

The user inputs their name	Name = INPUT "Enter your name"	
Display the users name	OUTPUT "Your name is" + Name	
If the age is greater than 10 then	IF age > 10 THEN	
Structured English	Pseudocode	Flowchart

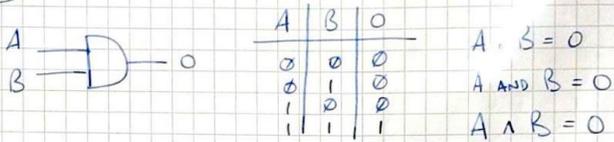
Create a random number between 1 and 10	WHILE i < list.length LOOP OUTPUT list[i] END LOOP	
Display "Hello" 10 times	FOR i = 1 to 10 LOOP OUTPUT "Hello" END LOOP	
While not at end of list, display list item	WHILE i < list.length LOOP OUTPUT list[i] END LOOP	
Structured English	Pseudocode	Flowchart

Computational Thinking – Boolean Logic – Term 3

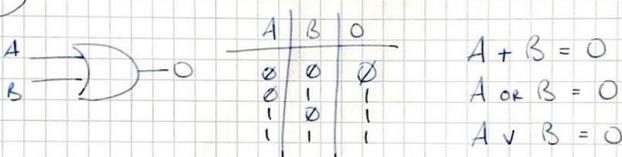
One

LOGIC

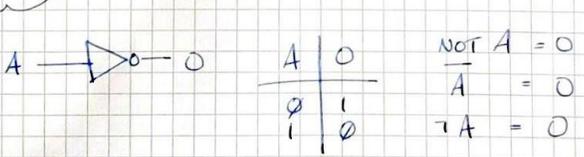
AND OUTPUTS 1 IF A AND B IS 1



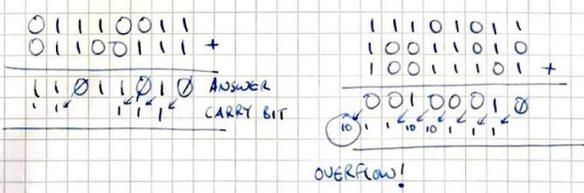
OR OUTPUTS 1 IF A OR B IS 1



NOT REVERSES THE INPUT



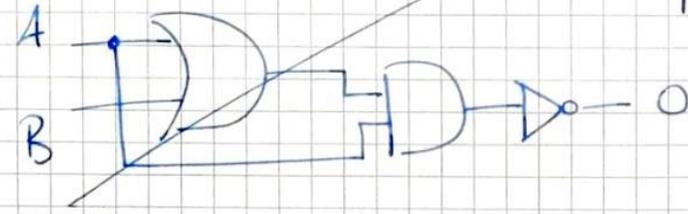
BINARY ADDITION



Two

$$(A + B) \cdot A = 0$$

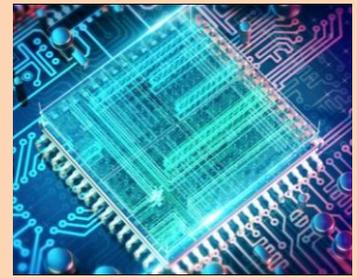
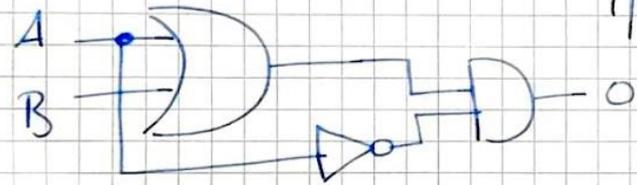
A	B	(c) A+B	C.B
0	0	0	0
0	1	0	0
1	0	0	0
1	1	1	1



Three

$$(A + B) \cdot \neg A = 0$$

A	B	(c) A+B	(d) $\neg A$	(e) C.B
0	0	0	1	0
0	1	1	1	1
1	0	1	0	0
1	1	1	0	0



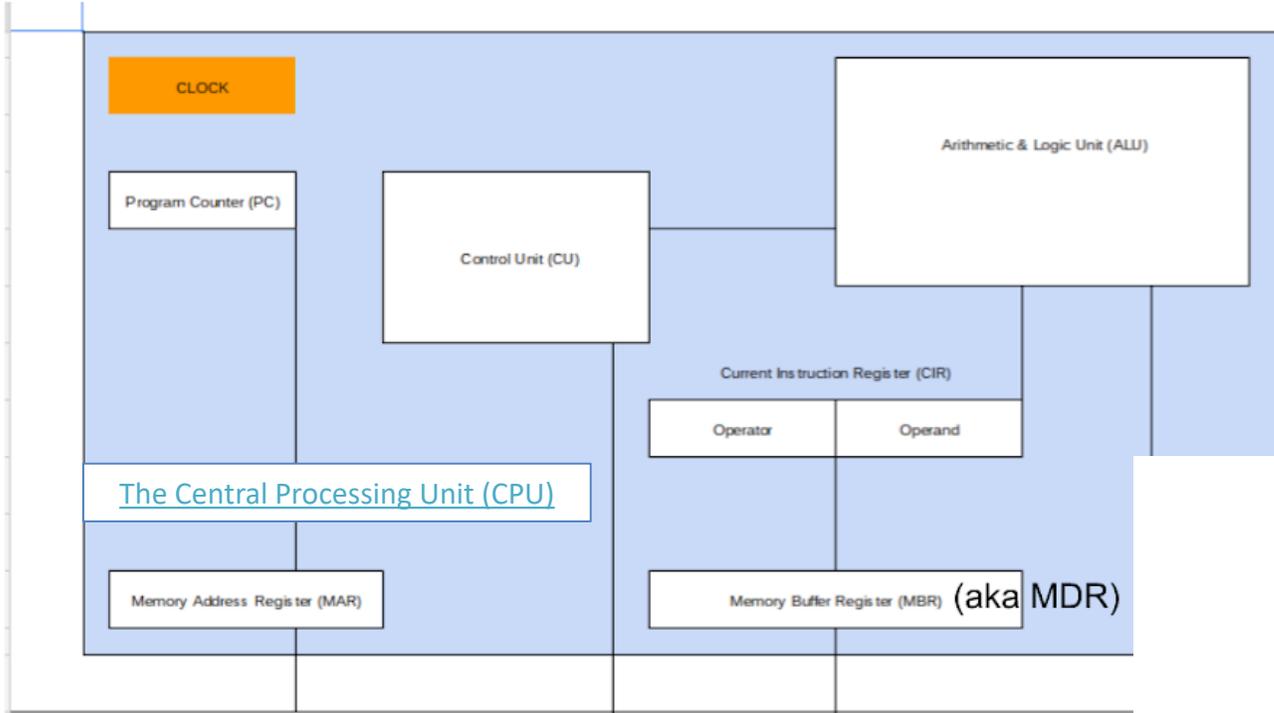
Expressing Logic

You must be able to **express logic** in 3 ways:

1. Logic diagrams
2. Logical expression
3. Truth table

Each **Expression** has been numbered for ease of use.

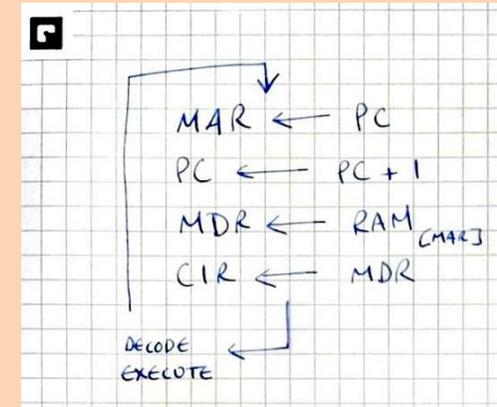
The Central Processing Unit (CPU)



RAM (main memory)

Addr.	Data
0	INP
1	LDA 6
2	INP
3	ADD 6
4	OUT
5	HLT

RAM controller

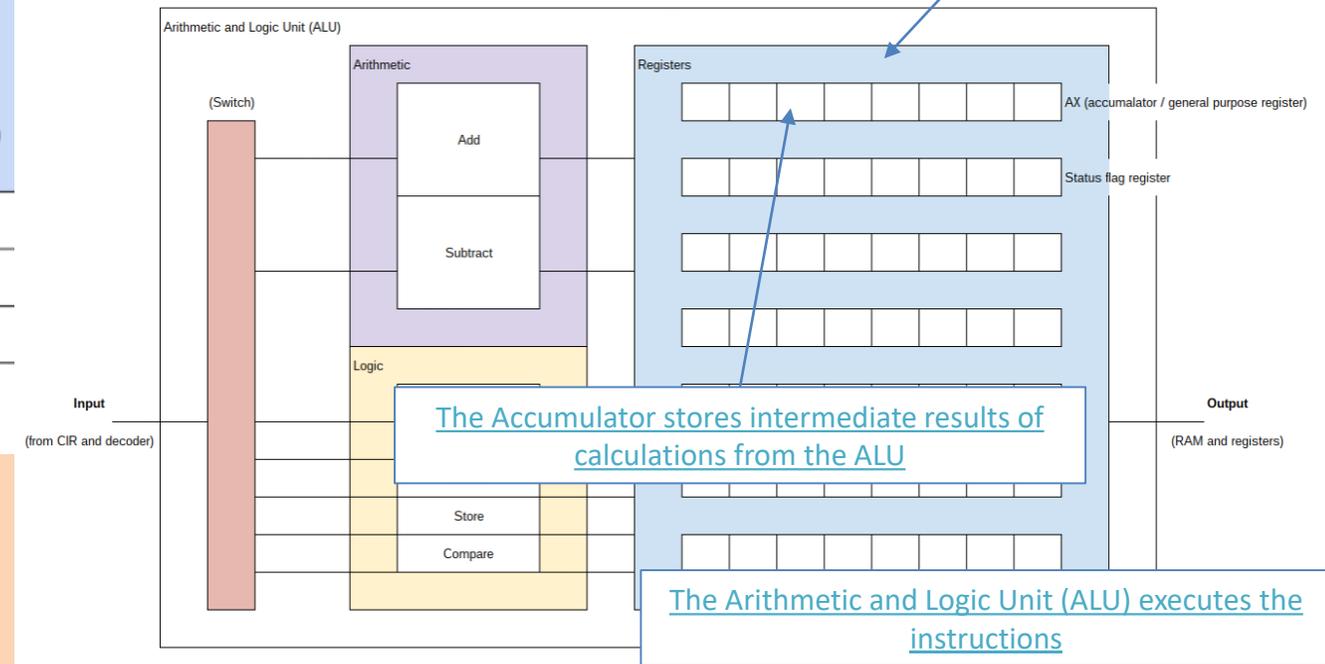


Registers = a super fast temporary place to store data in the CPU

- A CPU performance can be improved by:
- Increasing the size of RAM
 - Increasing the size of CACHE
 - Increasing the number of cores
 - Increasing the clock speed

Von Neumann architecture describes a system where the CPU fetches instructions and data from the same memory block

Harvard architecture describes a system where instructions and data are stored in separate memory blocks



The Accumulator stores intermediate results of calculations from the ALU

The Arithmetic and Logic Unit (ALU) executes the instructions

The impact of technology on a society can be examined in these ways:

<p>Ethical issues</p>	<p>What would be considered right and wrong by society. These values may be shared across many countries.</p>	<p>For example, is it ethical for Amazon to pay only £290m in tax when it earns £14b from the UK (about 2% tax) when the average UK citizen pays 20% tax on their earnings? For example, is it ethical for Governments to read all of your emails, know what websites you visit and listen to your phone calls? All in the name of keeping you safe?</p>
<p>Legal issues</p>	<p>What is actually right and wrong in the eyes of the law. These values are specific to individual countries.</p>	<p>For example, should you be able to buy alcohol or tobacco products online? Should you be able to buy drugs or weapons online? Different countries have different legal views on these issues. For example, it is now a criminal offence to upload messages onto the internet that are considered 'hate speech'.</p>
<p>Cultural issues</p>	<p>How groups of people with particular values, beliefs, languages or practices are affected by technology.</p>	<p>For example, should remote communities become connected to the Internet and therefore be exposed to alien beliefs and potentially be exploited by other cultures? For example, we are using technology more and more now to communicate which is reducing our time spent physically with other people. Is this causing anxiety, social separation or impacting on personal well-being?</p>
<p>Environmental issues</p>	<p>How technology impacts the natural world.</p>	<p>For example, the average UK person keeps their mobile phone for 22 months. This is an example of the waste of rare natural materials that take huge amounts of energy to extract and use. For example, by using online communication tools like Zoom we can reduce the number of times we need to travel to meetings, thus reducing carbon emissions.</p>

Computational Thinking – Network threats/Cyber security – Term 4

How a system is secured depends upon who it is being secured against.

What is Cyber security?

A set of tools that ensure:

- Secrecy of data
 - only authorised people can view/edit
- Integrity of data
 - only authorised people can use computer systems
- Availability of data
 - ensuring data is available to authorised users

Questions when considering how to protect?

- Threat model
 - What/who is the threat?
 - Who are they?
 - What are their skills/resources?
 - What is their goal?
- Attack vector
 - How to secure against the threat?

SQL Injection?

Malicious SQL statements are inserted into a data entry field of a system that is not appropriately secured.

Cyber Threats

- Social engineering
 - Tricking employees into providing details to gain access
- Brute force attacks
 - Millions of password combinations are autonomously attempted in search of a real password(s)
- DDoS / botnets
 - A network is flooded with useless data that then prevents authorised access
- Virus/malware
 - Malicious software that can be accidentally downloaded onto computer systems
- Disgruntled employees
 - Who want revenge and have access to your systems
- Phishing
 - Sending fake or spoof emails to trick someone into providing sensitive info.
- Packet sniffing / passive attack
 - Hackers monitor network traffic to intercept sensitive information
- Dumpster diving
 - Raiding paper/equipment being discarded in order to find sensitive info.

What are Network Policies?

- Regular software updates
- Enforce strong passwords that are regularly changed
- Network firewall
- Anti-virus software
- Staff training on spotting fraud
- Regular network pentesting
- Control physical access to hardware

System security questions

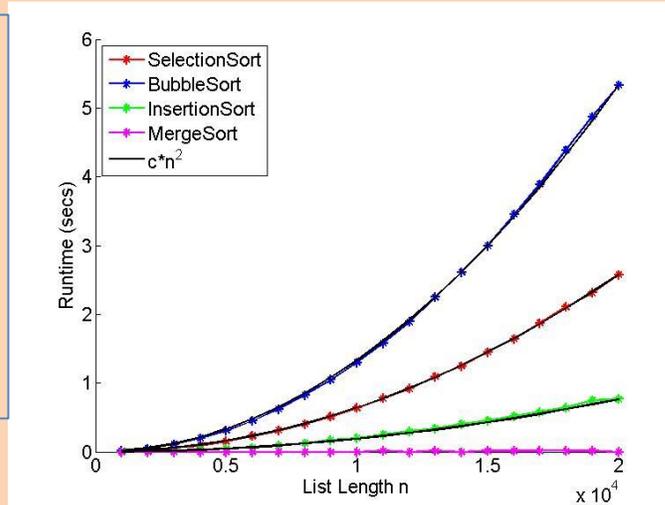
- **Authentication** (who are you?)
 - **What do you know?**
 - Passwords (det.)
 - Pin (det.)
 - **What do you have?**
 - Key fob (det.)
 - Physical key (det.)
 - **What are you?**
 - Biometrics (prob.)
 - Gait analysis (prob.)
- **Access control** (What should you have access to?)
 - Access levels: read, write, execute

Computational Thinking – Common algorithms – Term 4

Algorithms

Algorithms are written down in one of **three ways**:

- **Structured English**
- **Pseudocode** - great for detail
- **Flowcharts** - quickly read and understood but not good for details



An algorithm is a set of instructions that when followed precisely, solve a given problem

The common algorithms you need for the GCSE

Searching

- Binary search
- Linear search

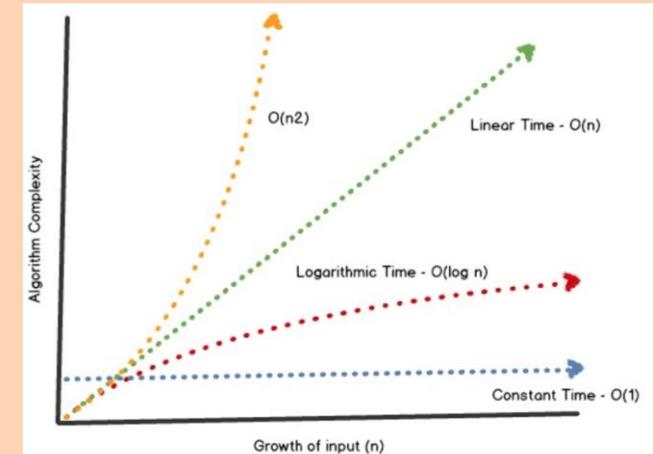
Sorting

- Merge sort
- Insertion sort
- Bubble sort

BIG O

Why have different algorithms that do the same job? Because some are faster than others due to their design. Algorithms are judged by:

- Space complexity (how much memory they take to run)
- Time complexity (how much time they take to complete given a number (n) of items)



The user inputs their name	Name = INPUT "Enter your name"	
Display the users name	OUTPUT "Your name is" + Name	
If the age is greater than 10 then	IF age > 10 THEN	
Structured English	Pseudocode	Flowchart

iMedia – Designing a Game Concept– Key Terms

Generations 1 - 9	Game consoles have been categorised using this system since the early 1970s. The generations 1 through to 8 represent periods of time when consoles have evolved. For example, Atari Pong arcade game is generation 1, the original Xbox is generation 6 along with PlayStation 2, whereas the Xbox series X and PS5 are generation 9.
Legislation	In game design terms, this applies to the use of any intellectual property and copyrighted material that is planned within the content of the game. For example, the use of established and well known characters such as Mario, Harry Potter or any Marvel superheroes in a new game would not be allowed. In terms of copyrighted material, this may restrict the use of some assets e.g. images, graphics, sounds and background music.
Narrative	This refers to the storyline that the game is based upon. Not all games have a narrative such as a basic racing game. However, as soon as there are multiple levels or strategies as part of the game then this becomes part of the storyline.
PEGI	PEGI is the Pan European Gaming Information who provide age ratings for games based on their content. The age ratings are 3, 7, 12, 16 and 18.
Scoring Systems	These are a way of measuring progress and achievement in a game. They can be based on points that are accumulated through gameplay or alternatively, based on timing systems (where a faster time to achieve an objective equates to a higher performance by the player).
Visual Style	This is related to the genre and refers to what is shown on the game screen. Stylisation can also refer to colours, brightness and the overall visual content, which may be dark and moody to give a sinister feel for example.
Visualisation Diagrams	A visualisation diagram is a drawing or sketch that illustrates what is to be produced and/or what the final product will look like. This would be a rough version and used either for approval purposes by the client or potentially by a designer when creating the actual product. The diagram could be created either digitally or drawn by hand for example.

Key Term	Explanation
2D/3D	In game terms, this refers to whether the gameplay screen is 2 dimensional or 3 dimensional. For example, an overhead view of a maze would be a 2D game whereas a walkthrough first person shooter game would be 3D.
Characters	These are the characters that are found within the game. Examples would include the player character(s) and any non-player characters, which are controlled by the game programming.
Game Characteristics	This covers elements such as main theme, number and type of players, player characters, style of game play, type of environment, genre etc. In combination, they define the characteristics of the game. Contrasting examples would be a first person shooter game versus a quiz or simulation game.
Game Console	A dedicated piece of hardware used for playing digital games. Examples include Nintendo 64, Sega Dreamcast, Microsoft Xbox, Sony PlayStation, Nintendo Wii.
Game Environment	This is the setting for the gameplay and may be the 2D background or the 3D room. This is sometimes referred to as the game world. The players' character is positioned in the environment or room. This term should not be confused with the game development environment, which would be the same as game engine.
Game Platforms	The platforms are the hardware that the game is played on, which might be different to the hardware that is used for the development. Examples of games platforms would include a PC, Xbox, PS4, Wii and Smartphone.
Genre	The style of game. Examples would be arcade, FPS (first person shooter), role playing, adventure, MMORPG (massively multiplayer online role playing game).

iMedia – Designing a Game Concept– Term 3

What Are Video Game Characters

A game character is a person or any other entity acting in a game. This can either be:

- **Player Character (PC):** A character whose actions are directly controlled by a player of the game rather than the rules of the game
- **Non Player Character (NPC):** Characters that are not controlled by a player. The actions of non-player characters are typically handled by the game itself

What Are Video Game Objectives

Video games have objectives. These objectives tend to boil down to seven basic goals (with multiple variations and modifiers), the basic goals are:

- Escape or get to the exit
- Go to point A
- Kill X
- Bring X to Y
- Solve a Puzzle
- Obtain the X
- Rescue X

Video Game Generations

GEN (Year)	Platforms
1 (1972 – 1977)	Atari PONG
2 (1977 – 1982)	Atari VCS(Video Computer System)
3 (1982 – 1984)	Atari 5200
4 (1985 – 1989)	Nintendo Entertainment System (NES), SEGA, GameBoy
5 (1989 – 1995)	Sega Genesis, Super NES Atari Jaguar
6 (1995 – 1998)	Nintendo 64, Sony PlayStation, Sage Saturn
7 (1998 – 2012)	Sega Dreamcast, Sony PlayStation 2, Nintendo GameCube, Microsoft Xbox
8 (2012 – 2019)	Nintendo Wii – Wii U, Sony PlayStation 3 – 4, Microsoft Xbox 360 - One
9 (2019 – 2026)	Sony PlayStation 5, Microsoft Xbox Series X, Nintendo Switch

What are Video Game Characteristics

Characteristics of Games offers a new way to understand games: by focusing on certain traits—including number of players, rules, degrees of luck and skill needed, and reward/effort ratio—and using these characteristics as basic points of comparison and analysis.

Key Words

Characters Objectives
 Characteristics Genre
 Environment Narrative
 Generations (GEN) Platforms
 Consoles

What is a Video Game Genre

A video game genre is a classification assigned to a video game based primarily on its gameplay rather than visual or narrative features. Such as:

- Action/Adventure
- Sports
- Role Playing game (RPG)
- First Person Shooter (FPS)
- Strategy
- etc.

What are Video Game Environments

A game world is an artificial universe, an imaginary place in which the events of the game occur. When the player enters the magic circle and pretends to be somewhere else, the game world is the place she pretends to be.

Most video games present their game world with pictures and sound: art, animation, music, and audio effects.

What is a Video Game Narrative

The narrative in games consists of the plot, sounds, music, atmosphere, dialogues, player choices and, of course, gameplay. It creates the overall impression of a game and allows the player to feel like part of a story.

What is a Video Game Platform

A computer system specially made for playing video games. **Not to be confused with Video Game Consoles.** A platform is the hardware for playing a video game which would include PC and Smartphone.

What is a Video Game Console

A video game console is an electronic or computer device that outputs a video signal or visual image to display a video game that one or more people can play through some type of game controller. Video game consoles are typically powered by operating systems and CPUs that differ from desktop computers. The consoles are under the control of their respective manufacturers, and the software is geared to the machine's capabilities.

iMedia – Designing a Game Concept– Term 4

What is a Client Brief

A client brief is what a company will be asked to do when designing a media product. These might come from as written brief, a discussion, a script or from a specification.

Visualisation Diagrams

A Hand Drawn Design that will plan the layout of a still image in a visual manner. Show how the finished item may look. Magazine cover, website, multimedia product, Game character or Scene.

What is a Game Concept

A **game concept**, in its simplest form, is the easy-to-understand vision you have for your **game**. It's also a way for you to sell your **game** idea. Your **game concept** should include exactly what the **game** is and what creating it involves. This includes the story, the art, and how you're going to make money with the **game**

What is a Game Proposal

The game proposal is the complete package you go to the publisher with, proposing they give you a lot of money to develop the game and then spending even more money on your game to market and promote it when it is finished.

What is a Design Document

A Game Design Document (GDD) is a highly descriptive living software design document of the design for a video game. A GDD is created and edited by the development team and it is primarily used in the video game industry to organize efforts within a development team.



Age Rating/PEGI

The Pan European Game Information ratings system is designed to help European consumers make informed decisions when buying or playing video games.

The ratings are as follows:



Suitable for all ages

Recommended for 7 and older. May contain frightening scenes or sounds

Suitable for 12 and older. May contain slight graphic violence or nudity

Suitable for 16 and older. Contains realistic violence or sexual activity

Suitable only for 18 and older. Contains very realistic and extreme violence that may be repulsive to players

3 Act Structure

The three-act structure is a model used in narrative fiction that divides a story into three parts (acts), often called the Setup, the Confrontation and the Resolution or Beginning, Middle and End.

What is Game Structure

Game structure describes the pathways players can follow as they play a game.

Look at Three-Act Structure as some form of "Get the hero up a tree, throw rocks at him, then have him get himself down (one way or another)." Of course, this is a simplified example, but it's the root of story-driven games that are worth the money.

Visual Style

A Visual Style is used to define the appearance of an application. It defines a common style to be used and adopted by multiple components.

Examples:

- Photorealism: Call of Duty
- Cel Shaded: Borderlands
- Abstract: Geometry Wars: Retro Evolved 2
- Exaggerated – Pokémon Black and White

Key Words

Client Brief Visualisation
Diagrams Concept Age
Rating/PEGI Proposal Design
Document 3 Act Structure
Game Structure

Downloadable Content (DLC)

Downloadable content (DLC) is additional content created for an already released video game, distributed through the Internet by the game's publisher.

DLC can range from cosmetic content, such as skins, to new in-game content such as characters, levels, modes, and larger expansions that may contain a mix of such content as a continuation of the base game.

iMedia - Designing a Game Concept– Term 4

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

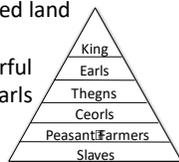
Normally, copyrighted material is protected and cannot be used without permission and payment of royalties. Royalties are usually a percentage of earnings or recurring payment made to a creator or intellectual property owner.

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.

Anglo Saxon Society

Anglo Saxon Society

- Population – 2 million, 90% peasants who farmed land and there were about 6000 Thegns
- Church controlled by Bishops, who were powerful
- Society was in a social hierarchy; King at top, earls ruling the 5 earldoms, Thegns (local lords) in charge of shires, and military figures
- Ceorls (free peasants), Peasants and Slaves worked the land



Anglo Saxon England

- 5 Earldoms: Mercia, Wessex, East Anglia, Kent and Northumbria
- Parts of the North were still ruled by descendants of the Vikings/Danish, called the the **Danelaw with own culture**
- The biggest cities were London and York but the capital was Winchester where the Royal Mint was (where money is made)
- Earldoms were split into shires, shires were split into hides (100 families) and 10 families was a tithing
- 10% of people lived in towns (burhs), which were fortified



Anglo Saxon Government

- King most powerful but took advice from the Witan (royal council) made up of earls and bishops, who provided advice on foreign threats, religious affairs and land disputes. King did not have to listen to advice and did pick the members
- Earls very powerful, with key roles: collecting taxes (they kept 1/3 themselves), oversaw law and order, military generals with considerable power over thegns and housecarls. This made Earls like the Godwin's powerful, almost rivalling Edward himself
- Earls power based on King and thegns, depending on how weak King was and the support of their thegns
- Each shire had a shire reeve (sheriff) who followed kings writ: keep law and order, collect taxes and raise the fyrd (army)

The Economy

- England was a wealth country, trading wool, farming in East and international trading with Denmark with North and Flanders.
- Trading was based around Burhs, which the king taxed, biggest towns were London and Lincoln. Efficient tax system

Legal system

- Collective responsibility, whole tithing had to keep own order
- Wergild, compensation for killing family, to avoid blood feud
- Hue and Cry, community join together to track down criminals

Edward the Confessor and The Succession Crisis of 1066

The King/Edward the Confessor

- The King was the most powerful person in England, chosen by God and all had to swear an oath to him.
- Edward was King from 1042 to 1066, his powers as king included:
- Economic: controlled mint and coin distribution, decided geld tax
- Military: He had the power over army, and could raise for war
- Law: made all laws, owned all land and could give/take it
- Edward was a respected but weak king (not a warrior and spent too long in church), he relied too heavily on the Godwin's who became strong (militarily and economically) and a influence.

The Godwin family

- Earl Godwin was made Earl of Wessex in 1018
- Godwin helped Edward to become King and Edward was married to Godwin's daughter Edith, giving royal connections
- The Godwins were very powerful – they ruled 4/5 earldoms, they were lords to hundreds of Thegns, they had limited military rivals, they convinced Edward to appoint Bishops to the church and had great wealth and influence over England
- Tostig, Earl of Northumbria, Harold, Earl of Wessex
- Edward needed Godwins to protect from Danish threat, whilst Harold and Tostig put down threat of Welsh prince Llewelyn, 1062

The Embassy to Normandy, 1064

- In 1064 Harold Godwinson was sent on an embassy to Normandy by Ed, Anglo Saxons claim it was to recover hostages
- Normans claim Harold came to confirm William to get throne
- He was taken prisoner by Count Guy of Ponthieu – William of Normandy rescued him and then Harold spent time in Normandy with many military victories, William have him sword
- Harold then swore an oath, upon the bible and relics, that he would support William's claim to the throne (William uses later)

Uprising against Earl Tostig, 1065

- In 1065 there was uprising against Earl Tostig in Northumbria
- 1. Northumbrians didn't like Tostig as he was from the south and stayed there too much, he didn't understand Danelaw culture
- 2. People thought he abused his power by imposing new laws, raising the geld tax and taking land from people for himself.
- 3. He didn't defend Northumbria against Malcolm II of Scotland
- 4. He ordered murder of popular Thegn Gospatric, triggered riot
- Edward tried to raise an army to defeat the rebels but Harold refused so he had to give in to the rebels, by replacing Tostig with Morcar and exiling Tostig. Edward seen as a weak king
- Harold possibly betrayed brother so he could get the throne

The Succession Crisis, 1066

Edward the Confessor died on 6th January 1066, leaving no heir starting the succession crisis (who should be king!)
The Witan always had to choose the new King, they had options and were certainly worried of threat from William and the Danes

Reasons for the crisis

1. No Heir

- Edward has no son, therefore not having an heir to the throne
- His nephew, Edgar the Aethling was his natural born heir, as he was Edward's nephew and had royal blood.
- However, as he was only 16 at the time, he had no support of the Anglo Saxon Earls or Witan, who wanted a strong king to face the threats to England.

2. Harold's Embassy to Normandy

- William, duke of Normandy, claims that he made an agreement with Edward in 1051 that he would become king if Edward had no child, which was confirmed by Harold in 1061 during the embassy to Normandy. William had the support of the Pope
- Normans claim Harold Godwinson swore an oath on the bible to support William's claim to the throne, but this is rumour!

3. Promises

- **Harold Godwinson** claimed that Edward had chosen him to be next king on his deathbed. Harold was Edward's deputy, was experienced and had family connections to the king
He had the support of the Earls, Thegns and military power
- **Harald Hardrada** – Harald was king of Norway and a fearsome warrior, he claimed that his relatives had been promised the throne in a secret deal that started when Viking Cnut ruled England until 1035. Hardrada claims the throne was his to claim after he took over from Magnus in 1047.
No strong claim, but felt could gain support from Danelaw, had 15,000 warriors and also had support from Tostig Godwinson

Harold Crowned

- The same day as Edward's death, Harold gets himself crowned by the Witan on 6th January. This looks like he seized the throne!
- The Witan certainly knew William would plan to invade to claim the throne, so historians believe they crowned Harold quickly so they he could prepare the defences for an invasion.
- Soon as he is crowned, Harold goes to York, to ensure North does not protest and raises the largest army England had ever seen
- He places his army and fleet along the coast, waiting for the inevitable invasion from William
- William claims Harold has 'broken' his oath, causing his invasion

The Three Battles of 1066

Battles of Fulford Gate, 20th Sept 1066

- Harald Hardrada and Tostig invade with 10,000 warriors
- They fight Earls Edwin and Morcar just outside York (foolishly not defending the city), they are defeated by the invaders.
- Hardrada outflanks the English, many killed & hostages taken
- Harold Godwinson is now forced to come north himself

Stamford Bridge – 25th September 1066

- Harold surprises Hardrada and Tostig at Stamford Bridge, they had left their armour and some of their troops at their boats
- Harold was victorious, killing Tostig and Hardrada because their armies were tired from Fulford Gate, the surprised arrival of Harold and that his men broke the Viking shield wall



How significant were these battles?

- Distracted Harold from the South; William arrived whilst Harold was in the North
- Harold's troops were tired; some had fought at both Fulford Gate and Stamford Bridge, 400km march

The Norman invasion

- Williams fleet was delayed leaving Normandy, but they left on 27th Sept, arriving 28th at Pevensey where William built a pre made castle, had a feast, harried the local area and began to prepare.
- Harold had to rush down from York, gathering troops/visiting London and arriving at Hastings first

The Two Armies

- Normans: Cavalry (trained, well armoured, cavalry charge devastating) Archers and foot soldiers
- Anglo Saxons: Fyrd (Untrained soldiers with poor weapons and Housecarls (trained, axe wielding)

The Battle of Hastings, 14th October 1066

1. William launches attack at 9:00am with arrows, followed by foot soldiers and cavalry attacks against the English shield wall, but this fails and by 12:00 English hold strong on Senlac hill
2. Rumour William is dead, panic in Normans but William removed helmet and increases morale
3. William ordered feigned retreat, he Norman cavalry pretend to flee (run away) and the English housecarls leave the shield wall to chase them. This happens 3 times, breaking the shield wall
4. In chaos, Harold is shot in the eye, many of the Fyrd flee and Housecarls are cut to shreds
5. By 6:00 William has won the battle

Why did William win?

- | | |
|---|--|
| <p>1. William's tactic and leadership</p> <ul style="list-style-type: none"> • Feigned Retreat Tactic, worked 3 times and broke English shield wall: hugely significant • William changed tactics and used his variety of troops well (archers, foot soldiers, cavalry) • William delayed invasion until Harold was in North • The Normans prepared well, brought castle and first ever cavalry to England | <p>2. Harold's leadership and bad luck</p> <ul style="list-style-type: none"> • Harold's had disbanded fyrd just before invasion • He rushed south to fight William. He could have stayed in London and fought a better better • His men were poorly disciplined as left shield wall • Harold's men were tired from fighting up north and then marching back down South. • Bad luck Harold died and caused panic |
|---|--|

Establishing Control

The submission of the Earls & Williams Coronation

- After Hastings, the Witan immediately elected Edgar as King and William sent troops to seize Winchester (the royal treasure) and marched towards London, he 'harried' the South by destroying homes and farms to intimidate the Anglo Saxons. The tactics work against the weak English
- At Berkhamstead Edgar, Archbishops Ealdred and Stigand, Edwin and Morcar and the Witan submitted to William. They swore an oath to obey him, and he swore to be a fair and just king.
- William was crowned king on Christmas Day 1066.



Rewarding Followers & New Oaths

- **William rewarded his Norman followers:** gifts sent to the pope, a heavy geld tax allowed him to pay off his mercenaries (professional soldiers) and he gave out land to his followers as he declared he owned it all, for example Bishop Odo was given Kent and kept 20% for himself.
- **To encourage Anglo Saxon loyalty,** William allowed Earls Edwin and Morcar to keep their earldoms but they were smaller than before, he promised Edwin could marry his daughter (this did not happen) and he allowed some archbishops to keep their positions.
- However, all those who fought against William at Hastings lost their land.

Securing the Welsh Marches

- William created new marcher earldoms (on the Welsh border) Chester, Shrewsbury and Hereford, given to people like William FitzOsbern for a number of reasons:
 1. **Protection from the Welsh** who had been a threat to Edward, he allowed the Marcher to build castles (80 in Hereford) and did not pay tax so could spend on defence of their lands,
 2. **To reward loyal Normans:** Each Marcher Earl was given independence to run their own earldom, with own sheriffs and powers to set up towns, to encourage settlement in England
 3. **To increase his power & loyalty:** He broke up earldoms to create, Earls more loyal & less threat

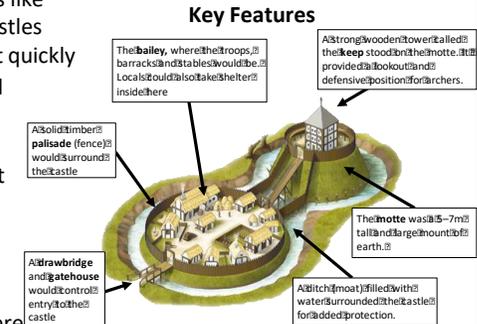


Williams use of Motte and Bailey Castles

- Castles were an essential part of William's rule over England and it is estimated **William built over 500** during his reign. 'Motte and Bailey' castles were quick/easy to build, taken less than 2 weeks.
- William even brought a 'pre made' Motte and Bailey with him during his invasion in 1066.

There were multiple benefits for William:

1. **Control:** Bases for Norman knights in rebel areas like Midlands/North to stop rebellions of 1069/75. Castles were often built 32km apart, making it easy to act quickly
 2. **Symbols of power:** Size showed domination and used to put Norman 'stamp' on areas e.g. York
 3. **Protection:** Built along Marcher Earldoms to protect from Wales (70 built in Shropshire), whilst others built on border of Scotland and on Coast Castles were essential in stopping the rebellions, but were just one method & could be destroyed as they were in York
- The building of castles angered Saxons as many were built by destroying Anglo Saxon houses



Anglo Saxon and Norman Resistance

Edwin and Morcar 1068

Why did they rebel?

- Edwins Earldom of Mercia was made smaller & he never got to marry Williams daughter
- Regents Odo and William FitzOsbern stole Anglo Saxon lands allowed looting whilst in charge, triggering rebellion
- Many Anglo Saxons had lost land
- William ordered a heavy Geld Tax 1066
- Morcar's Earldom (Northumbria) reduced

Events

- Edwin and Morcar flee North and gather rebels, including Edgar the Atheling, Waltheof and Welsh prince Belddyn
- William marches north, attacks Edwin and Morcar's earldoms (Wessex and Northumbria) and builds castles in cities like Warwick and Nottingham to prevent more
- William reaches Northumbria and builds a new castle in York, Edwin and Morcar surrender whilst others flee to Scotland

Results

- Edwin & Morcar imprisoned (but escape to cause another rebellion in 1069)
- The building of castles to prevent rebellions
- William had defeated a weak rebellion, which showed his power but he had failed to prevent a further one in 1069.

Why were there rebellions?

- **Norman rule:** Hatred of Williams rule (high geld tax) and actions of his regents in rule
- **Loss of Land:** Normans took Saxon lands, earldoms were reduced in size
- **Danish:** Invade three times, for gold?
- **Opportunity:** Whilst William away in 1075

How did William deal with rebellions?

- **Castles:** Used to stop 68/69/75 rebellions and launch attacks against rebel areas
- **Bribery:** Paid off the Danish three times, possibly not successful as they kept returning
- **Violence:** Harrying of the North & William openly leading the attacks on rebels
- **Landholding:** Changed who owned lands, forfeited lands

The Anglo-Danish Rebellion 1069

Why did they rebel?

- Hatred of Williams rule and Normans
- January 1069, Robert Cumin (Earl of Northumbria) allowed looting of villages, caused rebellion in York and his death.
- Small rebellion put down and second castle built in York, however much larger rebellion starts in September 1069

Events

- King Sweyn sends 240 ships to invade, where they join with Edgar the Atheling, Edwin Morcar and an Anglo Saxon army
- They attack York, destroy both castles killed 3000 Normans
- Rebellions in North spread around England; Cheshire, Welsh Marchers and in Devon. A serious threat to William
- William heads north but rebels scatter as they are too weak to fight him. William recaptures York
- As Danish are hiding in the marshlands, William pays them off to leave. Shows Danish had no aim to overthrow William

Results

- The rebels had failed, Edgar flees and William regains control of England. Shows how weak rebels are, not united
- William does the Harrying of the North in winter of 1070/71

Harrying of the North, 1070/71

Causes

- **Triggered by 1069 rebellion:** William wanted revenge for attacks and killing of Normans/Robert Cumin
- **Tactics:** One of Williams tactics, used before in 1066 to send message. William was merciless if did not obey him and used fear/terror as a method to get what he wanted
- **Ending rebellion:** Wiping out rebels in North and allies of the Danish in the Danelaw. Harrying would mean no men or resources left for further rebellion, and there was not!

Events

- "Devastation" of the North, 60% of Yorkshire wasteland homes destroyed, crops salted, animals kills, seeds burnt.
- Thousands killed, rebels and innocent, over 100,000 dead.
- Many die of starvation, thousands flee to the Midlands.

Results:

- William builds more castles (Newcastle) to stop rebellions
- From 1071, there were no more rebellions in north, northern rebels and Danish allies had been removed
- 60% of North destroyed, 80,000 less people, 20 years later, Domesday Book, called the area a 'wasteland' and William could not take any tax from the area.
- William changes strategy, begins to replace Anglo Saxon earls with Normans and take lands to reduce rebellion

Hereward the Wake and the rebellion at Ely – 1070-71

Why did he rebel?

- Hereward, an English Thegn, returns from exile to find lands had been given to a Norman and joins with King Sweyn who has returned to England to raid
- **Events**
- Hereward's rebels and the Danish set up on the island of Ely (in the marshlands as it's easy to defend). They began a campaign of guerrilla war
- They raid local areas like Peterborough Abbey and the Danish take all the gold
- Between 1070-71, the Normans struggle to stop as they can't get cavalry across the marshlands
- In 1071, they are joined by Morcar
- William decided to bribe the Danish (again) to leave and they can keep treasures, they leave
- Surrounds Ely, builds a bridge across to send his cavalry and defeats the rebels

Results

- Hereward escaped, Morcar imprisoned and rebels had either hands or feet amputated
- This was the last Anglo Saxon rebellion

Revolt of the Norman Earls, 1075

Why did they rebel?

- Norman Earls Ralph De Gael and Robert De Breteuil and last Anglo Saxon Earl, Waltheof. Met at a wedding
- The men were angry about loss of land, loss of privileges and loss of power e.g. Roger's Marcher Earldom was smaller than his father (FitzOsbern) owned, whilst new sheriffs reduced his power
- Waltheof promised support of Danish
- Planned to takeover when William was in Normandy and split the country in 3

Events

- Waltheof told Lanfranc of the plans
- Lanfranc urges Roger to not rebel, but he ignores so he is excommunicated from church
- Lanfranc and Odo raise a combined Norman and Anglo Saxons army and defeat the rebels. The people support William, first time Anglo Saxons join
- William arrives back when the Danish do, they flee after just raiding York.

Results

- William did now have to be careful of his own earls – Waltheof was executed and Ralph escaped and Roger imprisoned.
- There were no more rebellions at all

Maintaining Royal Power

- Military power, new oaths taken by all men, travelling around the country, using power of ruling land, control of mints/coinage, royal ceremonies and wearing crown

Changes to land ownership

- William owned all land, and gave out as part of the Feudal System, all based on loyalty to him and could be taken (forfeit) if they disobeyed.
- He broke up the big earldoms (Wessex), which reduced Earls power and made them all dependent on him for their land
- William increased his power: to inherit land you had to pay William and if you had no heir, the land went to William.
- William began to take land using forfeit, set up new earldoms (Marcher Earldoms) to help his rule and simply land grabs (taking it!)
- By 1087 less than 5% of the land was held by Anglo Saxon Nobles, majority owned by 10 Norman barons (William personally owned 20%, worth £12,000) & church held 25%
- Tenants in chief given power to take rebellion thegn land and give out for loyalty

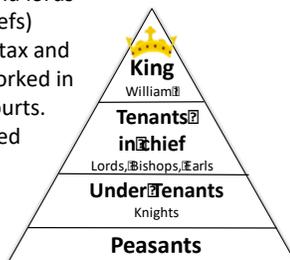


Four Page History: Norman England

Between 1066 and 1088, William I ruled over 'Norman England' and as a result Anglo Saxon England was 'Normanised', changing large parts of the government, church & society

The Feudal System

- To help his rule of England, William introduced the **Feudal System**, which was a hierarchy with William at the top. Simply, he gave out land in return for loyalty (homage)
- Tenants in chief:** These were earls and lords who were given huge areas of land (fiefs) in return for military service, raising tax and dealing with law and order. Many worked in the Witan as advisors, or ran local courts. They got to keep share of tax collected
- Under Tenants:** These were knights who had to provide up to 40 days 'knights service' a year for the king.



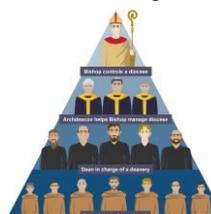
- The king ruled a small area, collecting tax and keeping order. They replaced the thegns, there were roughly 6000 of them. William needed these knights for his military power. This was important as it gave William a private army, loyal to him
- Peasants:** Lived on land but did not own it. They had to do 2-3 days labour service for the knight, farming the land
- Landholding:** When a landholder died, the heir had to pay a relief (money) to William to claim the land, this increased loyalty. William could raise or reduce relief price for most loyal followers
- How did it help William?** William had ultimate control as all land was based on allegiance/loyalty to him, those who failed to do their duty would have their lands 'forfeit', or the threat of it. The system helped William's governance; he had taxes collected, could raise an army loyal to him and law and order was kept. He also used landholding as a method of control, taking the land from Edwin and Morcar, or reducing the size of land to stop threats e.g. Roger and Ralph, but this led to rebellion in 1075

Norman Government

- William centralised power around himself**, he had total control over the feudal system, land/forest, economy (the mint, geld tax), shire reeves (answered to him) & the church (Lanfranc/Bishops).
- Kept Anglo Saxon government of witan for advice and shires/hides/tithings for administration and geld tax of England
- Reduced Power of Earls:** Earldoms now smaller, removed Wessex/Mercia, increased power of sheriffs and Earls had to make new oaths to him. Used Marcher Earls as powerful leaders
- Increased power of Regents:** Trusted followers in charge whilst William in Normandy, had power to rule England. Bishop Odo provoked Anglo Saxon rebellions in 1068, so replaced by Lanfranc, who overcame the Revolt of the Earls in 1075

Normanisation of the Church

- Church in Anglo Saxon England was powerful, under the rule of Archbishop Stigand, however William thought it was corrupt and needed to be controlled.
- Stigand was replaced by William for the following:** he gave out jobs for money (simony), he gave posts to friends (nepotism) and had already been excommunicated by the pope for being a bishop in two different areas (pluralism)
- In 1070 Lanfranc became Archbishop of Canterbury** and was made head of the Church of England and began to use his council of bishops (who met 10 times) to force the following reforms (changes) to England's church:



- More control:**
 - A **new hierarchy** with Lanfranc at the top was enforced, with Norman bishops and Archdeacons given power over priests
 - Strict laws** for priests such as celibacy (no sex) or marriage to be more spiritual
 - Independent **church courts** set up for church crimes, giving the church its own place in the legal system, ran by archdeacons
 - Replacing Anglo Saxon Power**
 - All but one Anglo Saxon bishops were replaced by 1070
 - Within 50 years, every English church was replaced by larger Norman ones, usually in city centres like Norwich to increase a Norman bishop's power and influence over the areas.
 - Development of new monasteries to spread Christian values
- Lanfranc's power:** Lanfranc and the church were very powerful, only 25% of the land, however William had complete control as Lanfranc swore an oath of allegiance to William and not the Pope, whilst William who controlled all decisions, oversaw the church council and had power to appoint/remove/forfeit Bishops..

The Domesday Book

- In December 1085, William ordered a survey of England, called the **Domesday Book** and completed 1086, surveyed 12,000 villages
- England had 1,000 tenants in chief, almost 2 million people
- There were a number of benefits for William
 - Financial:** Valued England's land and wealth (animals, crops etc.) so, William could now tax effectively, immediately set a high Geld Tax in 1086 allowed him to see who was underpaying from his tenants and rule effectively.
 - Military:** Allowed him to know many men he could raise in an army and what supplies he could get. He used this information to raise an army for a potential Danish invasion 1086
 - Legal:** William knew who held the land and could deal with any disputes between landholders & later that year got all landholders to swear a new oath of loyalty, solidifying his rule.

Norman Culture and Aristocracy

- Many Norman aristocrats came over, they only spoke Norman-French using interpreters, showed off wealth with buildings (Westminster), feasts and hunting in royal forest
- Chivalry:** Moral code ruling aristocracy, combined Christianity warriors to dictate actions, e.g. showing mercy in battle
- Penance:** Highly Christian and believed should 'pay' for conquest of England by building churches and prayer, e.g. Battle Abbey
- Landholding:** Norman culture passed land to single heir, this caused a succession crisis after William's death in 1087

Changes to Anglo Saxon Society

- Slaves free under Norman rule
- Number of free peasants (Ceorls) reduced as all peasants now tied to their lord as part of Feudal System. Life remained hard
- Thegns completely replaced by under tenants (knights)
- Norman earls replaced AS, less powerful with oath to William

Shire Reeves and The Forest Laws

- Sheriff (Shire Reeve) replaced by Normans and had powers increased: only answered to the king, raised fyrd, managed castles, kept law and order and managed the King's lands/forest (demense).
- As they were entitled to a share of the taxes, some misused this to raise taxes whilst others took land from Anglo Saxons
- William liked hunting and he made new 'Royal Forests, simply by taking land from wherever
- He was able to make money by charging nobles to hunt there and it showed off his power
- There were harsh punishments (eye gouging) for breaking forest laws (e.g. poaching).
- William seen as unfair by simply taking and it encouraged others to take land too



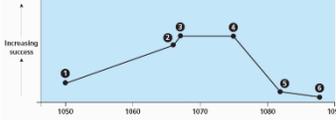
Who was most powerful?

- William:** Certainly most powerful, had complete rule and all others depended on him
- Others did increase power:
 - Lanfranc/Church:** Role in Church
 - Sheriffs:** More independent power
 - Regents:** Ruled as King
- But, all these answered to William and he could remove, as he did earls

Five Page History: William and his family

The life of Bishop Odo

- Odo was William's half brother, he was Bishop of Bayeux in Normandy
- 1066, Odo contributed 100 ships to William's invasion fleet of England and fought at Hastings
- Odo made Earl of Kent and given many other estates (22 counties!), 2nd largest landholder.
- Made regent of England, but caused AS rebellions by allowing the theft of lands and rape of women to go unpunished.
- 1082, Odo is investigated for taking church lands, misruling his earldom and planning to make himself pope: he is imprisoned
- 1088, Odo is released from prison after the death of William, but leads a rebellion against William II. He is eventually exiled.



Who was William I?

- William had 9 children with Matilda, his wife, who was he devoted to and trusted as his regent in Normandy.
- His personality: very religious, would use extreme brutality, wanted to be acknowledged as legitimate King, experienced leader
- The three main children in this topic are: Robert, William Rufus and Henry

William and Robert

- William had a very strained relationship with his son Robert, who he nicknamed 'Curthose', a.k.a. 'Dumpy Legs'
- Robert was a good warrior but lazy and weak-willed, meaning William had little respect for him and wouldn't let him rule Normandy, trusting his wife Matilda instead. This infuriated Robert
- In 1077, William did not punish Robert and Henry for a prank on Robert, so he went into **rebellion against William**
- Robert captured Rouen Castle, but fled and then gained support from the King Phillip of France who gave him a castle close to Normandy which allowed him to raid his father's lands.
- William raised an army to stop Robert, but Robert beats him in personal battle, humiliating William.
- Matilda organised a reconciliation between William and Robert, where William makes Robert his heir to Normandy

The Succession Crisis of 1087

- In 1087, William fell off his horse and he soon died, leaving a crisis over who claimed his Kingdom, but why?
1. On his deathbed **William did not announce who would be king of England**. He preferred William Rufus, but said he would leave it in 'God's hands' to decide, this sparked the crisis as it was unclear
 2. **William did not like his son Robert**, especially after his rebellion, and did not want to leave England to his eldest son. However, this would break Norman inheritance traditions as he was only left Normandy, with Robert feeling England was also rightfully his. William had promised Normandy would be Robert's after his defeat against Robert.
 3. **Robert had support of many Norman barons**, who wanted him to rule England & Normandy, as they hoped to manipulate him
 4. **William wanted his son William Rufus to have the throne**, and wrote a letter to give to Lanfranc, saying to crown him
- Before William died, Rufus went to England and took a letter to Lanfranc, who supported his claim and crowned him William II in 1087. This caused another rebellion led by Bishop Odo and Robert.

Odo and Robert's Rebellion, 1088

- In 1087, Bishop Odo was released from prison and in 1088 he started a rebellion against William Rufus alongside Robert Curthose. Odo thought Robert would be a better ruler of a united England and Normandy kingdom.
- Many Norman nobles were divided because they had two lords, as they had lands in both Normandy and England but most lords, Norman bishops and the Anglo-Saxon population supported William II,
- Rebellions spread across England: In Norwich, Somerset and Wiltshire, these were put down by William Rufus
- Bishop Odo and Robert of Mortain controlled large parts of southern England, they took refuge in Pevensey Castle, William Rufus and the local fyrd, lay siege to the castle for 6 weeks and eventually capture Odo and Roger who surrendered
- Robert Curthose never came to England to support the rebellion, Odo is stripped of his titles, land and exiled. Rebellion failed.

How to answer each exam question

4 Mark Features Question: 5 minutes

Identify and give 2 features with one specific detail.

12 Mark Explain Question: 18 minutes

3 paragraphs that focus on changes, causes, factors in a period. Usually 'Explain why' or 'Explain how'

Three separate points, that explain using specific detail and always link back to the question 'This was important as...'

16 Mark Judgement Question: 25 minutes

Agree Disagree and Conclusion (Can give 2 agree or disagree, you choose)

Must stay focused on how far you agree or disagree and always link back to the question throughout. Include specific detail

For L4 (13+), make sure you balance your point 'However' 'Despite this..'

4 Mark Questions

- Describe two features of Lanfranc's reforms of the English Church
- Describe two features of the Forest Laws
- Describe two features of the Witan.
- Describe two features of the Battle of Stamford Bridge.
- Describe two features of Hereward the Wake's rebellion 1070-71.
- Describe two features of the changes in landownership by William
- Describe two features of the career of Bishop Odo.
- Describe two features of Robert's Rebellion, 1087 to 80

12 Mark Questions

- Explain the changes to the Norman Church made by Lanfranc
- Explain why motte and bailey castles were built throughout England.
- Explain why the English rebellions against William the Conqueror failed.
- Explain why Robert of Normandy rebelled against his father in 1077-80.
- Explain how William controlled England
- Explain why Earl Harold of Wessex became king of England in 1066.

16 Mark Questions

- *The main consequence of the Normanisation of England was that the king became more powerful.* How far do you agree? (16 Marks)
- *The main reason for the failure of the Revolt of the Earls in 1075 was Wulfstan's warning to Lanfranc.* How far do you agree?
- *It was changes in landholding that did the most to secure Norman control of England.* How far do you agree?
- *The main consequence of William I's decisions about the succession was that William Rufus inherited the English crown.* How far do you agree?
- *The main reason why there was rivalry over the throne in 1066 was because Edward the Confessor did not have a son.* Do you agree?

Development Indicators

Development indicators are used to illustrate progress of a country meeting a range of : economic, social, and environmental goals.

Development Indicator	Definition
People per doctor-	The average number of people for each doctor.
Gross Domestic Product (GDP)	The total value of goods and services a country produces in a year.
GDP per Head	The GDP divided by the population of a country, sometimes referred to as GDP per capita.
Life Expectancy	the average age a person is expected to live to.
Infant Mortality Rate	The number of babies who die under 1 year old per thousand babies born.
Literacy Rate	The percentage of adults that can read and write.
Death Rate	The number of deaths per 1000.
Birth Rate	The number of births per year per 1000 people.
Access to safe water	The percentage of people who get access to clean water drinking water .
Human Development Index (HDI)	this number is calculated using life expectancy, literacy rate , educational level (e.g. average years of schooling) and income per head . Every country has a value between 0-1.

Is money the best indicator?

We live in a money orientated world, so doesn't it seem fair to judge how developed a country is money? However, using economic indicators to judge development can actually mislead people for the following reasons:

- Hides **inequality** of distribution
- Ignores all aspects of quality of life, eg well-being, education, life expectancy etc
- Does not acknowledge the cultural quality of life
- Does not count externalities - costs passed to others eg a polluting factory

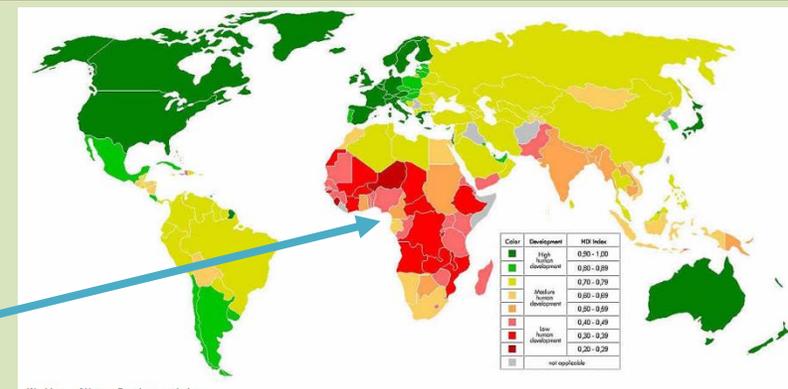
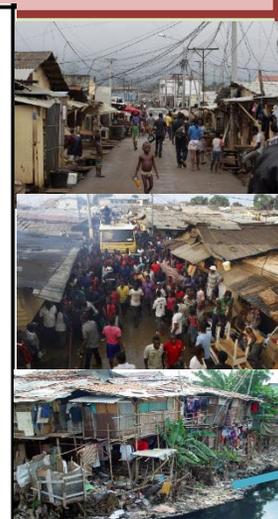
Instead its recommended that we use a mixture of both economic indicators and social indicators to get a fair representation of **development**. One indicators that is considered to be more representative is called **Human Development Index (HDI)**.

Why is HDI a better indicator?

According to **GDP per capita**, Equatorial Guinea (which is located in western Africa) has a value of \$21,557 which would make it a reasonably rich nation. However, we only need to look at the photos to see that is not true. This is because Equatorial Guinea has oil which is exported to different nations. However, the money made from selling oil is not shared equally and is shared between a few very wealthy people. This means that many people are in fact very poor. By using **HDI**, it takes into account the life expectancy, literacy rate and **GDP per capita** to create a more accurate number between 0 and 1 to show development. With a value of 0.655, Equatorial Guinea has a very low **HDI** compared to the UK of 0.95. Although Equatorial Guinea might make money from oil, most people still do not have access to decent education and healthcare and are therefore in **poverty**.

This map shows the **HDI** value for every country. Countries with a greener shade represent a higher HDI value and can be associated with **HICs**, whereas countries with a red shade have a lower **HDI** and can be associated with **LICs**. Nations in the middle normally share similarities with **NEEs (newly emerging economies)**. From this we can see that Equatorial Guineas has a much lower **HDI**.

Equatorial Guinea	
Development Indicator	
GDP Per Capita	21557
HDI	0.655
Life Expectancy	45
Access to doctors	3

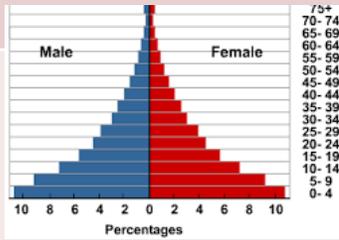


STAGE 1

Current example : Ethiopia

Birth Rate : **HIGH**

- Cultural or religious beliefs
- Lack of contraception
- Compensation of high infant mortality
- Children needed to work on the land



Death rate : **HIGH**

- Prolific disease
- Famine, and malnutrition
- Poor hygiene
- Lack of healthcare and medical science

STAGE 2

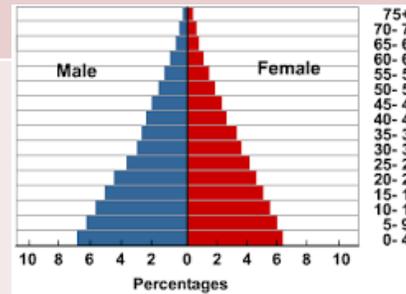
Current example : Bolivia

Birth Rate : **HIGH**

- Same as stage 1

Death rate: **DECLINING**

- improvements in healthcare, sanitation, and clean water
- E.g doctors per people indicator.



STAGE 3

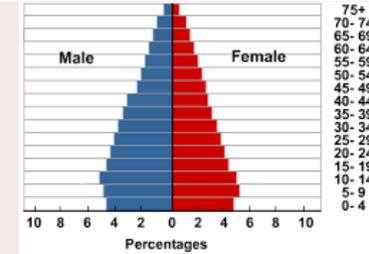
Current example China

Birth Rate: **DECLINING**

- Increased access to contraception and education
- Improved healthcare means infant mortality rate falls
- Industrialization & mechanisation
- Wealth increases; want less children

Death rate: **DECLINING**

- Developments such as underground sewers, medical advancements e.g penicillin, malaria tablets vaccines etc.



STAGE 4

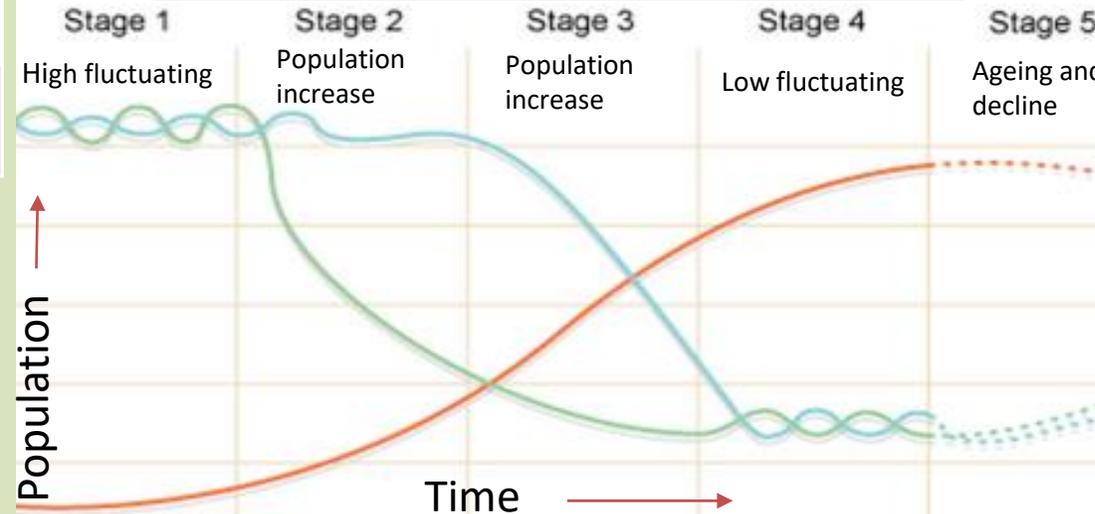
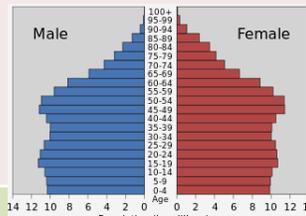
Current example Canada, USA

Birth Rate: **LOW**

- This is due to continued decline of reasons explained in stage 3.

Death rate: **LOW**

- Remains low



STAGE 5

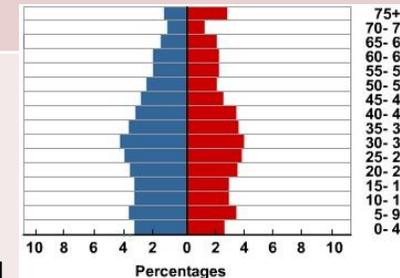
Current example UK, Germany, Japan

Birth Rate : **VERY LOW**

- Emancipation of women, means women focussing on careers, women want children later or less in general.
- Increased education and women's right.

Death rate: **RISE**

- Begins to rise very slightly due to ageing populations reaching the end stages of their life.



The Demographic Transition Model

The word demographic simply means population, and transition relates to change. Therefore this model proposes what should happen to a population over time and how it should change. The Demographic Transition Model graphs birth rate, death rate and population over 5 stages and was actually based on the United Kingdom and how it developed. If birth rate is greater than death rate the population will increase. If the death rate is greater than birth rate the population will naturally decrease. The greater the difference the greater the rate of Natural Increase. The rate of Natural Increase is much higher in developing countries (LICs and NEEs) of the world and many countries in HICs are actually experiencing population decline

Causes of Uneven Development

Physical Causes

- Lack of rainfall
- Reliance of subsistence farming results in food shortages due to extreme, changing climate
- Countries with natural disasters have to spend their money rebuilding
- Few raw materials to export (coal, oil, etc)
- Steep land/poor soil so not much to grow.

Economic Causes

- Over-reliance on exporting primary products (e.g. crops, and other raw materials)
- More wealthy countries can manipulate the prices paid for raw materials
- Poor trade links
- Some countries have too much debt to pay back

Historical Causes

- Deaths as a direct result of fighting/war or disease/malnutrition
- Political instability leading to coups
- European colonisation during the 19th century removed slaves and raw materials
- During civil wars, money is spent on weapons instead of development. Infrastructure is also destroyed

Reducing the Global Development Gap

Microfinance Loans

This involves people in LICs receiving small loans from traditional banks.
 + Loans enable people to begin their own businesses
 - It's not clear they can reduce poverty at a large scale.

Foreign-direct investment

This is when one country buys property or infrastructure in another country.
 + Leads to better access to finance, technology & expertise.
 - Investment can come with strings attached that country's will need to comply with.

Aid

This is given by one country to another as money or resources.
 + Improve literacy rates, building dams, improving agriculture.
 - Can be wasted by corrupt governments or they can become too reliant on aid.

Debt Relief

This is when a country's debt is cancelled or interest rates are lowered.
 + Means more money can be spent on development.
 - Locals might not always get a say. Some aid can be tied under condition from donor country.

Fair trade

This is a movement where farmers get a fair price for the goods produced.
 + Paid fairly so they can develop schools & health centres.
 - Only a tiny proportion of the extra money reaches producers.

Technology

Includes tools, machines and affordable equipment that improve quality of life.
 + Renewable energy is less expensive and polluting.
 - Requires initial investment and skills in operating technology

Consequences of Uneven Development

Levels of development are different in different countries. This uneven development has consequences for countries, especially in wealth, health and migration.

Wealth

People in more developed countries have higher incomes than less developed countries.

Health

Better healthcare means that people in more developed countries live longer than those in less developed countries.

Migration

If nearby countries have higher levels of development or are secure, people will move to seek better opportunities and standard of living.

Case Study: Economic Development in Nigeria

Location & Importance

Nigeria is a newly emerging economy in West Africa. Nigeria is just north of the Equator and experiences a range of social, political economic environments.

Nigeria is the most populous and economically powerful country in Africa.

Economic growth has been based primarily on oil exports.



Influences upon Nigeria's development

Political	Social	Cultural
<p>Suffered instability with a civil war between 1967-1970. From 1999, the country became stable with free and fair elections. Stability has encouraged global investment from China and USA.</p>	<p>Nigeria is a multi-cultural, multi-faith society. Although mostly a strength, diversity has caused regional conflicts from groups such as the Boko Haram terrorists.</p>	<p>Nigeria's diversity has created rich and varied artistic culture. The country has a rich music, literacy and film industry (i.e. Nollywood). A successful national football side.</p>
The role of TNCs	Changing Relationships	Industrial Structures
<p>TNCs such as Shell have played an important role in its economy. + Investment has increased employment and income. - Profits move to HICs. - Many oil spills have damaged fragile environments.</p>	<p>Nigeria plays a leading role with the African Union and UN. Growing links with China with huge investment in infrastructure. Main import includes petrol from the EU, cars from Brazil and phones from China.</p>	<p>Once mainly based on agriculture, 50% of its economy is now manufacturing and services. A thriving manufacturing industry is increasing foreign investment and employment opportunities.</p>
Environmental Impacts	Aid & Debt relief	Effects of economic development
<p>The 2008/09 oil spills devastated swamps and its ecosystems. Industry has caused toxic chemicals to be discharged in open sewers - risking human health. 80% of forest have been cut down. This also increases CO² emissions.</p>	<p>+ Receives \$5billion per year in aid. + Aid groups (ActionAid) have improved health centres, provided anti-mosquito nets and helped to protect people against AIDS/HIV. - Some aid fails to reach the people who need it due to corruption.</p>	<p>Life expectancy has increased from 46 to 53 years. 64% have access to safe water. Typical schooling years has increased from 7 to 9.</p>

Key questions for this topic. Use the command word to help answer them appropriately when instructed to do so.

This could also be used as a revision activity, getting someone else to ask you the question and confirm the answer against your 'master' answer.

Suggest reasons why Nigeria is of global economic importance **(4 marks)**

Describe a physical cause of uneven development of a nation. **(2 marks)**

Describe a historical cause of uneven development. **(2 marks)**

Outline the measures of development that would lead a country to be categorised as at Stage 5 country on the Demographic Transition Model **(3 marks)**

Suggest ways in which HICs may help LICs to close the global development gap. **(4 marks)**

Outline a strategy that an LIC may themselves use to close the global development gap. **(2 marks)**

Key questions for this topic. Use the command word to help answer them appropriately when instructed to do so.

This could also be used as a revision activity, getting someone else to ask you the question and confirm the answer against your 'master' answer.

Using an example you have studied **suggest** how manufacturing industries can stimulate economic development. **(4 marks)**

To what extent do TNCs operating in Nigeria create advantages and disadvantages for the country. **(6 marks)**

For one type of aid, **suggest** how it impacts on the receiving country **(3 marks)**

Outline the environmental impacts of economic development in Nigeria **(4 marks)**

Discuss the effects of economic development on the quality of life of the population **(4 marks)**

To what extent is GDP the best measure of development of a country ? **(9 marks)**

How has the UK's economic structure changed and why? The industrial or economic structure (the type of work people do) of the UK is always changing. In 1841, at the height of the **industrial revolution**, there was a substantial change in the UK's industrial structure, due to the increase in the use of machinery in farming and factories being built and resulting in **urbanisation**.

During the twentieth century, another significant change in the UK's employment structure happened, as **mechanisation** (introduction of robots etc.) occurred in factories, along with increased competition from abroad. In turn, the introduction of public services, the growth of financial services and an increase in leisure time and disposable income led to growth **in tertiary (service) industries**. Since the 1980s, the research and development sector has become increasingly important, particularly in South East England.

What impact does globalisation have on the UK economy?
 The UK economy, like all the others around the world, have been affected by **globalisation**. Business, ideas and lifestyles now spread rapidly across the globe due to improvements in travel, the introduction of the internet and the development of trading blocs such as the EU. This has led to more businesses in the UK owned by companies based in other countries. In the same way, UK companies now own more businesses in other countries. For the UK economy to be prosperous, we need to be part of the global economy. The main impacts of globalisation in the UK include:

Migration	Migrants fill jobs where there is a shortage of skilled workers in the UK, such as in healthcare and construction
Less manufacturing	Fewer goods are manufactured in the UK because they can be imported more cheaply in countries such as China where wages are lower.
Inequality	The gap between the best-paid and lowest-paid jobs is increasing
Outsourcing	Jobs are outsourced to other countries where wages are lower, such as HSBC call centres to India.
Economic growth	In most cases, the UK economy increases by 1-2 per cent each year. This is mainly down to trade with other countries, helping the country to become wealthier over time
Foreign investment	Foreign companies invest in the UK, bringing new ways of working and technology. This provides jobs and skills development to people living in the UK.
Cheaper goods and services	Wages and production have become more competitive, leading to lower-priced products and services

How have traditional industries declined in the UK?

De-industrialisation is the reduction of industrial activity in a region or economy, especially of heavy industry or manufacturing industries. De-industrialisation is one of the most significant (ever) economic processes to occur in the UK and has involved the decline of heavy industries such as coal mining, shipbuilding and steel manufacturing.

During the twentieth century, the UK went from over 3000 coal mines to just 30. The last working deep coal mine in the UK closed in December 2015. This was due to **mechanisation**, increasing costs of extraction and growing availability of cheap imports. Following this, and a move towards more **sustainable energy production**, there has been a rapid decline of imports as our reliance on coal has dropped. Currently in the UK there a handful of surface mines for coal, which produce just enough to support the house coal and heritage steam industries. An industry that once employed 1.2 million people, now employs fewer than 600.

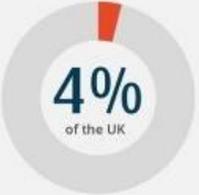
North East England was one of the first **industrialised** regions in the UK. Tens of thousands of people were employed in heavy industry including coal mining and shipbuilding. However, it was also one of the first regions to be affected by **de-industrialisation** with the closure of coal mines and shipyards. This also led to a negative multiplier effect. Many smaller businesses that supplied and supported heavy industries closed, a **knock-on effect** affecting thousands more people. It has suffered huge job losses and a rise in unemployment as factories and industrial sites closed.

How has the government responded to de-industrialisation?
 Successive UK governments have tried a range of strategies to re-energise economic opportunities in North East England, including:

- investing in new **infrastructure** such as roads and industrial parks
- encouraging **foreign investment** e.g. Nissan opened a car plant near Sunderland in 1986 which now employs 7000 people
- setting up a **regional development agency** in 1999, which was replaced by a local enterprise partnership in 2012 which supports businesses, plans for economic growth and training

Regional Profile of the North East

Population



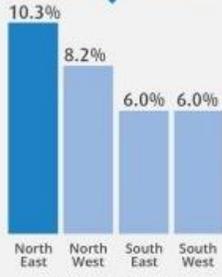
2.6 million
Lowest in England
mid 2012

Median Age

London
34.0 years
North East
41.5 years
South West
42.9 years

mid 2012

Unemployment



Highest in the UK
(2013)

Economic Output



Gross value added
smallest in
England



Weekly Earnings



Median earnings of
full time employers
lowest in England

House Prices



Crime



One of the lowest
crimes per 1000
people (2013)

The UK's post-industrial economy

A **post-industrial economy** is one that replaces manufacturing with service industries (also known as **tertiary industries**). A new sector, the **quaternary industry**, is now developing in the twenty-first century UK. The quaternary industry is sometimes referred to as the '**knowledge economy**' because it involves research and development. This sector includes IT, new creative industries and **biotechnology**. Estimates suggest 10-15% of the UK workforce is employed in quaternary sectors.

The development of information technology has transformed lives in the UK and has encouraged economic growth. Examples of the impact of information technology on lives and economic development include:

- The UK is viewed as one of the top IT countries in the world and receives **overseas investment** as a result. Investment in technology companies totalled £6.3bn during 2018. 1.3 million people are employed in IT
- Homeworking and self-employment due to the development of the internet because information can be accessed anywhere
- Technological developments have led to the growth of specialist manufacturing services along with service and research
- Already, the UK represents a global centre of technology talent, accounting for 5 per cent of all high-growth technology workers employed globally. Only Germany, amongst the UK's European rivals, employs more people in the technology sector.

Services provide support rather than manufacturing products. The service industry is the largest sector in the UK economy both in terms of the number of people employed and **economic output**. Financial services employ over 2 million people and account for 10% of the UK's **GDP**. The UK is a leading financial centre, with London at its centre. Financial services are the most significant contributor to job creation in the service industry, with insurance technology and financial technology employers accounting for 24 per cent and 18 per cent of the high-growth **workforce**, respectively.

Research and development is part of the rapidly expanding **quaternary sector**. It contributes over £3 billion to the UK economy and employs over 60,000 educated people. Research and development involve biomedical, computer and environmental sectors and are linked to UK universities. Research is conducted by the UK government and private companies. Cyber, artificial intelligence and clean-tech businesses are now employing substantial numbers. All three sectors are attracting growing amounts of **investment**, suggesting they may generate even more jobs in the coming months and years.

Science and business parks in the UK

The development and growth of science and business parks have been an important aspect of developing the UK's **post-industrial policy**. **Science parks** are typically located on the edge of university cities. They can be found in cities such as Cambridge, Oxford and Southampton. They have good transport links and usually have attractive environments. Sometimes, science parks are located close to, or within, university grounds. Graduates are often employed to apply their knowledge and experience to innovative businesses. Businesses often have close links to local universities and tap into their research and development. There are over 100 science parks in the UK, employing around 75,000.

Business parks are areas with a small group of businesses in the same area of land. There are hundreds of business parks across the UK. Business parks are often located on the edge of major **urban areas** where there are good communications and the land is cheap. Although there is a broad mix of businesses found here, they can benefit from supplying goods and services to each other.

Developments in infrastructure in the UK

The UK's transport **infrastructure** is increasingly under pressure as car ownership continues to increase and economic development puts pressure on rail, port and airport capacity.

Road	Rail	Ports	Airport
<p>The UK government launched a £15bn road improvement strategy in 2014. The purpose of the plan was to improve the condition and capacity of the UK's roads. The programme has involved:</p> <ul style="list-style-type: none"> The introduction of smart motorways on busy stretches of roads to improve the flow of traffic and reduce congestion. Over 100 new road schemes before 2020. Constructing additional lanes on busy motorways and major roads such as the A1. Over 1600km of new lanes will be added. 	<p>The government is also attempting to improve the UK's ageing rail infrastructure and help encourage economic growth, particularly in the north of England. Developments include:</p> <ul style="list-style-type: none"> Trans-Pennine Rail – Plans are in place to electrify lines between Manchester and York and Liverpool and Newcastle. London's Crossrail - a new underground line to improve east-west connections across London. High Speed 2 (HS2) – This project involves the construction of a high-speed rail network, linking London to Birmingham and one to northern cities such as Manchester, Leeds and Sheffield. HS2 has been very controversial due to its cost, environmental impact and its likely economic impact. 	<p>The future of the United Kingdom's ports is at the centre of a new government program, Maritime 2050, which will create a road map of measures needed to guarantee the country's continued prominence in the global shipping trade. While the government works on the details of the Maritime 2050 plan, the country's privatised ports have already started making a series of infrastructure investments, with spending totalling £1.7 billion by late 2019. One of the most important projects will involve Bristol, where £400 million is being spent to enlarge the docks so that the port can be used by the world's largest container ships.</p>	<p>3.6 per cent of the UK's GDP comes from airports. They are essential to the UK's economic development.</p> <p>Over 750000 flights depart the UK each year carrying 200 million passengers and 2 million tonnes of freight pass through airports. Heathrow is the UK's largest airport. It handles over 70 million passengers every year.</p> <p>The government proposed a third runway for Heathrow in 2016. The additional runway aims to reduce congestion and increase capacity. The proposal is very controversial due to its social and environmental impact. However, it will create thousands of jobs and boost the local economy.</p>

What are the impacts of industry on the physical environment?

In the past, industrial growth has had a significant impact on the environment. Coal mining led to the creation of spoil heaps, vast mounds of waste material removed during extraction. Burning coal, to generate electricity, led to considerable air pollution in cities across the UK. Toxic waste materials from heavy industry have polluted the land and water supplies. **Slate mining** in North Wales turned beautiful mountains inside out and created unsightly, dangerous spoil mountains, most of which, people still don't know what to do with it.

Due to changing attitudes and strict environmental laws, modern industries must be more considerate of their ecological impacts. The majority of industries nowadays develop based on sustainable principles, for example:

Nissan Car Plant, Sunderland

Car manufacturing was not **sustainable** in the past due to inefficient engines producing toxic pollutants, parts that were difficult to recycle and the energy-intensive production processes. However, the situation is very different today. **Over 7000 people are employed by Nissan** at its car manufacturing plant in Sunderland. The factory has become efficient in a number of ways:

- The site has **10 wind turbines** generating 6.6MW and 19,000 photovoltaic panels (solar panels) generating 4.75MW of energy. This equates to 7% of the plant's electrical requirements, enough to build 31,374 vehicles.
- Nissan is developing **electric and hybrid cars**. CO2 levels have been reduced by 22.4% since 2005.
- The Skills Academy for Sustainable Manufacturing and Innovation (SASMI)** supports the industry's future through specialist training. Based at Nissan's Sunderland plant, SASMI provides a training infrastructure for sustainable manufacturing and the low carbon vehicle industry, and a learning facility for employers, apprentices and students, providing new skills for new jobs.

How are rural areas changing?

Rural landscapes in the UK are experiencing significant change. Although the majority of people live in urban environments, 18% of the population live in rural areas. Despite rural areas not appearing crowded, the population in most rural areas is growing due to **Counter-urbanisation**. People are migrating from urban to rural areas for a better quality of life.

Major cities in the UK are generally surrounded by an area of green, open space where development is restricted. Within, and just beyond this, are desirable towns and villages from which commuters can travel to work. Urban areas would have experienced much more significant growth if it was not for the protection of these areas. There is increasing pressure on the UK government to allow development within greenbelts – full of greenfield sites - due to the housing shortage the country is facing. Even rural areas furthest from urban areas are becoming popular with tourists and second homeowners. This is the case in places that are national parks, such as the Lake District and North Norfolk. House prices in rural areas have increased significantly due to the increased demand for housing. The rising cost of properties in rural areas has made homes for local people unaffordable in some areas. This has led to more people having to rent or move to another area where they are more likely to afford to buy a property.

What happens in an area of population decline?

The Outer Hebrides are a group of islands off the northwest coast of Scotland. Since 1901 it has experienced a 50 per cent decline in its population, mainly due to young people moving away. They have migrated to the mainland in search of jobs. The current community is around 27,000, and most inhabitants live on the islands of Lewis.

Social impacts:

School closures could result from fewer children

An ageing population, caused by the migration of young people, will require higher amounts of social care, which will have social and economic impacts

A further decline in the fishing and farming industry due to the ageing population

Economic impacts:

Maintaining transport services such as ferries and other services is very costly

There has been a significant decline in traditional fishing for lobsters and prawns

Tourism has become an essential source of income. However, the infrastructure is struggling to cope with this

Shellfish catches have increased, due to more foreign boats

What is the impact of increasing populations in rural areas ?

Southeast England experiences the most significant pressure on rural areas in England. This is because people with jobs in London want to live in a more attractive environment which brings a range of benefits and problems.



BENEFITS

- An increased population leads to a higher demand for goods and services. This helps ensure the future of rural shops, schools and businesses.
- It provides balance to rural-urban migration, particularly as young people move away in search for better opportunities.
- New people are more likely to invest in new, local businesses and new developments in rural areas provide jobs

PROBLEMS



- Rural areas can lose shops as commuters buy products in supermarkets in urban areas on their way home from work.
- Older people tend to move to rural areas, which raises the average age.
- House prices often increase rapidly due to wealthy newcomers, pushing out local people.
- Car owning commuters do not require public transport, so services may be reduced, affecting local people.
- Modern developments in rural areas cause tensions with the local community, especially when the sale of agricultural land in rural areas can lead to unemployment in the local community

Key terms

Industrial revolution: a rapid major change in the UK economy in the late 18th century marked by the general introduction of power-driven machinery and coal production.

Tertiary jobs : Jobs providing a service such as Doctors, teachers, Civil servants, police

Quaternary jobs: consists of those industries providing information services, such as computing, ICT (information and **communication** technologies), consultancy (offering advice to businesses) and R&D (research, particularly in scientific fields)

Mechanisation: the introduction of machines or automatic devices into a process, activity, or place, often replaces a human workforce for a machine workforce.

Counter urbanisation: is a process contributing to social and demographic change in rural settlements. Changes include outward-migration of those seeking education/employment elsewhere; inward-migration of middle class families increasing house prices.

What is the North-South divide?

The north-south divide is a term used to describe the social, economic and cultural **disparities** between the London and the south-east of England and the rest of the UK.

People living in the south-east typically have a longer **life expectancy**, **higher income** and better **standard of living** than those living in the north. **House prices** in the south-east are higher due to high demand. Rates of **unemployment** are higher in the north as regions continue to adjust to de-industrialisation. The main cause of the north-south divide is **de-industrialisation**, as manufacturing industries, traditionally located in the north have closed. Manufacturing continues to be very important in the north whereas in the south it is not so much. Any changes in manufacturing have a considerable impact on the north. As the northern economy declined the south-east became increasingly prosperous in response to the growth of the financial and service sector and the dominance of London. The growth in incomes led to increased house prices in the south-east. For several decades the UK government and the EU have attempted to reduce the north-south divide by investing in the north. **Assisted area status** has been assigned to areas that are less economically advantaged. New businesses setting up on these areas are eligible for financial assistance. There is likely to be a significant impact resulting from Brexit in areas supported by these schemes.

The North East had the highest unemployment rate in the UK

Unemployment rates by region, seasonally adjusted, March to May 2019 UK regions



What is the place of the UK in the wider world?

The UK was once one of the world's most powerful political and trading nations. The British Empire covered almost one-third of the Earth's land surface, with colonies all over the world. Many of the former colonial countries gained independence in the twentieth century. The Commonwealth is one of the world's oldest political associations of states. Its roots go back to the British Empire when some countries were ruled directly or indirectly by Britain. Some of these countries became self-governing while retaining Britain's monarch as Head of State. They formed the **British Commonwealth of Nations**. Besides the Commonwealth, the UK also has political, economic and cultural influence through organisations such as the **UN**, **NATO** and the **G8** group of nations. The UK remains one of the world's major economies and is a **global financial centre**. The UK is also highly regarded for its democratic values, legal system, rich cultural heritage, values and fairness.

The UK's main trading partners are the EU, USA and China. Germany is the primary source for **imports** and the USA the leading destination for **exports**. Following Brexit, the UK is likely to develop stronger trading links with India, China and the USA. The internet is becoming increasingly important to UK businesses in the creative and financial sectors.

The UK is an important hub, for the global network of submarine telecommunications cables, linking Europe to the USA.

What are the UK's political and economic links with the European Union (EU)?

The UK joined the EU in 1973. Today, the EU consists of 27 countries. It is one of the world's largest trading blocs and has considerable political and economic influence. In 2016 the UK opted to leave the EU (Brexit).

Top 10 UK trading partners (2017)

TOTAL TRADE RANK

Country	Total trade £bn (% of total trade)	% change since 2016	UK exports £bn, to (% of total exports)	% change since 2016	UK imports £bn, from (% of total imports)	% change since 2016
1 United States*	183.2 (14.6%)	↑ 9.9%	113.8 (18.4%)	↑ 11.2%	69.5 (10.8%)	↑ 7.9%
2 Germany	134.9 (10.7%)	↑ 10.5%	56.4 (9.1%)	↑ 13.1%	78.6 (12.3%)	↑ 8.7%
3 Netherlands	85.7 (6.8%)	↑ 13.9%	38.6 (6.2%)	↑ 13.4%	47.1 (7.3%)	↑ 14.2%
4 France	81.4 (6.5%)	↑ 12.1%	41.0 (6.6%)	↑ 16.3%	40.4 (6.3%)	↑ 8.0%
5 China	67.0 (5.3%)	↑ 13.8%	22.1 (3.6%)	↑ 25.5%	44.9 (7.0%)	↑ 8.8%
6 Ireland	58.7 (4.7%)	↑ 18.1%	36.7 (6.0%)	↑ 25.1%	21.9 (3.4%)	↑ 7.9%
7 Spain	48.6 (3.9%)	↑ 5.6%	17.3 (2.8%)	↑ 8.1%	31.3 (4.9%)	↑ 4.3%
8 Belgium	47.1 (3.7%)	↑ 11.6%	19.3 (3.1%)	↑ 20.5%	27.9 (4.3%)	↑ 6.2%
9 Italy	43.1 (3.4%)	↑ 4.6%	19.3 (3.1%)	↑ 2.8%	23.8 (3.7%)	↑ 6.2%
10 Switzerland	32.1 (2.6%)	↓ -7.1%	20.0 (3.2%)	↓ -2.2%	12.1 (1.9%)	↓ -14.1%

Key questions for this topic. Use the command word to help answer them appropriately when instructed to do so.

This could also be used as a revision activity, getting someone else to ask you the question and confirm the answer against your 'master' answer.

Suggest causes of deindustrialisation in the UK **(3 marks)**

Describe how a government strategy has led to a change in employment structures in the UK **(2 marks)**

Using an example you have studied **explain** how modern industrial development can be made more environmentally sustainable **(4 marks)**

Explain the potential benefits science or business parks could bring to the UK **(4 marks)**

Key questions for this topic. Use the command word to help answer them appropriately when instructed to do so.

This could also be used as a revision activity, getting someone else to ask you the question and confirm the answer against your 'master' answer.

Compare the social and economic changes in rural areas whose populations are shrinking, or growing **(4 marks)**

Describe how the UK is improving its transport infrastructure at a national level **(4 marks)**

Discuss strategies used in attempt to resolve the North-South divide in the UK **(4 marks)**

Outline one potential problem resulting from Brexit **(2 marks)**

Beliefs about Evil and Sin

Christianity

The act is **evil not necessarily the person**. This way there is always room to repent (say sorry) and God to **grant forgiveness**.

God gave people **free will** so people can make their own mistakes and turn to evil

In order for there to be good there must be evil – **natural balance**

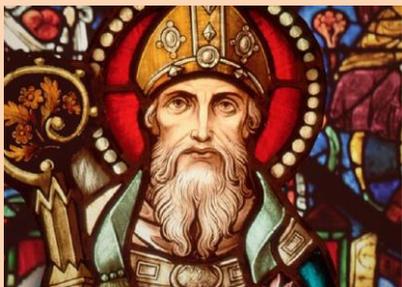
Some Christians believe that everyone was **born with sin** – from the **Original Sin**. This idea came from **St Augustine**. Therefore infant baptism is encouraged. Everyone must earn God's love.

Islam

Iblis (or the devil) will **tempt** Humans to be wicked.

Religious believers **use the story of Original Sin** to learn about evil – the devil tempted Adam and Eve and they were banished from Eden.

This is Christians too



IMPACTS

Forgiveness
Be aware of actions
Test from God

BVT – Crime and Punishment

Key Terms

- Sin
- Evil
- Hate crime
- Terrorism
- Reformation
- Deterrence
- Retribution
- Capital punishment
- Corporal Punishment
- Payback
- Victim Support



Crime is caused by many factors such as greed, poverty, environment, upbringing, friends etc.
Crime can be categorised into **3 groups**: Crime against a person, crime against property or crime against the state.

Hate crime is also on the **increase**. This includes showing hate / prejudice towards different groups. There are over **100 hate crimes reported every day** in England. Most common hate crime is **prejudice towards religious groups, sexual preference and race**. Most crime is shouting abuse but can often be physical attacks or attacks on people's property.

Terrorist acts: ISIS claiming responsibility to show discontent with the **nature and way we live our ideas** in the west. Recent examples include: Manchester Bombing and London bridge attacks both in 2017.

Christians, Buddhists and Muslims are against all crimes:

Against violent crimes e.g. Terrorism:

Religions are against crimes against a person as this **displays violence**, these religions are **pacifists**

Violence goes against Buddhist ideas of the **5 precepts**.

“Hatred will not cease by hatred , but by love alone” Dali Lama

“Blessed are the peacemakers” – Jesus, against war / violence

Crimes against individuals e.g. Hate crimes

All religions show **acceptance of equality and are against prejudice**

Christianity: The **Good Samaritan** and *“Neither Jew nor Greek, slave nor free, male nor female, for you are all one in Jesus Christ”* Bible

Muslim practices show equality among groups: 5 pillars show beliefs and actions are equal.

Types of crime



Types and Beliefs about Punishment

There are 3 aims or types of punishment:

Reformation - To help the criminal reform their behaviour so they do not commit crime again

Deterrence – to show / warn others not to commit crime otherwise they will be punished

Retribution – to seek justice for the behaviour of the criminal

Electronic tagging as a punishment

- This is used when inmates are released from prison and they can be tracked where they go
- It is used so the remainder of a sentence can be served at home
- The inmate can be monitored and they are not allowed out at night.
- This system can be used for between 1 month and 1 year of the last part of a sentence.
- Electronic tagging frees up space in prisons



Retribution Deterrence Reformation

Christianity	Buddhism	Islam
<p>For Reformation: Forgiveness of crimes – <i>“We forgive those that trespass against us”</i> Lord’s Prayer The law has the right to punish and care for a criminals while trying to reform them</p>	<p>For Reformation: Buddhists believe that criminals need to understand the impact of their crime on others and to help criminals to adjust their ways. Against Reformation: Buddhists encourage forgiveness, however understand that sometimes it can be too hard, in some circumstances. If suffering is too great, forgiveness can be hard.</p>	<p>For Reformation: Islam also talks about forgiveness. <i>“Those who pardon... are rewarded by Allah”</i> Qur’an</p> 
		<p>For Deterrence: Some Islamic countries use corporal punishment to deter others, such as lashings.</p>
<p>Against Retribution: Jesus taught to <i>“turn the other cheek”</i> to avoid revenge Christians are against corporal punishment. Jesus was flogged before going on the cross.</p> <p>For Retribution: However, some Christians may believe in retribution - the old testament <i>“An eye for an eye and tooth for a tooth”</i></p>	<p>Against Retribution: Buddhists are against corporal punishment as it goes against the 5 precepts (harming others)</p> 	<p>For Retribution: The Qur’an states a punishment for a thief is having their hands cut off. Islam teaches <i>“A life for a life”</i> In Iraq stoning to death is used as a capital punishment for adultery and homosexuality <i>“If your lusts on men in preference to women.... we rain down on them a shower of stones”</i> Qur’an</p>

Community Service or payback



- Community service is also known as payback because criminals are giving back to the community.
- It consists of working in the community for **40-300 hours** (could be 3-4 days a week)
- Cleaning is often used as community service
- Crimes for which this is a punishment are often damage to property or drink driving



Corporal Punishment

- ❖ Corporal punishment is physical punishment e.g. flogging or beating
- ❖ Christians see this as unjust and unnecessary and reminds them of how **Jesus was whipped and tormented before his death** by the Romans
- ❖ In the UK corporal punishment has been banned since 1980's in school, though it is still legal for parents to hit their own children.
- ❖ However the **Human Rights Act of 1998** bans corporal punishment
- ❖ Examples of corporal punishment are in Islamic countries such as Iran where stoning is legal and practiced

I agree with prisons; However am against suffering. Therefore prisons must have good conditions; where there is little drug use, assault and self-harming, overcrowding etc.



Prisons don't work as many inmates reoffend this was **29% in UK in 2019**. Maybe we need more retribution punishments like in Islamic countries using Shari'ah Law



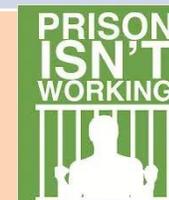
UK Prisons

Benefits of UK prisons

- Acts as deterrent to others
- Prisoners can be reformed before their release
- It protects society
- Education and paid work programs provide opportunities for prisoners
- Support for mental health / counselling available
- **Prison reform Trust:** is a charity which helps by improving treatment and conditions for prisoners and their families

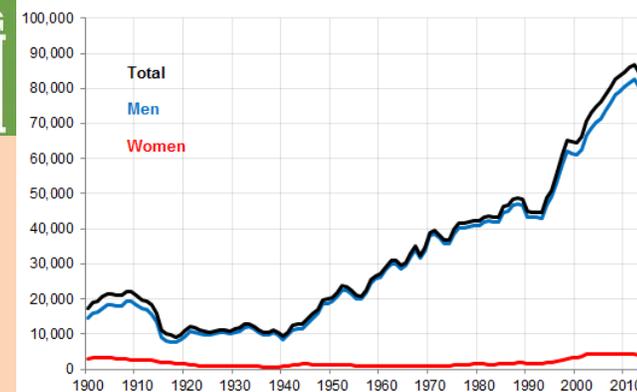
Problems in UK prisons

- Self-harming of inmates has increased
- Assault between prisoners has increased – tripled since 2013
- **Staffing** – over a third of officers have less than 2 years experience
- **Drug use** has increased since 2015 after years of it declining
- **Overcrowding** – 80,000 prisoners in England and Wales in 2019 (increase from 35,000 from 1970).



Prison population

Number of male and female prisoners, annual average, England and Wales



By Full Fact using offender management statistics annual, 2013, Ministry of Justice

Prisons work well as reformation. Providing the opportunities to reform with education and work based schemes so inmates can fit back into society so they do not reoffend



Impacts of Punishment:

Reformation:

- In prisons systems in place to support reform: Jobs, counselling, education
- Community service so criminals can see the errors of their ways and **give back to their community**
- Criminals have time to reflect on their crimes
- **This all leads to forgiveness**
- Community service – Criminals can give back to the community in a positive way. For small crimes is good, so that small time criminals **do not mix and get caught up with worse criminals at prison**

Deterrence:

- Long prison sentences issued; however now shorter sentences and electronic tagging is used more to **free up space in prisons** because of overcrowded.
- Corporal and capital punishment used frequently to deter in some countries
- Community service does not work as a deterrent as its punishment is **too soft.**

Retribution:

- **Shari'ah Law** show retribution as stated in the Qur'an: A thief's hand is cut off
- Capital and Corporal punishment gets justice for the victims. This can also serve as **humiliation as part of retribution** e.g. stoning / honour violence/abuse. This may lead to **prejudice** against religious belief
- Religious groups will **campaign against retribution** crimes e.g. death penalty
- However some argue it cannot bring a loved one back to life if murdered.



Support for victims of crime

- Counselling for emotional support, support of rape and abuse victims
- Practical support – how to report crimes, what will happen at court etc
- Rights support – what rights do victims have?
- Support for younger victims
- Support for those that don't speak the language
- **It important that victims forgive their perpetrators so they can move on and let go of their anger. Not forgiving can lead to resentment and also fear.**
- **Religious believers may feel that suffering as part of being a victim is a test from God: Like the story of JOB**

Story of Job

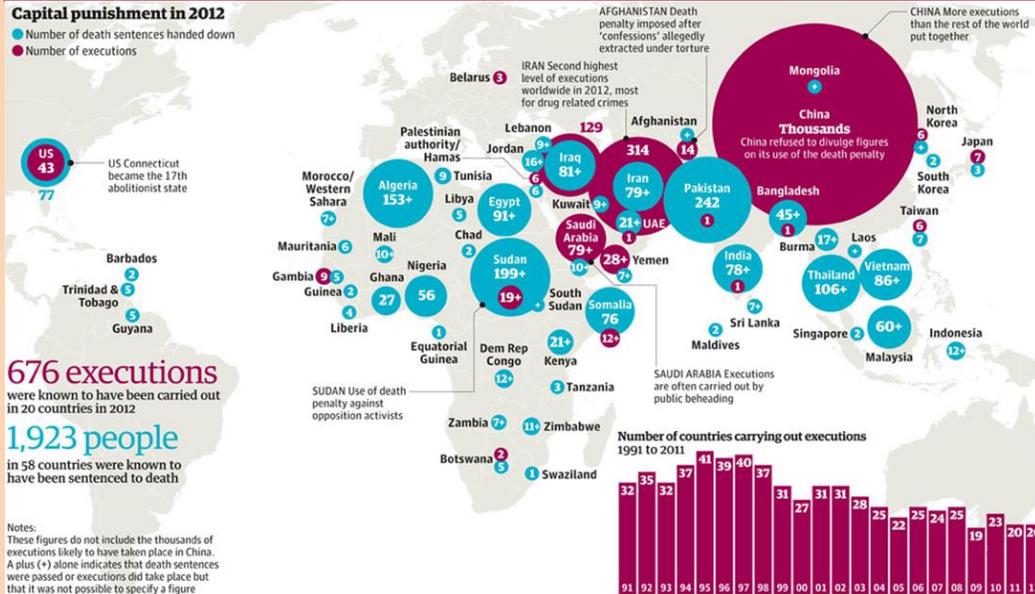
JOB's faith was tested as he suffered the death of his children, his cattle and farm was destroyed and he became very ill. He remained faithful through this suffering and God rewarded and saved him.



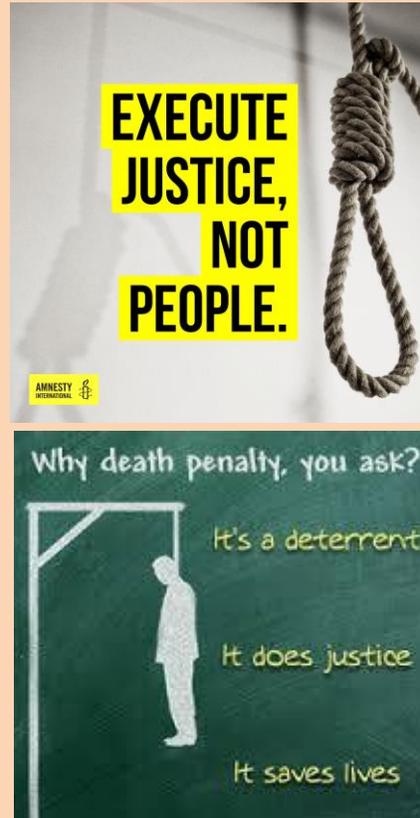
Where has the death penalty?

Saudi Arabia, Iran – though **China** has more executions than all the countries put together in 2012.

In the USA most states (32) have the death penalty. Texas has executed more than any other state.



Death penalty



FOR the death penalty

- **Retribution** – murders should pay for the life they took away
- Some argue it is a good **deterrent** of crime
- Some argue it brings **justice** for the families who are grieving
- **Prisons** are overcrowded and costly
- **Life sentences** do not mean life! Murders walk free on average after 16 years
- It totally **protects** society from that person

AGAINST the Death penalty

- It is **cruel, barbaric and uncivilised** for the modern world – this can be firing squad, stoning, even lethal injection can be painful
- Killing someone for murder is a **contradiction**
- Some **convictions are based on prejudice** e.g. of race, sexuality or gender
- What if **new evidence** comes to the case, the person will already be dead

Religious ideas FOR the death penalty

- **“A life for a life”** – Islam
- Islam teaches - If a man is killed unjustly, his family are entitled to satisfaction of his death
- Shari’ah Law punishes breaking the law of murder, homosexuality and adultery with the death penalty. In Islam this is disrespecting the community and Islamic laws.
- **“An eye for an eye, a tooth for a tooth”** Old Testament
- God is just and justice must be served e.g. **original Sin** – God punishes sin

Religious ideas AGAINST the death penalty

- Christians should be given the opportunity to repent and ask for **forgiveness**
- Forgiveness brings justice – Lord’s prayer
- **“Pray for those that persecute you”** Jesus
- Ten Commandments – Thou shall not kill
- **“I your God give life, and I take it away”** Bible
- Buddhists believe in **Karma** – consequences have consequences.
- Buddhists do not harm other living things – **5 Precepts**

Impacts

This can result in fear, hatred and anger of those in charge – in communities or the government

The death penalty can show injustice when issued to crimes such as adultery or homosexuality. This can isolate and force unacceptance and persecution of groups such as homosexuals

Countries can be divided over their beliefs e.g. USA States – and forced to operate different laws

Campaigns can protest against such laws e.g. Amnesty International speak out against these laws

Scan the QR code to read about the **Rodney Reed** case:



SCAN ME

The Five Pillars

Shahadah

This is the first pillar means **Declaration of the Islamic faith**. Muslims repeat the words of the Shahadah to show their faith and commitment to Allah. The first line is: **“There is no God but Allah, Muhammad is the messenger of Allah”**.

The Shahadah is therefore spoken at very **important** times: it is the call to prayer, spoken to new born babies and to Muslims just before they die.

Salah – Prayer

Muslims prayer a 5 times a day, the **importance** of this is:

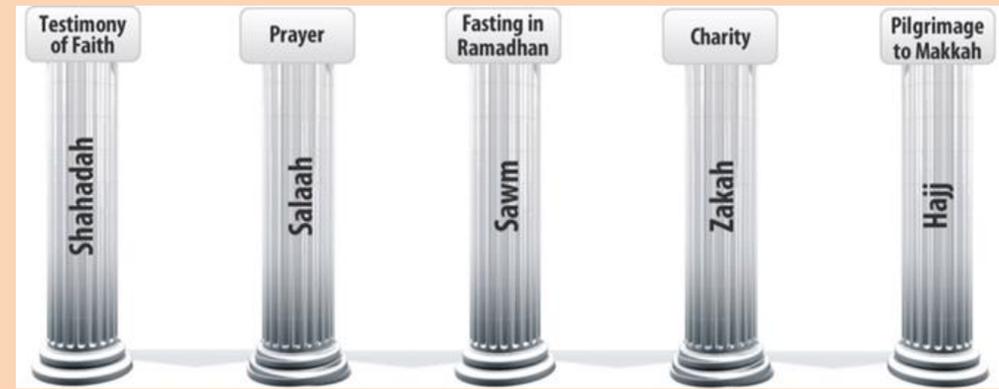
- It is frequent because otherwise Muslims sins would build up
- Rewarded by Allah in Heaven

Muslims also pray in a large group at Mosque. Men gather at the mosque, women often pray at home. This strengthens the idea of **Ummah** (which translates as Brotherhood) or community.

Islamic Practices

Key vocabulary

Shahadah
Salah
Adhan
Wudu
Rak’ah



How do Muslims pray?

Muslims are called to prayer (this is called **Adhan**). The call is called out from the Mosque, it uses the words of the Shahadah.

Before prayer Muslims perform **Wudu**. This is to wash before prayer. This is to be physically clean before praying to God.

Muslims pray using the movements of **Rak’ah**.

These are special movements with set words. This is a set routine that is used every time a Muslim prays.

The first 2 lines of prayer/Rak’ah are the words of the Shahadah.

The **importance** of this is:

- A Connection to Allah – this is shown in the Qur’an quote **“Prostrate and draw near to Allah”**
- Strengthens faith and dedication and praise of Allah

Friday night Prayer – called Jumu’ah

This happens only once a week
Adhan - call to Prayer given
Wudu performed
The Imam gives a sermon
The congregation are given direct spiritual guidance as part of the sermon
The sermon may be about local or global issues
It finishes with Rak’ah

Regular daily Prayer

Daily prayer is conducted 5 times a day
Adhan - call to Prayer given
Wudu performed
Rak’ah is performed
It is a set prayer of words and movements, with no sermon



The Five Pillars

Sawm

Sawm means fasting. It happens during the Islamic calendar month of **Ramadan**.

It is a celebration of a past event. The past event being the Night of the power. This is the night that Muhammad was visited in the cave by Jibril and chosen as prophet.

“Ramadan is the month in which the Qur'an was sent down as a guide to humanity” Qur'an

What happens during Sawm?

- ❖ Fasting from sunrise to sunset
- ❖ Refrain from sexual activity
- ❖ Consider behaviour to others
- ❖ Time should be spent reflecting praying not wasted on material things e.g. watching TV
- ❖ Get up before dusk and eat something. Then after sunset have a meal with their family.
- ❖ Many Muslims go to mosque in the evening for prayers.

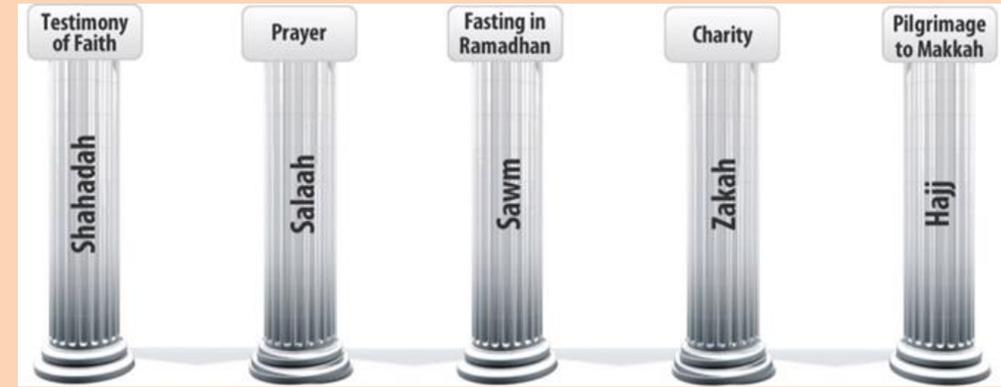
Why is Sawm important?

- Sawm remembers the importance of Muhammad and therefore his teachings. (see quote above)
- Sawm develops Muslims determination, faith, resilience; it stops cravings and desires and allows Muslims to reflect and focus on their religion.
- Sawm also brings Muslims closer to Allah, showing them the right path for their life, it is also a month for forgiveness.
 - Zakah given this month demonstrating what Muslims have (e.g. money, possessions, food) and what others do not. That they should not to take things for granted.

Islamic Practices

Key vocabulary

Sawm
Fasting
Ramadan
Zakah
Alms



Zakah

Zakah is giving **Alms** – this means giving to charity. Giving Zakah is a duty for Muslims – as part of the 5 pillars.

Muslims give **2.5%** of their annual income and savings as adult. It is paid by all Muslims after debts, expenses are taken out and of those Muslims who have money left over. Therefore if you have nothing left after rent, food etc it is not paid. For this reason it is not a tax as you only pay if you can.

The Qur'an promotes Zakah as it says “**Be steadfast in prayer and giving**”.

Importance of Zakah

- Purifies Muslims by showing they have no greed – they are blessed by Allah for this giving
- By giving they will be rewarded by their actions on judgement day
- Zakah can be given to charities to support poverty in Muslim communities but also in other world wide communities.

Watch this clip about Ramadan and Sawm:



The Five Pillars

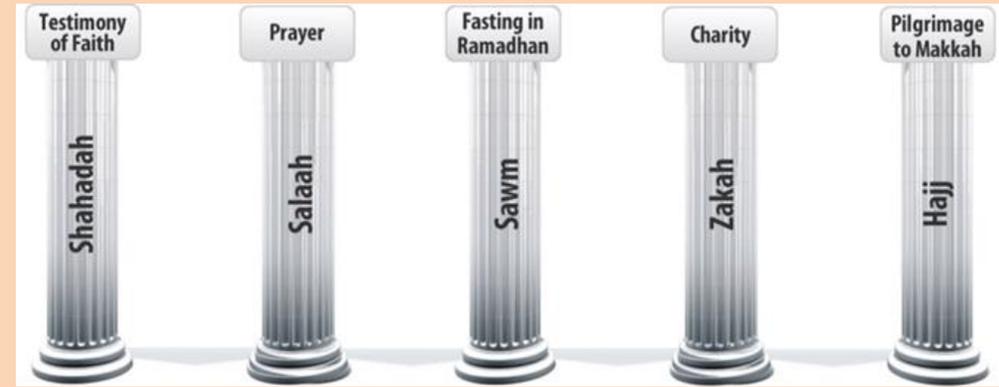
Hajj – Pilgrimage

- All Muslims are expected to take part in Hajj at least once in their lives. It happens once a year for a 10 day period.
 - Everything that happens at Hajj has meaning and **Significance in its actions or the Places** where it is set, hence why the pilgrimage has a **set route**, around the cities of Mekkah and Medinah.

Islamic Practices

Key vocabulary

- Hajj
- Mekkah
- Medinah



Below are some of the KEY places and their significance that are visited during Hajj



Place	What happens here?	Why is it important? Significant?
Ka'aba and the black stone.	The Ka'aba shrine is covered each year in black cloth embroidered in gold. Muslims perform Tawaf – walking around the ka'aba 7 times.	The black stone is said to have been given by Jibril to Adam. The Ka'aba was built around the sacred black stone (first by Adam, then Ibrahim). These are the oldest shrines to Allah on earth . The circling re-enacts Muhammad smashing idols to convert Mecca to Islam.
Zam well	Muslims drink water from the well	The well was given to Ibrahim by Allah for his wife and step son Ismail, when they were searching for water. It represents for Muslims how water is essential for life and Allah is also essential for life . It shows how Allah will provide for them .
Mount Arafat (Also called mercy mountain)	A hill Muslims climb up. Muslims pray for forgiveness for their sins here.	Muhammad gave his final sermon here. It is believed that all sins can be forgiven here.
Madinah	The prophet's mosque is here with Muhammad's tomb . Muslims visit this sacred place.	Madinah was the first city Muhammad converted to Islam. Muslims believe no prayer will be unanswered here.

Festivals of Islam

Eid Ul-Fitr

What is Eid Ul-Fitr and how is it celebrated?

- ❑ This is the festival at the **end of Swam during Ramadan**
- ❑ Muslims are allowed the day off school and work
- ❑ People greet each other “Eid Mubarak”
- ❑ The fast is broken by eating dates
- ❑ At mosque morning and evening Eid prayers are said and the importance of Zakah is explained
- ❑ Families meet up and celebrate: Cards and presents are exchanged, new clothes and a special evening meal.

Why is Eid Ul-Fitr important?

Eid Ul-Fitr is the celebration of completing Swam through Ramadan and the giving of Zakah. Therefore its importance is...

- ❑ In giving Zakah to needy /helping others, sharing Allah’s wealth
- ❑ A celebration that Muslims have completed Ramadan.
 - That Muslims have given up material things and focused on their faith and family
 - Showing good behaviour - respectful, kind and humble to others.
 - Focused truly on Allah for the month.



Islamic Practices

Key vocabulary

Eid Ul-Fitr

Sawm

Ramadan

Zakah

Eid Ul-Adha

Ashura

Musa

Israelites



Look at these news stories / photos to show celebrations of Eid Ul-Fitr:



Eid Ul-Adha

This translates as **Festival of the sacrifice** and relates to the story of **Ibrahim**. It is celebrated at the **end of Hajj**.

How is it celebrated?

The Sacrifice of a Lamb is split 3 ways:

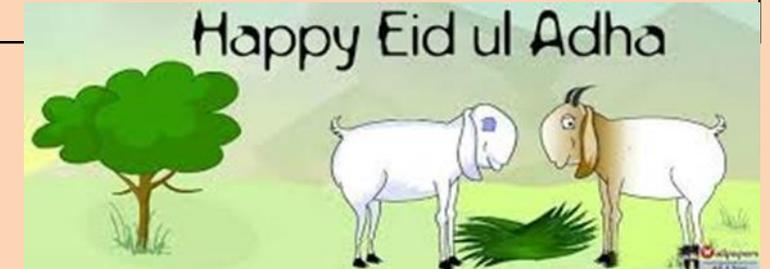
1. 1/3 for family
2. 1/3 for relatives, friends, neighbours
3. 1/3 for the poor

Though more families now give money to charity instead of a slaughter New clothes are brought and Muslims go to Mosque. Eid prayers are read and Muslims are reminded of Ibrahim's sacrifice for Allah.

Why is it important?

Muslims observe this Festival in respect and remembrance of Ibrahim, who showed devotion and faith to Allah

It shows Muslims that they should be able to submit to Allah for their faith and you shall be rewarded; just like Ibrahim.



Festival of Ashura

This Festival is a celebration which recognises how **Allah helped prophet Musa (Moses) escape the persecution of the Egyptians**. The Israelites escaped with Musa (Moses) on the **10th** day (Ashura means 10th). On this day the Israelites and Musa fasted in the desert. For this Festival Muslims also fast on this day in recognition of Prophet Musa and for forgiveness.

How do Shi'a Practices differ?

10 obligations of Shi'a Islam

These are the **Shi'a equivalent of the Sunni 5 pillars**.

10 obligations have 4 of the 5 pillars in – Salah, Hajj, Sawm and Zakah.

The 10 Obligations DO NOT have the Shahadah

The 10 Obligations also have some other duties:

- Khums – a different charity / alms giving
- Showing Maroof – is guiding others towards good. E.g. encouraging charity, helping others, fighting against injustice.
- Munkar is forbidding evil e.g. rejecting Shaytan (Satan)
- Tawalla is expressing and showing love to others
- **Jihad: Greater** = spiritual. . **“The person that struggles so that Allah’s Word is supreme is the one serving Allah”** - Muhammad
- **Lesser Jihad** = preserve and defend Islam
- Tabarra is showing hatred to those that oppose Allah. Some may argue that this links with Lesser Jihad and Holy war. Fighting against others in the name of Allah.

Khums

Shia Muslims pay **20%** on their annual wealth after expenses/debts are paid.

Khums are split 6 ways:

- ❖ Allah
- ❖ Muhammad (now this section goes to religious teachers)
- ❖ Relatives of Muhammad
- ❖ Orphans
- ❖ The poor
- ❖ Anyone who is away from their home and in need

This would create lots of money for the needy however only 10-15% of Muslims are Shi'a.



Islamic Practices

Key vocabulary

10 Obligations
Khums
Maroof
Munkar
Tawalla
Tabarra
Jihad



Salah – How is pray different for Shi'a Muslims?

1. Shi'a Muslims pray **3 times**. However – they do the same amount of pray / Rak'ah, but fit it into 3 sessions.
2. A wooden block or clay tablet signifying the Holy city for Shia Muslims is touched when praying
3. When Shia Muslims pray it is to affirm Muslims humility to the power of Almighty Allah.
4. Wudu must also be seen as purifying the heart (as well as body) before standing in front of Allah

How is Sawm different?

For Shi'a Muslims: Swam is about giving generously at Ramadan, but also to think about **Judgement day** – to remind themselves to reject evil. Swam helps them grow spiritually and will therefore be stronger to reject evil



Festival of Ashura

Its importance:

This festival is a **remembrance festival for the Death of Hussain**:

Therefore it is a mourning Festival, one of sadness.

It remembers Hussein (Grandson of Muhammad) who was a Shi'a Islamic leader. Yazid tried to seize power from Hussain which led to the battle of Karbala on the 10th day of the month (Ashura means 10th). Hussein and his family tried to flee, but were captured and murdered by Yazid

What happens?

- Muslims wear black and Mosques are covered with black cloth
- After afternoon prayers poems and the story of the murder is told
- Many Muslims will find it very upsetting and will cry, Some Shi'a Muslims will whip themselves in sorrow (though this is now less common)

GCSE FRENCH YEAR 11: SOCIAL / WORLD ISSUES; ROLE PLAYS; EXAM PREPARATION

la pauvreté (*poverty*)
la guerre (*war*)
la sécheresse (*drought*)
l'inégalité (*inequality*)
l'inondation (*flood*)
la violence
l'extinction
le déboisement (*deforestation*)
le chômage (*unemployment*)
le réchauffement de la planète (*global warming*)
l'effet de serre (*greenhouse effect*)
le monde (*the world*)
les sans-abris (*homeless*)
le harcèlement (*bullying / intimidation*)
le réfugié (*refugee*)
le cauchemar (*the nightmare*)
le souci (*worry / concern*)
la manifestation (*demonstration*)

je pense que / je crois que... (*I think / believe that*)
à mon avis (*in my opinion*)
plus...que / moins...que (*more than / less than*)
le / la plus (*the most*)
le plus grand problème (*the biggest problem*)
sévère (*severe / strict*)
sérieux (*serious*)
grave (*serious*)
la pollution de l'eau **m'inquiète** (*water pollution worries me*)

R – range
O – opinions
T – tenses
A – adjectives
T – tie together
E – extend

aujourd'hui (*today*)
de nos jours (*these days*)

on devrait (*we should*)
on pourrait (*we could*)
organiser (*to organise*)
écrire (*to write*)
voter (*to vote*)
participer (*to participate*)
éduquer (*to educate*)
apprendre (*to learn*)
enseigner (*to teach*)
améliorer (*to improve*)
augmenter (*to increase*)
supporter (*to put up with*)
supprimer (*to suppress*)
éviter (*to avoid*)

TRANSACTIONAL SITUATIONS

GENERAL PHRASES

je voudrais (*I would like*)

avez-vous... ? (*Do you have... ?*)

donnez-moi... s'il vous plaît (*Please give me...*)

c'est combien ? (*How much is it ?*)

où est... ? (*Where is... ?*)

pour aller à... (*How do I / does one get to... ?*)

est-ce qu'il y a ...? (*is / are there...*)

à quelle heure ? (*At what time / when ?*)

commence / finit (*start / finish*)

ferme / ouvre (*close / open*)

part / arrive (*leave / arrive*)

se plaindre (*to complain*)

je voudrais me plaindre (*I would like to complain*)

AU RESTAURANT

l'entrée (*starter*)

le plat principal (*the main course*)

le dessert (*dessert*)

le boisson (*drink*)

le pourboire (*tip*)

commander (*to order*)

trop froid (*too cold*)

trop chaud (*too hot*)

je n'ai pas de... (*I don't have*)

est-ce que je peux avoir... (*can I have*)

A L'HOTEL

une chambre (*a room*)

avec douche (*with a shower*)

avec balcon (*with balcony*)

pour une nuit (*for one night*)

le lit (*the bed*)

un grand lit (*a double bed*)

la clef (*the key*)

l'étage (*the floor*)

l'ascenseur (*the lift*)

ne marche pas (*doesn't work*)

EN VILLE

l'hôtel de ville (*the town hall*)

le centre commercial (*shopping centre*)

à gauche (*on the left*)

à droite (*on the right*)

tout droit (*straight on*)

la première / deuxième (*the first / second*)

c'est en face de / près de / derrière / devant (*it's opposite / near / behind / in front of*)

AU SYNDICAT D'INITIATIVE / AU BUREAU D'INFORMATION

un plan de la ville (*a plan of the town*)

une fête (*a festival*)

A LA GARE (ROUTIÈRE)

le quai (*platform*)

le prochain train/bus/car (*the next train / bus / coach*)

un aller simple (*one-way ticket*)

un aller retour (*a return ticket*)

un billet (*a ticket*)

le tarif pour étudiants (*prices for students*)

la réduction (*reduction*)

le prix (*price*)

AUX MAGASINS

un kilo de... (*a kilo of*)

une tranche de (*a slice of*)

un paquet de (*a packet of*)

une bouteille de (*a bottle of*)

quelques (*a few*)

quelque chose de plus grande (*something bigger*)

quelle taille? (*what size*)

quelle pointure? (*what size [shoe]*)

en coton (*in cotton*)

en laine (*in wool*)

en vert (*in green*)

un cadeau (*a gift / present*)

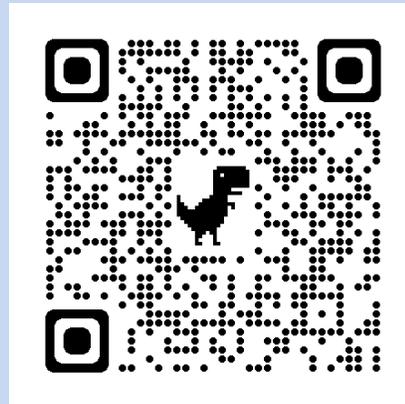
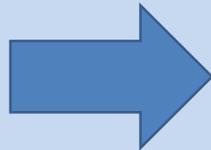
COMMON QUESTIONS

à quelle heure ? (*at what time?*)
ça s'écrit comment ? (*how is that written?*)
c'est combien ? (*how much is it?*)
c'est quelle date ? (*what is the date?*)
c'est quel jour ? (*what day is it?*)
de quelle couleur ? (*what colour?*)
d'où ? (*from where?*)
pour combien de temps ? (*for how long?*)
que veut dire... ? (*what does... mean?*)
quelle heure est-il ? (*what time is it?*)

COMMON ABBREVIATIONS

CDI centre de documentation et d'information le *resource centre*
CES collège d'enseignement secondaire le *secondary school*
EPS éducation physique et sportive l' (f) PE (*physical education*)
HLM habitation à loyer modéré l' (f) *council/social housing accommodation*
SAMU service d'aide médicale d'urgence le *emergency medical services*
SDF sans domicile fixe le *homeless person*
SNCF société nationale des chemins de fer
français la
National Rail Service
TGV train à grande vitesse le *high-speed train*
TVA taxe sur la valeur ajoutée la *VAT (Value Added Tax)*
VTT vélo tout terrain le *mountain bike*

Useful guide for role-plays...



Attention ! Vous pouvez utiliser la même lettre plus d'une fois.

NB You can use the same letter more than once.

C'est quelle personne ? Ecrivez le nom de la bonne personne.

Which person is it? *Write the name of the correct person.*

C'est qui ? Ecrivez le nom de la bonne personne. *Who is it? Write the name of the correct person.*

Choisissez (deux) phrases qui sont vraies. *Choose (two) correct sentences.*

Choisissez la réponse correcte/la bonne réponse. *Choose the correct answer.*

Complétez ... en français. *Complete... in French.*

Complétez la grille. *Complete the grid.*

Complétez le texte suivant avec les mots de la liste ci-dessous.

Complete the following text with words from the list below.

Complétez les phrases avec les mots de la liste. *Complete the sentences with words from the list.*

Décidez si c'est Vrai (V), Faux (F) ou Pas

Mentionné (PM). Ecrivez V, F ou PM.

Decide if it is True (V), False (F) or Not Mentioned (PM). Write V, F or PM.

Donnez (deux) détails. *Give (two) details.*

Ecoutez ce passage/cette conversation/cette interview/ce reportage...

Listen to this passage/this conversation/this interview/this report...

Ecrivez la bonne lettre dans chaque case. *Write the correct letter in each box.*

Ecrivez la bonne lettre dans la case. *Write the correct letter in the box.*

Ecrivez les bonnes lettres dans les cases. *Write the correct letters in the boxes.*

Identifiez la bonne personne. *Identify the correct person.*

Il n'est pas nécessaire d'écrire en phrases complètes.

It is not necessary to write in full sentences.

Lisez ... *Read...*

Mentionnez un aspect positif/négatif/avantage/inconvénient.

Mention one positive aspect/negative aspect/advantage/disadvantage

Pour une opinion négative, écrivez N

Pour une opinion positive, écrivez P

Pour une opinion positive et négative, écrivez P+N

For a negative opinion, write N

For a positive opinion, write P

For a positive and negative opinion, write P+N

Quelle est la réponse correcte ? *Which is the correct answer?*

Qui ... ? *Who...?*

Remplissez les blancs. *Fill in the blanks.*

Répondez à ces questions. *Answer these questions.*

Répondez (aux questions) en français. *Answer (the questions) in French.*

Paper 1: Listening

What's assessed

Understanding and responding to different types of spoken language

How it's assessed

- Written exam: 35 minutes (Foundation Tier), 45 minutes (Higher Tier)
- 40 marks (Foundation Tier), 50 marks (Higher Tier)

- **25% of GCSE**

(Each exam includes 5 minutes' reading time of the question paper before the listening stimulus is played.)

Questions

Foundation Tier and Higher Tier

- Section A – questions in English, to be answered in English or non-verbally
- Section B – questions in French, to be answered in French or non-verbally

Paper 2: Speaking

What's assessed

Communicating and interacting effectively in speech for a variety of purposes

How it's assessed

- **Non-exam assessment**

- 7–9 minutes (Foundation Tier) + preparation time
- 10–12 minutes (Higher Tier) + preparation time
- 60 marks (for each of Foundation Tier and Higher Tier)
- **25% of GCSE**

Questions

Foundation Tier and Higher Tier

The format is the same at Foundation Tier and Higher Tier, but with different stimulus questions for the Photo card and different stimulus materials for the Role-play. The timings are different too:

- Role-play – 15 marks (2 minutes at Foundation Tier; 2 minutes at Higher Tier)
- Photo card – 15 marks (2 minutes at Foundation Tier; 3 minutes at Higher Tier)
- General conversation – 30 marks (3–5 minutes at Foundation Tier; 5–7 minutes at Higher Tier)

Paper 3: Reading

What's assessed

Understanding and responding to different types of written language

How it's assessed

- Written exam: 45 minutes (Foundation Tier), 1 hour (Higher Tier)
- 60 marks (for each of Foundation Tier and Higher Tier)
- **25% of GCSE**

Questions

Foundation Tier and Higher Tier

- Section A – questions in English, to be answered in English or non-verbally
- Section B – questions in French, to be answered in French or non-verbally
- Section C – translation from French into English (a minimum of 35 words for Foundation Tier and 50 words for Higher Tier)

Paper 4: Writing

What's assessed

Communicating effectively in writing for a variety of purposes

How it's assessed

- Written exam: 1 hour (Foundation Tier), 1 hour 15 minutes (Higher Tier)
- 50 marks at Foundation Tier and 60 marks at Higher Tier
- **25% of GCSE**

Questions

Foundation Tier

- Question 1 – message (student produces four sentences in response to a photo) – 8 marks
- Question 2 – short passage (student writes a piece of continuous text in response to four brief bullet points, approximately 40 words in total) – 16 marks
- Question 3 – translation from English into French (minimum 35 words) – 10 marks
- Question 4 – structured writing task (student responds to four compulsory detailed bullet points, producing approximately 90 words in total) – there is a choice from two questions – 16 marks

Higher Tier

- Question 1 – structured writing task (student responds to four compulsory detailed bullet points, producing approximately 90 words in total) – there is a choice from two questions – 16 marks
- Question 2 – open-ended writing task (student responds to two compulsory detailed bullet points, producing approximately 150 words in total) – there is a choice from two questions – 32 marks
- Question 3 – translation from English into French (minimum 50 words) – 12 marks

Guide to exams,
focus on Higher
(reading /
listening!)



GCSE SPANISH YEAR 11: SOCIAL / WORLD ISSUES; ROLE PLAYS; EXAM PREPARATION

la pobreza (poverty)
la guerra (war)
la sequía (drought)
la desigualdad (inequality)
las inundaciones (flood)
la violencia
la extinción
la deforestación (deforestation)
el desempleo (unemployment)
el calentamiento global (global warming)
el efecto invernadero (greenhouse effect)
el mundo (the world)
los sin techos (homeless)
el acoso (bullying / intimidation)
los refugiados/as (refugees)
la pesadilla (the nightmare)
la preocupación (worry / concern)
la demostración (demonstration)

pienso que / creo que... (I think / believe that)
en mi opinión (in my opinion)
más...que / menos...que (more than / less than)
el / la más (the most)
el principal problema (the biggest problem)
severo/a (severe / strict)
serio/a (serious)
grave (serious)
la contaminación del agua me preocupa (water
pollution worries me)

R – range
O – opinions
T – tenses
A – adjectives
T – tie together
E – extend

hoy (today)
hoy en día (these days)

deberíamos (we should)
podríamos (we could)
organizar (to organise)
escribir (to write)
votar (to vote)
participar (to participate)
educar (to educate)
aprender (to learn)
enseñar (to teach)
mejorar (to improve)
aumentar (to increase)
soportar (to put up with)
suprimir (to suppress)
evitar (to avoid)

TRANSACTIONAL SITUATIONS

GENERAL PHRASES

quisiera (*I would like*)

¿tiene Usted... ? (*Do you have... ?*)

dame... por favor (*Please give me...*)

¿cuanto cuesta ? (*How much is it ?*)

¿dónde está... ? (*Where is... ?*)

¿por dónde se va a ... (*How do I / does one get to... ?*)

¿hay...? (*is / are there...*)

¿a qué hora... ? (*At what time / when ?*)

comienza / empieza / termina (*start / finish*)

cerra / abierta (*close / open*)

sale / llega (*leave / arrive*)

reclamar (*to complain*)

quisiera reclamar (*I would like to complain*)

AL RESTAURANTE

la entrada (*starter*)

el plato principal (*the main course*)

el postre (*dessert*)

la bebida (*drink*)

la propina (*tip*)

pedir (*to order*)

demasiado frío (*too cold*)

demasiado caliente (*too hot*)

no tengo... (*I don't have*)

puedo tener... (*can I have*)

EL HOTEL

un dormitorio (*a room*)

con ducha (*with a shower*)

con balcón (*with balcony*)

para una noche (*for one night*)

la cama (*the bed*)

una cama doble (*a double bed*)

la llave (*the key*)

el piso (*the floor*)

el ascensor (*the lift*)

no funciona (*doesn't work*)

EN LA CIUDAD

el ayuntamiento (*the town hall*)

el centro comercial (*shopping centre*)

a la izquierda (*on the left*)

a la derecha (*on the right*)

todo recto (*straight on*)

la primera / segunda (*the first / second*)

está enfrente / cerca de / detrás (de) / delante (de) (*it's opposite / near / behind / in front of*)

AU SYNDICAT D'INITIATIVE / AU BUREAU D'INFORMATION

una mapa de la ciudad (*a plan of the town*)

una fiesta (*a festival*)

LA ESTACIÓN DE TREN / AUTOBUS

el andén (*platform*)

el próximo tren / bus / autocar (*the next train / bus / coach*)

el billete de ida (*one-way ticket*)

el billete de ida y vuelta (*a return ticket*)

el billete (*a ticket*)

una tarifa para los estudiantes (*prices for students*)

la rebaja (*reduction*)

el precio (*price*)

AUX MAGASINS

un kilo de... (*a kilo of*)

un trozo de (*a slice of*)

un paquete de (*a packet of*)

una botella de (*a bottle of*)

algunos/algunas (*a few*)

algo de más grande (*something bigger*)

¿qué talla? (*what size*)

¿qué número? (*what size [shoe]*)

en algodón (*in cotton*)

en lana (*in wool*)

en verde (*in green*)

un regalo (*a gift / present*)

COMMON QUESTIONS

¿a qué hora? *at what time?*

¿cuánto cuesta(n)? *how much does it/do they cost?*

¿cuánto es? *how much is it?*

¿cuánto vale(n)? *how much does it/do they cost?*

¿cuántos años tiene(s)? *how old are you?*

¿de qué color? *what colour?*

¿para/por cuánto tiempo? *for how long?*

¿qué día? *what day?*

¿qué fecha? *what date?*

¿qué hora es? *what time is it?*

COMMON ABBREVIATIONS

Sr (señor) *Mr*

Sra (señora) *Mrs*

Srta (señorita) *Miss*

Sta (santa) *St*

c/ (calle) *street*

1°/primero (2°, 3° etc) *1st (2nd, 3rd etc)*

1ª/primera (2ª, 3ª etc) *1st (2nd, 3rd etc)*

Dr (doctor) *Dr*

Dra (doctora) *Dr*

AVE, el *high-speed train*

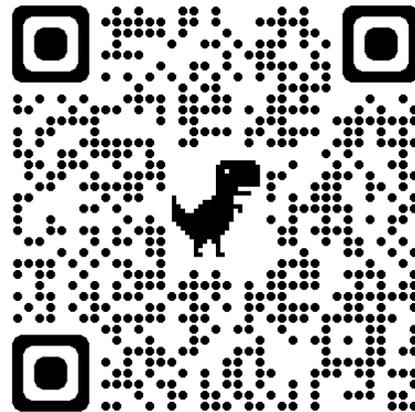
Renfe/RENFE *Spanish railways*

IVA *VAT*

Avda (avenida) *avenue*

EEUU (Estados Unidos) *USA*

Role-play advice...



Completa/Rellena la tabla/el texto/el espacio blanco en español.

Complete/Fill in the table/the text/the blank space in Spanish.

Completa la frase/las frases... **Complete the phrase(s)/sentence(s)...**

Contesta a las preguntas en español. **Answer the questions in Spanish.**

Da (dos) detalles... **Give (two) details...**

Empareja... **Match...**

Escribe la(s) letra(s) correcta(s) en cada casilla. **Write the correct letter(s) in each box.**

Escribe la letra correcta/el número correcto en la casilla.

Write the correct letter/number in the box.

Escribe todos los detalles. **Write all the details/Give full details.**

Escoge... **Choose...**

Escucha la descripción/la opinión/la entrevista/las noticias...

Listen to the description/the opinion/the interview/the news...

Indica... **Indicate...**

Indica las...frases verdaderas. **Indicate the ...true phrases/sentences.**

Lee el texto / el artículo / la lista de actividades / la lista de instrucciones / la información.

Read the text/the article/the list of activities/the list of instructions/the information.

Lee lo que dicen... **Read what they say...**

Menciona una ventaja/desventaja... **Mention one advantage/disadvantage...**

No es necesario escribir con frases completas. **It is not necessary to write in full sentences.**

Escribe:

P si la opinión es positiva

N si la opinión es negativa

P+N si la opinión es positiva y negativa

Write :

P if the opinion is positive

N if the opinion is negative

P+N if the opinion is positive and negative

Puedes escribir la misma letra más de una vez. **You can use the same letter more than once.**

¿Quién...? **Who...?**

Responde a las dos partes de la pregunta. **Answer both parts of the question.**

Selecciona/Escoge el párrafo... **Select/Choose the paragraph...**

Escribe aproximadamente 90 palabras en español. Responde a todos los aspectos de la pregunta.

Write approximately 90 words in Spanish. Write something about each bullet point.

Escribe aproximadamente 150 palabras en español. Responde a los dos aspectos de la pregunta.

Write approximately 150 words in Spanish. Write something about both bullet points.

Escribe cuatro frases en español que describan la foto.

Write four sentences in Spanish about the photo.

Escríbele sobre... **Write to him/her about...**

Escríbele una carta/un email. **Write a letter/email**

Paper 1: Listening

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Foundation Tier and Higher Tier

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Paper 2: Speaking

What's assessed

Communicating and interacting effectively in speech for a variety of purposes

How it's assessed

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- 10–12 minutes (Higher Tier) + preparation time
- 60 marks (for each of Foundation Tier and Higher Tier)
- **25% of GCSE**

Questions

Foundation Tier and Higher Tier

The format is the same at Foundation Tier and Higher Tier, but with different stimulus questions for the Photo card and different stimulus materials for the Role-play. The timings are different too:

- Role-play – 15 marks (2 minutes at Foundation Tier; 2 minutes at Higher Tier)
- Photo card – 15 marks (2 minutes at Foundation Tier; 3 minutes at Higher Tier)
- General conversation – 30 marks (3–5 minutes at Foundation Tier; 5–7 minutes at Higher Tier)

Paper 3: Reading

What's assessed

Understanding and responding to different types of written language

How it's assessed

- Written exam: 45 minutes (Foundation Tier), 1 hour (Higher Tier)
- 60 marks (for each of Foundation Tier and Higher Tier)
- **25% of GCSE**

Questions

Foundation Tier and Higher Tier

- Section A – questions in English, to be answered in English or non-verbally
- Section B – questions in Spanish, to be answered in French or non-verbally
- Section C – translation from Spanish into English (a minimum of 35 words for Foundation Tier and 50 words for Higher Tier)

Paper 4: Writing

What's assessed

Communicating effectively in writing for a variety of purposes

How it's assessed

- Written exam: 1 hour (Foundation Tier), 1 hour 15 minutes (Higher Tier)
- 50 marks at Foundation Tier and 60 marks at Higher Tier
- **25% of GCSE**

Questions

Foundation Tier

- Question 1 – message (student produces four sentences in response to a photo) – 8 marks
- Question 2 – short passage (student writes a piece of continuous text in response to four brief bullet points, approximately 40 words in total) – 16 marks
- Question 3 – translation from English into Spanish (minimum 35 words) – 10 marks
- Question 4 – structured writing task (student responds to four compulsory detailed bullet points, producing approximately 90 words in total) – there is a choice from two questions – 16 marks

Higher Tier

- Question 1 – structured writing task (student responds to four compulsory detailed bullet points, producing approximately 90 words in total) – there is a choice from two questions – 16 marks
- Question 2 – open-ended writing task (student responds to two compulsory detailed bullet points, producing approximately 150 words in total) – there is a choice from two questions – 32 marks
- Question 3 – translation from English into Spanish (minimum 50 words) – 12 marks

*Guide to
listening /
reading
exams...
(Higher)*



The Fundamentals of Art

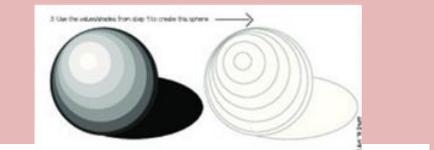
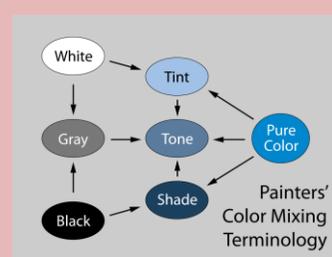
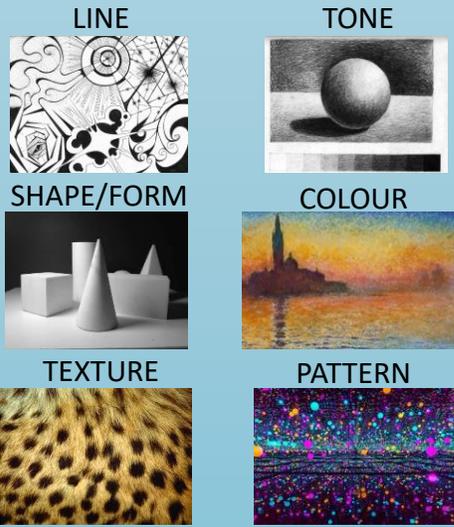
ESSENTIAL EQUIPMENT:

- PENCIL PACK (2B, 4B, 6B ETC)
- ERASER
- SHARPENER
- SKETCHBOOK

OPTIONAL EQUIPMENT:

- DRAWING PENS
- WATERCOLOUR SET
- WATERCOLOUR PENCILS
- PAINTBRUSHES

THE FORMAL ELEMENTS:



Positive/Negative Shapes
 Positive shapes – subject or dominant shapes on the picture plane
 Negative shapes – background areas



ATTITUDE

Be positive and try your best!

RESPECT

Respect others, work and the room

THINK

Understand and demonstrate.

IMAGINE

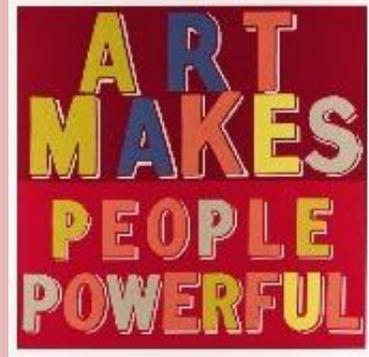
Be creative, use you imagination!

SPOTLESS

Tidy up after yourself.

TARGET

Follow directions.



COLOUR

- BRIGHT
- BOLD
- VIBRANT
- PRIMARY
- SECONDARY
- TERTIARY
- RADIANT
- VIVID
- DULL
- CONTRASTING
- COMPLIMENTARY
- HARMONIOUS
- MONOCHROME
- NATUARL
- SATURATED
- PASTEL
- COOL
- WARM

LINE

- FLUENT
- CONTINUOUS
- CONTROLLED
- LOOSE
- POWERFUL
- STRONG
- ANGULAR
- FLOWING
- LIGHT
- DELICATE
- SIMPLE
- THICK
- THIN
- BROKEN
- OVERLAPPING
- LAYERED
- MARK MAKING

SHAPE/Form/SPACE

- CLOSED
- OPEN
- DISTORTED
- FLAT
- ORGANIC
- POSITIVE
- NEGATIVE
- FOREGROUND
- BACKGROUND
- COMPOSITION
- ELONGATED
- LARGE
- SMALL
- 2D
- 3D
- TWISTED
- JAGGED

PATTERN AND TEXTURE

- REPEATED
- UNIFORM
- GEOMETRIC
- RANDOM
- SYMMETRICAL
- SOFT
- IRREGULAR
- UNEVEN
- ROUGH
- BROKEN
- GRID
- FLAT
- WOVEN
- ORGANIC
- SMOOTH
- ABSTRACTED

tone

- BRIGHT
- DARK
- FADED
- SMOOTH
- HARSH
- CONTRASTING
- INTENSE
- SOMBRE
- STRONG
- POWERFUL
- LIGHT
- MEDIUM
- DARK
- LAYERED
- DEPTH
- DEVELOPED
- SOFT

A01 EXPLORE
DEVELOP
 DEVELOP IDEAS
 INVESTIGATE & RESEARCH OTHER ARTISTS WORK
ANALYSE
 ANNOTATE

A02 REVIEW
REFINE
 EXPERIMENT
 EXPLORE DIFFERENT IDEAS AND MEDIA
 A RANGE OF TECHNIQUES & PROCESSSES
 SELECT
 IMPROVE

A03 EVIDENCE
RECORD
 PRESENT IDEAS
 PRIMARY OBSERVATION
 DRAWING, PAINTING, PRINTING, PHOTOGRAPHY, WRITING, PHOTOGRAPY...
 ANNOTATE
 DIFFERENT MEDIA

A04 OUTCOME
PRESENT
 FINAL IDEAS
 DEVELOPED AS PLANNED
 CLEARLY RESPONDS TO ARTISTS EXPLORED
 CONNECTION
 CONCLUSION

ART ANALYSIS GUIDE

CONTENT/DESCRIPTION OF AN IMAGE

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

PERSONAL OPINION

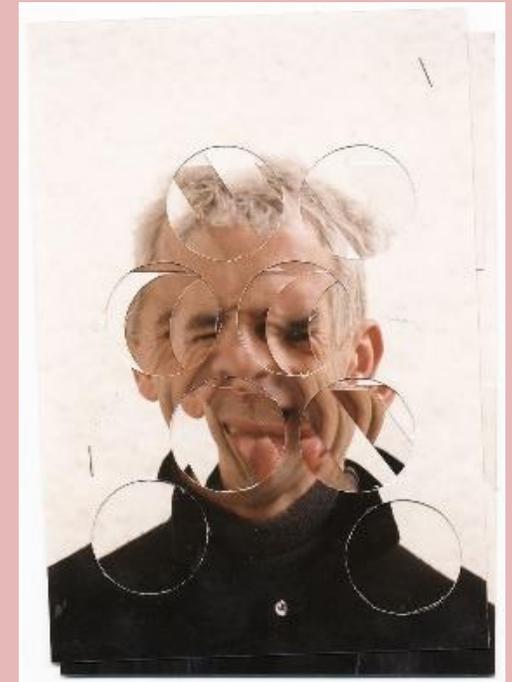
- What was your first reaction?
- What is the mood of the image?
- What is the message of the image?
- What do you like or dislike and why? Use art specific language and justify your opinions.
- How does the image make you feel? Why do you think you feel like this?
- Does the colour, texture, form, detail, 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?



EXAM PROJECT

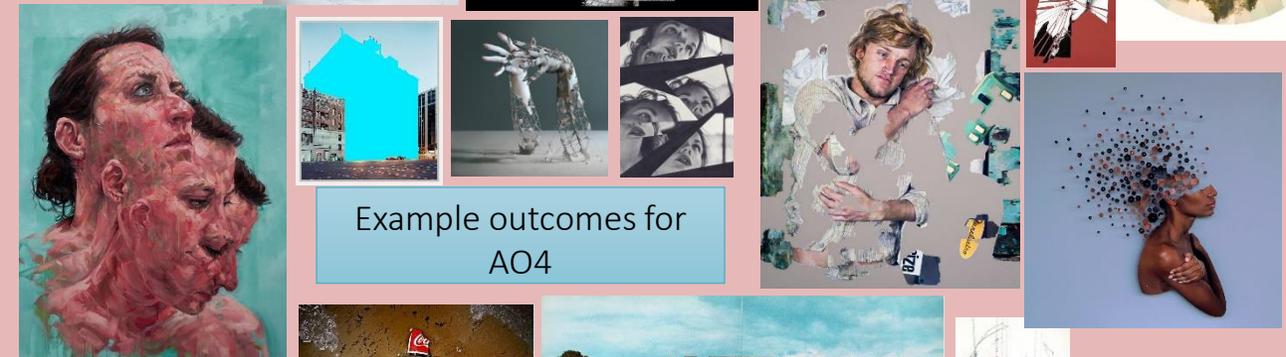
TERM 3 & 4

Use your exam paper as a guide for you theme title.

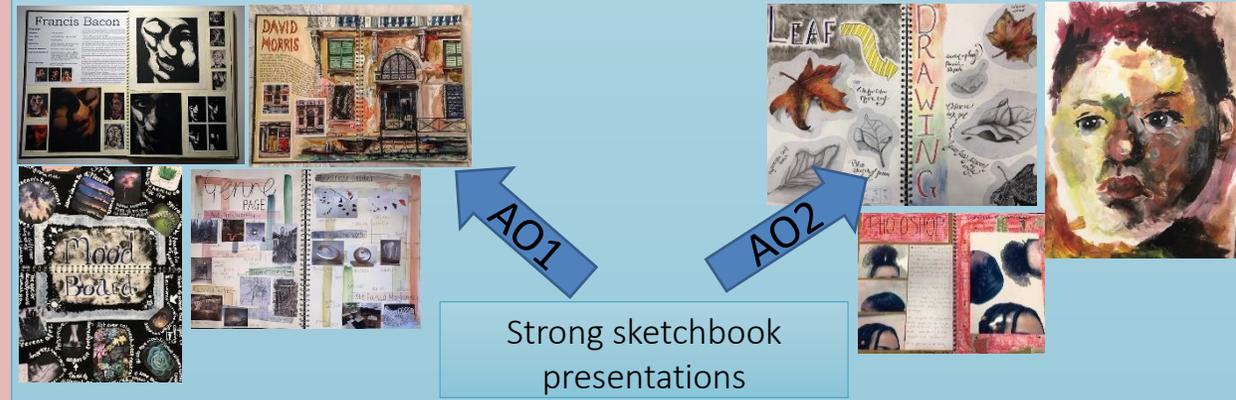
You will have scope within these titles to work more independently.

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

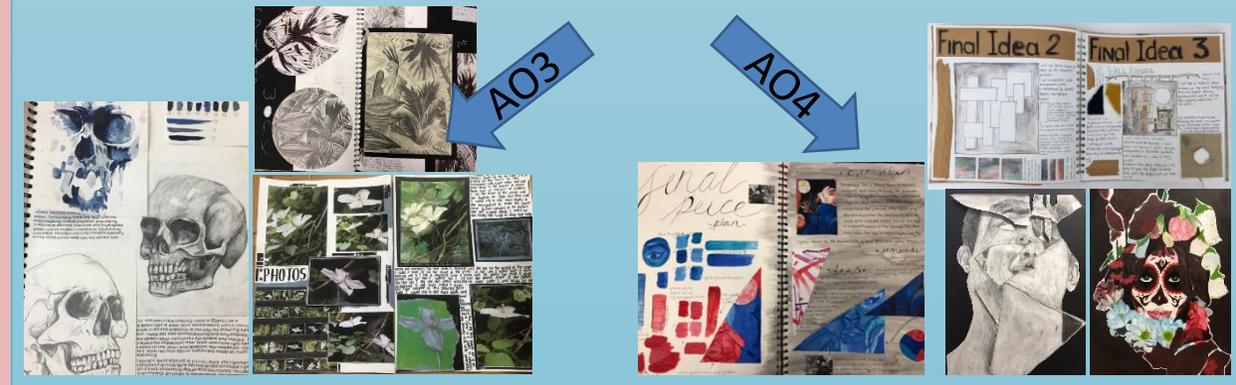
A01	A02	A03	A04
Mood boards	Experimentation	Recording	Final outcome
Mind maps	Different materials	Drawing	All planning
Genre pages	Different techniques	Photography	Trials
Initial ideas	Different 2D and 3D	Primary recording	Test outcomes
Artist analysis	Trials	Recording from secondary resources	Colour theory
Contextual research	Photoshop		Colour plans
Gallery visits			Annotations of ideas



Example outcomes for A04



Strong sketchbook presentations



EXAM PROJECT

TERM 3 & 4

A01
 Mood boards
 Mind maps
 Genre pages
 Initial ideas
 Artist analysis
 Contextual research
 Gallery visits

A02
 Experimentation
 Different materials
 Different techniques
 2D and 3D
 Trials
 Photoshop

ASSESSMENT OBJECTIVE SPECIFICS

A01
 AIM TO HAVE AT LEAST 4-8 DIFFERENT ARTIST ANALYSIS PAGES (THESE CAN BE SMALLER INSERTS TO EXPERIMENTS)

A02
 YOU SHOULD DEMONSTRATE A WIDE RANGE OF EXPERIMENTATION. AIM TO EXPLORE AT LEAST 6 OF THE EXPERIMENTATION EXAMPLES ON THIS PAGE.

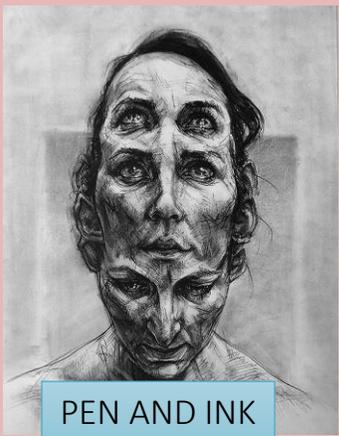
A03
 YOU NEED TO SHOW INITIAL DRAWINGS/STUDIES EXPLORING THE WORK OF YOUR ARTISTS. YOU MUST HAVE A PHOTOGRAPHY ELEMENT – PLEASE CONTINUE TO DEVELOP STUDIES FROM SHOOT.

A04
 YOU MUST INCLUDE AT LEAST 3-5 DIFFERENT FINAL OUTCOME IDEAS, SKETCHED WITH NOTES. THIS MUST INFORM YOUR FINAL OUTCOME WHICH SHOULD BE REFLECTED ON THROUGH AN EVALUATION AFTER IT IS COMPLETE.

A03
 Recording
 Drawing
 Photography
 Primary recording
 Recording from secondary resources

A04
 Final outcome
 All planning
 Trials
 Test outcomes
 Colour theory
 Colour plans
 Annotations of ideas

EXPERIMENTAL MARK MAKING
 - THIS CAN BE USED AS RESEARCH AND WITHIN YOUR STUDIES -



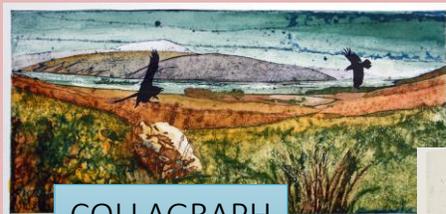
PEN AND INK



PHOTOGRAPHY



MONOPRINT

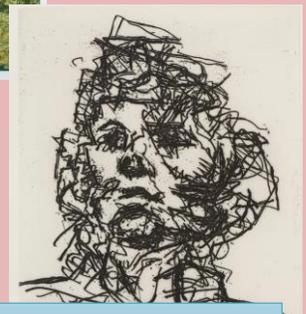


COLLAGRAPH

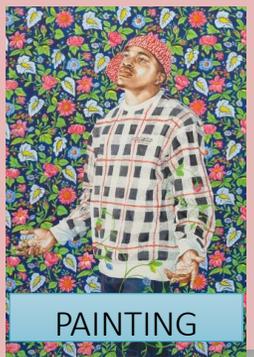
A RANGE OF WORKSHOP AND EXPERIMENTATION IDEAS



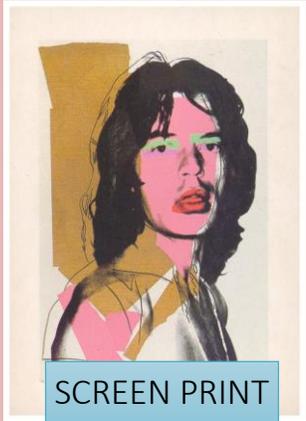
MIXED MEDIA



EXPERIMENTAL DRAWING



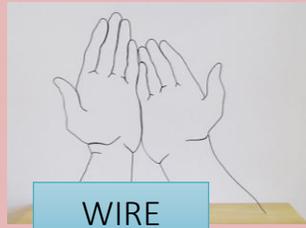
PAINTING



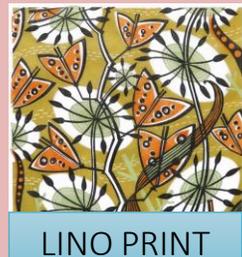
SCREEN PRINT



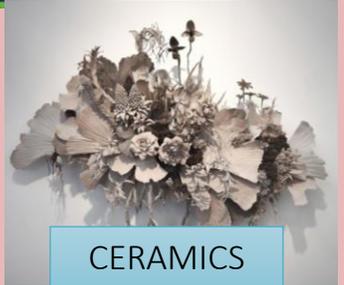
PHOTOSHOP



WIRE



LINO PRINT



CERAMICS



Performing from Text (C2 (& C3))

Y11 T3 & 4

• Study Focus

- Our focus in these terms is you completing your component 2 Examination, 'Performing from Text' and learning all the things that need to be taken into account so that you can write knowledgably about how a performance is organised and staged in your component 3 examination. This performance is worth 20% of your final grade.
- You will use your experience of working on text in terms 3 & 4 of year 10 and the skills and knowledge that you gained. You will use this to choose a suitable text- one that will best show off your acting skills and a partner who you work creatively and effectively with. You will devise and organise your own rehearsal schedule and plan separate production meetings. You will need to keep your teacher regularly informed about your rehearsals and the Artistic Intentions that you and your partner are pursuing. You will work with your teacher's guidance to complete an Artistic Intentions sheet which you share and discuss with the visiting examiner.

• Tasks and your responsibilities for this Performance Examination

- You will need to choose a play which best shows of your, and your partner's, acting talent. It is not a time to work on your weaknesses it is an opportunity for you to show what you do best, so, choose carefully.
- Read the whole play.
- Choose 2 or 3 scenes or moments from the play that show how your character develops and changes or allow the examiner to see how you can sustain a role in different situations and perhaps different emotional states.

You will need to choose, design and obtain the costumes for your play.

- You are responsible for designing a lighting plan with the limits and the possibilities of the lighting rig in the studio
- You will need to organise your rehearsals and keep your teacher regularly informed of them and your progress within them.
- You need to choose and organise any props and items of set that you will use in your performance.

• Remember

- You are only being assessed on your application of performance skills to realise your artistic intentions in performance (AO 2)... But you must use these consciously so that you can also apply your knowledge in your written exam on the *Caucasian Chalk Circle*.

You are examined on your skill in the following performance disciplines

Use of Space & Time

Proxemics

Pace

Tempo- rhythm movement

Tempo rhythm in voice

Vocal Skills

Tone

Pitch

Volume

Accent

Inflection

Intonation

Emphasis/ stress

Physical Skills

Gesture

Posture

Facial Expression

Body Language

Artistic intentions.

You will complete a sheet on the artistic intentions that you have for your performance from your chosen text. These will include your interpretation of your character and what you want to communicate to the audience. Include how you have costumed them to show their personality, social class, age etc., You will include what theme you want to communicate- this will be up to you- some plays can have different themes- think what you want to 'say' to the audience through your performance and what impact you intend.

Remember-

You arrange your rehearsal schedule. You choose your actor audience relationship; **end-on, traverse** or **in the round**. You choose and source your costume. Plan your lighting rig and lighting changes. Arrange any pre recorded sound you intend using. You will need to plan your use of set and props- it is best to be minimalistic. Be clear on your playing style- are you aiming for naturalism or a clear idea that you are an actor playing (many) roles

Rehearsal techniques to use

• Four of Stanislavski's Psychological Techniques – of rehearsal

- **The Character's Given Circumstances-** doing your research work and creative work to find out & establish everything about your character- their background, age, class, status, ethnicity, personality, life experience that most affect them, where have they just come from – everything about their physical, financial, emotional, mental, relationship situation that makes them the way that they are... in this moment.
- **The Actor's Objective (the character's motivation).** What the character wants in this situation (these Given Circumstances) and what the actor needs to achieve in the scene.
- **Emotion memory-** the past feelings and emotions that you have actually felt in your life that are similar to the ones that the character is feeling in the scene (and that you may not have directly experienced) that you can lend to the situation you are playing.
- **The Creative If-** something that an actor can use that is both honest and can lift you from the plane (level)of Everyday Reality and onto the plane of the imagination.

• Five Brechtian Rehearsal and preparation Techniques

- **Gestus** – finding a gesture, physical action or voice that captures exactly what the character's role in society is- are they an exploiter or are they the exploited.
- **Speaking in 3rd Person** about your character- this will help you distance yourself from your role so that you can present your character at arms length as Brecht wanted so that you can remind the audience that you are playing a character in a play not a real person in real life

Also

- **Hot Seating-** Asking an actor –in – role questions about the character's past, present thoughts, feelings, attitude, relationships in fact anything that will help them discover more about their character and develop a deeper connection with their character.
- **Role on a Wall** – Making an outline drawing on a wall and filling it in with all the facts and details about the character so that you develop the role and learn about them
- **Status work** – various status exercises that help an actor find out their status in the scene so they know how to speak, act and behave in relation to the other characters in the scene.
- **Improvisation** – trying out different episodes from the characters past, present and future to discover more about them and help the actor to build the role and get into character.

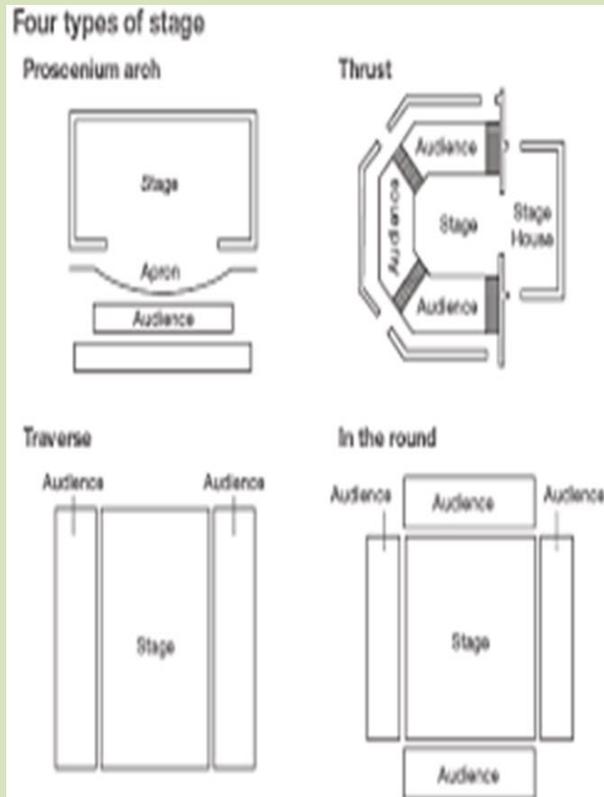
Techniques and concepts to be aware of and use in your performance

- **Subtext** – The prefix, ‘sub’ means below or underneath, like a submarine goes under the sea (marine means sea). So **sub** – text is the text, or meaning, beneath the actual words that are said or not said. In naturalistic theatre, the hidden meaning is brought out by the playwright’s very specific use of language- words and phrases that have a double meaning. In performance, the subtext comes out through your body language, intonation and tone of voice.
- **Intonation** – this is how the voice pitch rises and falls in a sentence. Characters sound excited and animated when there is a significant rise and fall. They sound dull and depressed when the voice stays flat in monotone.
- **Silence**- is such a powerful option on the stage. Young actors rarely use this device, often falling into the trap that they have to be saying something, as well as doing something, all of the time, probably out of awkwardness and lack of confidence. Silence – not saying something can be especially potent when the audience knows that there is lots that could be said, or indeed, needs to be said. As the playwright, Anton Chekhov wrote, “Characters often reveal more about themselves by what they do NOT say than by what they do say”. Lack of speech maintains the tension and builds the suspense.
- **Suspense** – This is the tension that puts us on the edge of our seats when we are watching something. The dictionary describes it as the state or feeling of excited or anxious uncertainty about what may happen. The more that we care about the characters on stage, the more anxious we get when it seems something bad may happen to them. The suspense increases in theatre because, as an audience, we can do nothing to save the situation - at least in naturalistic theatre.
- **Space** – We tend to put ourselves close to the people we like and apart from those that we do not like. Recent research has found this to be even more true than we previously assumed. Theatre people can use this basic information to communicate the state of character’s relationships. We also look for opportunities and excuses to be near those we like and similarly will walk a mile around someone we’re wanting to avoid. The study of spatial relationships is called. **Proxemics**. It is not an easy word to use and you can experiment. It is a favourite with the Examination boards.
- **Context** – It is important to remember that all scenes in a play and all events are partly the result of things that have previously happened. Past events inform and motivate character’s words and actions- everything comes out of a context. Knowing this will help you as an actor know how to behave in a scene and why the character is feeling this way and acting this way. In your devised work, creating the context of a scene will help you extend your scenes and make them clearer and richer
- **Naturalism/ Realism** – Later on you will explore the difference between these two genres, for now, we can think of them as the style of theatre that tries to depict things as they are like in everyday life. Television like, Eastenders and Coronation Street might be examples of these genres.
- **Genre** – a timely reminder that this is the word we use for the category or style that a play is performed in. We will explore a variety of genres in both text and devised work. Some examples are; Naturalism, Western and melodrama.

Staging & performance techniques to consider to make your scenes engaging and entertaining

- **Slow motion-** Moving in slow motion is a classic way of making your work less naturalistic and more entertaining. Acting key scenes or moments in slow motion will highlight these moments for you and make them more significant. You can also speak in slow motion which sounds very strange when performed live. It requires a lot of confidence and vocal skill- it is very effective though in creating a spooky and eerie atmosphere in a nightmare scene. It is a favourite technique in expressionist theatre and cinema. Action can also be sped up into **double** and even **triple time**. This can add a comic effect as well as a disturbing one
- **Chorus work** – in drama this means everyone doing or saying (or both) the same thing in the same way at the same time. It requires a lot of technical skill and a lot of rehearsal to get it right. As this is not something that we do naturally in everyday life, it is classed as a non-naturalistic technique. It can be very powerful. Ancient Greek Theatre used this technique and many modern productions are keen to employ it often to great effect, particularly when coupled with similarly dramatic lighting and sound.
- **Lighting & sound (LX and SFX)** – pre- recorded sound and lighting are straightforward ways of making your scenes more symbolic, surreal and expressionist. In physical theatre productions, the actors can make the sound effects live on stage. In the musical, Blood Brothers, the orchestra in the pit supply many of the play's required sound effects. You can use all sorts of sound effects to add tension and suspense to your scenes. Side lighting creates long shadows which add a disturbing and nightmarish quality. Coloured gels over the lanterns in the studio can enhance many stage atmospheres and can symbolise and suggest environments such as, Heaven.
- **Repetition/ reordering/ backwards** – repeating a scene, or parts of a scene, is another way of drawing attention to a specific speech, event or moment. A scene can also be repeated from another, or different character's, perspective. Political theatre often uses this device so that the audience can assess the rights and wrongs of a situation. Reordering scenes has a very strange effect and creates an odd, surreal dreamlike feeling. Playing a moment backwards requires great technical skill but it can have a huge effect on the impact of a scene
- **Breaking the 4th wall** – another technique that you met in our Storytelling work. Speaking directly to the audience- sometimes called, **direct audience address**. It can be very powerful – provocative even.
- **Tableaux** – Using your bodies to make **still images** representing objects or themes and narrating is a very useful and powerful non-naturalistic technique
- **Split staging/ composite staging** – dividing a stage into different sections representing different times and places is a useful way of making meaning.
- **Mood** – Mood in a scene is created by the actors use of voice, body, space and timing. Quiet sad tones of voice, pauses between cues and spaced out characters will create a solemn, sad, reflective mood suitable for a break up or funeral.
- **Atmosphere** – Atmosphere in a scene is created by changes in lighting (LX) and sound effects (SFX)
- **Pace** – pace in a scene is increased by actors coming in quickly on their cues. Pace is slowed by pauses between dialogue.

Ground plans affect the actor/ audience relationship– they bring opportunities and challenges- you should know what these are



Ground Plans – Actor audience relationships

The Ground plan chosen for a production of a play sometimes depends on the way that the theatre is set up and built- the Globe theatre in London is a reproduction of one of Shakespeare's original theatres and has a thrust stage just as the original would have had. Each ground plan or actor/ audience relationship has its own challenges, restrictions and opportunities, They do have a hugely significant impact on the way that a production is rehearsed, designed, performed and received by an audience. The proscenium arch became popular after theatres reopened in 1660. Before they closed (1642) Thrust staging was the norm. A key thing for you to remember when being asked in a written examination which ground plan you would choose as either a theatre director or theatre designer to stage a given scene in your set play is, that each Ground plan informs what you can and cannot do in a performance and each has a very different impact on the audience. You need to decide which ground plan best suits the ideas that you have for the scene, the meaning that you want to communicate and the effect you want to have on the audience. You then need to remember the restrictions that your chosen ground plan brings. Your examination board are keen that you understand these.

KEY TERMINOLOGY	EXPLANATION
HOLLYWOOD	Hollywood is a neighbourhood in the central region of Los Angeles, California. Its name has come to be a shorthand reference for the U.S. film industry and the people associated with it. Many of its studios such as Disney, Paramount Pictures, Warner Bros., and Universal Pictures were founded there; Paramount still has its studios there.
CINEMATOGRAPHY	Includes all on screen VISUAL elements, such as: lighting, framing, composition, camera movement, camera angles, depth of field/focus, zoom and colour palette
COMING OF AGE	Coming of age films portray the feeling of growing up and moving from one part of your life to the next that every audience can relate to . Even in the most obscure film set in another country or time in history, the audience can still reflect upon their own experiences in relation to the characters.
MISE-EN-SCENE	Mise en scène is the arrangement of scenery and stage properties in a play. Translated from French, it means "setting the stage" but, in film analysis, the term mise en scene refers to everything in front of the camera, including the set design, lighting, and actors. Mise en scene in film is the overall effect of how it all comes together for the audience.
MCCARTHYISM	a vociferous campaign against alleged communists in the US government and other institutions carried out under Senator Joseph McCarthy in the period 1950–4. Many of the accused were blacklisted or lost their jobs, though most did not in fact belong to the Communist Party. An era of Communist paranoia.
VERISIMILITUDE	A film has verisimilitude if it seems realistic and the story has details, subjects, and characters that seem similar or true to real life, or mime convincing aspects of life in important or fundamental ways. Basically, true to life/believable.
CONTINUITY	the principle of making sure that all details in a film or TV show are consistent from shot to shot and from scene to scene.
JUXTAPOSITION	Juxtaposition is a film editing technique that combines two or more shots to generate ideas or create thoughts. The intended impact of this is to create contrast for emphasis.
SOUND/SOUNDSCAPE	A soundscape is a sound or combination of sounds that forms or arises from an immersive environment. ... Crucially, the term soundscape also includes the listener's perception of sounds heard as an environment: "how that environment is understood by those living within it" and therefore mediates their relations.



FOR MORE INFORMATION ON ALL THINGS FILM, PLEASE VISIT
<https://www.filmsite.org/filmhistory-overview.html>



Institutional Information

1. **Director** – Nicholas Ray
2. **Year of release** – 1955
3. **Production company** – Warner Brothers
4. **Star marketing** – James Dean and Natalie Wood

Narrative

1. **Narrative** –the method and means by which you construct the events of a story into a plot
2. **Narrative structure** - Follows a five act structure
3. **Narrative viewpoint** – Teen POV. A mistrust of authority figures, parents are overtly criticized for being too weak, or too dominant, they can't win at all. But this message clearly appeals to the target audience.
4. **Binary Oppositions** – create conflict – key oppositions are children vs. their parents and teenagers vs. adults

Context

1. Set in a suburb of **Los Angeles** in the early **1950s**
2. **1950s** – Considered the birth of the teenager
3. Young people had more money (a disposable income); products such as music, film and fashion were targeted at this group. They were powerful consumers and therefore a powerful 'voice' in consumerist America.
4. Better education, which led them to question the world.
5. It was a time of peace, so young men were not at war, a confusing era for young men who could not identify with their war time fathers or have a war to fight and prove themselves.
6. This new social group was considered by some as **threatening, unruly** and **out of control**, the film reflected and responded to this concern.
7. This film offers a **sympathetic representation of teenagers**, blaming the parents for their delinquency.
8. More people were **speaking out against inequality** and **civil rights** in this time. The film demonstrated the **desire for young people to do the right thing**. Jim wants to confess and desires justice, it is **the older generation that get in the way** of this, and they do not listen.



Key Characters

Jim Stark	Protagonist. 'The Outsider'. Struggling with finding his place in the world. Wants to do what's right.
Judy	"He hates me." Craves love and affection from her father. "I'll never get close to anybody". Later falls in love with Jim.
John 'Plato' Crawford	Another 'outsider' character. Bullied and alone. His father is absent His mother leaves him for long periods of time. He too craves love and affection. The first gay teenager on film? Plato's sexuality is only ever inferred. Never commented on explicitly.
Buzz	The film's antagonist . The bully. A teen film genre character type. Provides an opposition to Jim for much of the film. Highlights Jim as the 'outsider'.
Frank Stark	Represented as unable to connect with his son. Unable to stand up for himself. Until the end: "I'll stand up with you."

COMPONENT 1 – COMPARATIVE US FILM

REBEL WITHOUT A CAUSE

Key Quotes	
“You’re tearing me apart” – Jim	Significant line in the film. Shows the impact that his relationship with his parents is having on him.
“How can a guy grow up in a circus like that?” - Jim	Jim talking to Ray (Police Officer) at the start of the film. Gives the audience an insight into his family life.
“What does he know about man alone?” - Plato	This line gives the audience an insight into how Plato feels. He too feels alone in the world, abandoned by his parents and craving love and affection.
“Don’t I buy you everything you want?” – Frank Stark (Jim’s Dad)	Shows that his father associates buying his son material possessions with being a good parent. He can’t understand why his son is misbehaving.
“If only you could’ve been my dad.” – Plato	Plato sees Jim as a replacement father figure. Someone who looks out for him and is kind to him. Further supports the film’s theme of parent/child relationships.
“You, you say one thing, he says another, and everybody changes back again.” – Jim	All Jim really wants—and he really demands—from his parents is that they communicate. Tell the truth. Allow him to understand what they mean and, perhaps, come to a more incisive understanding of themselves in the process.
She’ll outgrow it dear. It’s just the age...It’s the age when nothing fits.” – Judy’s mother	This is a close as any adult in the film comes to understanding the teenagers in the film and society in general.
“One thing I know is I never want to be like him.” – Jim	Jim is angry with his father. He doesn’t feel a connection with him and doesn’t look up to him as an example of how to live his life. His worst fear is turning into him.

Key Element of Film Form

Mise-en-scene – Use of the colour red in costumes.	Judy’s dress and lipstick symbolise at the start her desire to stand out and be noticed. Jim’s red jacket creates a connection to this idea and also comes to symbolise danger. Plato later wears the red jacket. It foreshadows his death. All three central characters wear red. Teenagers standing out.
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Context

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1950s AMERICA

The US became a world superpower after WW2. Before the war, the US was the biggest economic power, but the government concentrated on problems at home rather than get involved in problems overseas. After the war, however, the US became far more involved across the globe to stop the Soviet Union (Russia) spreading its influence and its communist ideals.

The fear of communism was strong in America as it has a long tradition of opposition to any form of collective ownership. In the 1950s, a suspected communist in the US was treated with a high level of suspicion and fear – they were seen as an ‘enemy of the state’.

At the end of WW2, another conflict began – The Cold War between Russia and America. This lasted for over 40 years. Each saw the other as an arch enemy and they built more and more nuclear weapons to defend themselves and deter the other from launching an attack. Young people growing up in the 1950s lived in fear of nuclear war.

Life in 1950s America was a paradox. The fear of the bomb, communism, invasion and the pleasures of prosperity all existed at the same time. Many Americans had more in terms of material wealth than they had ever had before; the more they had, the more frightened they were of losing it. These fears found their way into popular culture, especially in novels, TV programmes and films.

If the 1950s were the true beginning of the Cold War, then the 1980s was the last full decade of this superpower confrontation. Although the fear of ‘the bomb’ was still there, it had continued at a desensitised lower level. There was some relief in the late 1980s, when President Reagan (USA) and Gorbachev (Russia/USSR/Soviet Union) eventually began the process for arms reduction which was concluded in 1991.

The 1980s was the decade that seemed to be about rewarding success and allowing people with money to keep more of it. The reasoning was that the more money people had, the more they would spend – this investment would benefit businesses and, eventually their workers, meaning that everyone had a better deal in terms of economic growth. This did not happen – the gap between rich and poor grew. The symbol of this decade’s approach to wealth was the ‘yuppie’ – a baby boomer (born between 1946 and 1964) with a college education, well paying job and expensive tastes. This character trope can be seen in many films of this decade.

The 1980s was a time when family dynamics and societal views changed to allow men and women to share the financial and domestic responsibilities within their family. The number of families grew and the number of lone parent families grew by 74%. The 1980s saw a huge rise in divorce rates. The 1950s ‘culture of marriage’ had turned into the 1980s ‘culture of divorce’.

1980s AMERICA

COMPONENT 1 SECTION C: GLOBAL NON-ENGLISH FILM

KEY TERMINOLOGY

KEY TERMINOLOGY	DEFINITION
INDEPENDENT	One that received less than 50% of its funding from one of the 'big six' major film studios; typically, with a relatively small budget, where the filmmaker gets to tell the story they want to tell in the way they want to tell it.
FILM PRODUCTION BUDGET	The money allowed to be spent on making the film project.
'BIG SIX' STUDIOS	Sony – Columbia (MGM & UA), 20 th Century Fox, Walt Disney Pictures, Warner Brothers, Paramount Pictures, Universal Pictures.



For this part of the specification, you are asked to engage with some specialist writing based on the independent film that you are studying.

This specialist writing will be provided for you – you are not to choose/use your own. These are set by Eduqas (our Examination Board).

These extracts will not be available in the examination. You are not expected to learn them off by heart but you are expected to be aware of one or two key points.

You can use quotations but this is not compulsory.

For this aspect of the course, you have an opportunity to study films produced in the 21st century that have been made, and at least in some part funded, outside the Hollywood system. This section also allows a consideration of how institutional issues affect the kinds of films that are made.

Juno places young people and their experiences centre stage whereas *Hurt Locker* is set against the context of military conflict.

**COMPONENT 1 SECTION C:
GLOBAL NON-ENGLISH FILM**



Characters	
Juno Macguff:	An intelligent, precocious, single-minded teenager, Juno is quick-witted, with an acerbic tongue and her use of sarcasm and snappy dialogue marks her out as being an especially unique character.
Paulie Bleeker:	In many respects the opposite of Juno; a much shyer, reserved person who is perhaps somewhat under the control of his mother. Also intelligent and ambitious-dedicated to his running and ultimately, Juno.
Vanessa Loring:	We are introduced to Vanessa as a very formal and almost person who is clearly desperate to have a child. Through various scenes we witness how natural she will be as a mother and that the breakdown of her relationship is no cause for her to stop wanting a baby of her own.
Mark Loring:	Generally regarded as a selfish and somewhat immature character who doesn't consider the feelings of others. His character development is interesting in that he seems to be a slightly different person each scene he's in, owing to the pressure of situation he's under causing him to behave in a variety of ways including a worryingly comfortable relationship with Juno.
Leah:	Juno's best friend and her rock throughout the film. She has her own opinions about what Juno should do, but besides learning that she likes older men, she is developed much as a character beyond the stereotypical 'best friend' role.

Context:
Made for a reported budget of \$6.5-7.5 million, the film made over \$230million worldwide.
Along with KNOCKED UP and WAITRESS , JUNO was another film released in 2007 films about women facing unplanned pregnancies.
Jennifer Garner accepted a lower salary than usual to prevent the film from exceeding its budget.
Cody collected stories of adoptees, birth parents and adoptive parents, including that of her then-husband, an adoptee who reunited with his birth parents after she wrote the film.
Much of Juno was based on Cody's own high school experiences: She dated a tic-tac-loving boy, she was best friends with a cheerleader and she used a hamburger phone identical to the one that appears in the film.
She also found inspiration in the story of a close friend who had become pregnant in high school and used details of her experiences, such as mistreatment from an ultrasound technician.
In 2008, after 17 students under sixteen in Gloucester, Massachusetts, Time magazine named the "Juno Effect", for glamorising teenage pregnancy.

Key vocabulary						
composition	semiotics	rebellious	adolescent	irresponsible	disparaging	verbose
mise-en-scene	symbolic	arrogant	distant	acerbic	contemptuous	palaverous
cinematography	visual metaphor	sarcastic	sophisticated	altruistic	idiosyncratic	periphrastic

**COMPONENT 1 SECTION C:
GLOBAL NON-ENGLISH FILM**



Themes/issues.	
Teenage pregnancy:	The key narrative element: Juno's unplanned pregnancy is the inciting incident for the film and something which every character in the film is affected by. The representation of Juno and her pregnancy are handled in a very positive way, with Juno being a mature and intelligent woman who takes charge of her own destiny.
Adults vs. teenagers:	Generally, this theme is seen throughout teen films in the form of conflict. In JUNO. we see that the adults, the Maguffs and the Loring, are broadly not involved in conflict with the teenagers. Instead, we do see some individual scenes involving Juno and Mark Loring, Bren Maguff and Paulie's mum. In this way, it's somewhat different to other teen films and reflects how single-minded Juno is and how the film isn't as concerned with what adults say and do.
Coming-of-age:	Coming-of-age is a theme that shows a teenage character maturing or growing up in some way during the course of a film. The use of a 3 or 5 Act structure is usually employed to help show the development of a character's personality. In JUNO, we see this most notably through Juno who, whilst mature at the beginning of the film, takes responsibility for her actions and is much more honest about her feelings towards Bleeker by the end of the film. We also see her consider the nature of love and relationships beyond platonic friendship and casual sex, suggesting a sense of achieved maturity after the birth of her child.
Love:	A classic theme which is seen in various ways in the film; the romance between Juno and Bleeker, the platonic love between Juno and Leah, maternal love as demonstrated with Vanessa and the unborn baby as well as the paternal love between Mac and Juno.
Consequences:	Consequences refer to the idea of one thing leading to another; in the case of Juno, the consequence of her having unprotected sex with Bleeker is her pregnancy. Other significant consequences include Mark's reluctance to have a baby resulting in divorce with Vanessa and Juno seeing Vanessa in the mall having the consequence that Juno decides to continue with the adoption despite the separation of their marriage.
Selfishness vs selflessness	Throughout the film we see examples of Juno acting in selfish manner, whether that means pouring slushy into Bren's vase to spite her, her use of Mark as a way to comfort herself, her apparent use of Bleeker for sex or her nature in trying to handle things by herself. Other characters such as Mark are also somewhat selfish in their overall nature, but the adults are generally seen in the film as somewhat more selfless and wanting to help others. By the end of the film we see a Juno who is much more selfless, suggesting a growth and a maturity that was absent at the start of the film.



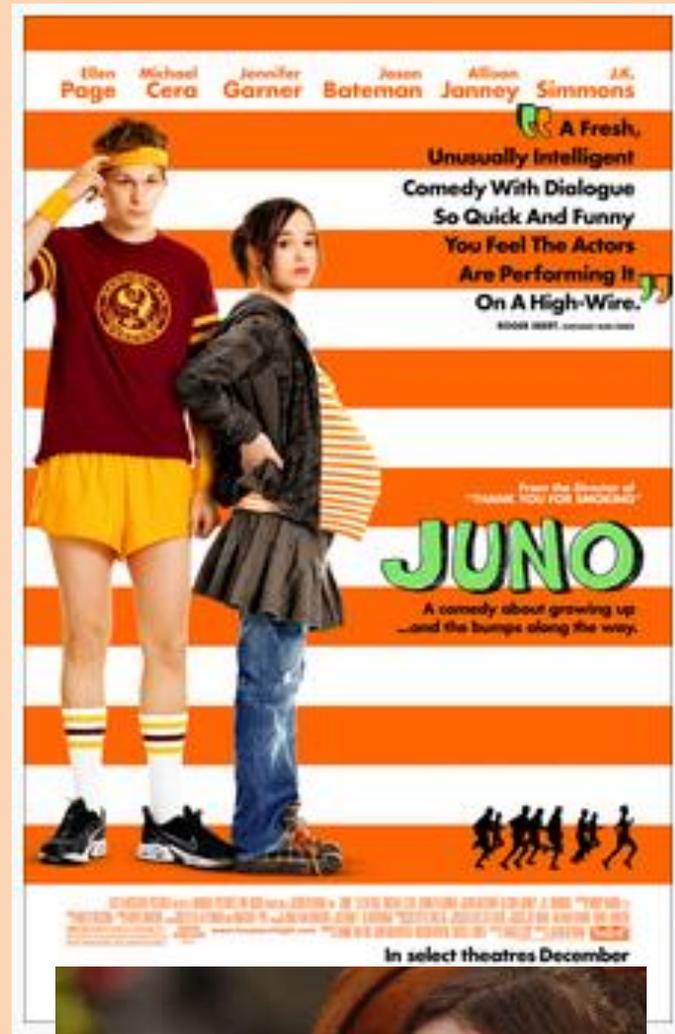
Key scenes	
AUTUMN: The opening scene http://bit.ly/junoks1	An establishing shot of Juno, THE chair and her house. The text on screen says Autumn and instantly tells the audience that the film will not only be split into 4 distinct sections but that the seasons are metaphorical for Juno's experiences in the next 9 months. The extreme long shot also features warm, ambient lighting and the overall appearance is that this is a welcoming scene that suggests the protagonist is alone, isolated and in some way connected with the props and location she shares the shot with. The close up of her face after this shot shows that Juno is confused, concerned or just deep in thought and the jump cut to the next scene, her and Bleeker just before they had sex, is inside, lit differently and shot from an entirely different perspective. These combine to make clear that this is a memory and is a direct, engaging way to open the film.
The Abortion Clinic http://bit.ly/junoks2	Teen pregnancy is a subject that other films have dealt with before openly discuss abortion as an option. Even in this film, Bren cannot bear to utter the word abortion later on and it's interesting to see then that we get an entire scene taking place both outside and inside of an abortion clinic. Outside the clinic, Su Chin protests and presented in an isolated way, standing alone. Juno briefly stops and chats but then proceeds to the clinic, also looking alone and isolated. Inside, the clinic is drab, the colour palette emphasising the lack of natural light. The receptionist is shot from a high-angle and Juno eventually leaves of her own volition, highlighting her power in the situation. The montage of extreme close-ups of others in the clinic is an interesting use of cinematography and editing to show Juno's discomfort in the situation.
Meeting the Lorings http://bit.ly/junoks3	First seen in montage, Vanessa is shot through a variety of tight close-ups that focus on her hands, adjusting and making her home seem more presentable. The montage is inter-cut with a montage of Juno's van passing large, imposing but impressive houses. Any one of these takes as individual shots show how large and impressive the houses are in scale compared to Juno and her van, suggesting a sense of superiority. The similarity of the houses also suggest the people inside are somewhat similar and lack personality or the individualism that we see in Juno. Interesting to note that there is a lot of foreshadowing used in this scene in relation to the Loring's relationship. For example, Vanessa opens the door alone and Mark doesn't come into the scene immediately. His reticence over the situation is clear; note his performance and the use of composition to help highlight this.
Juno tells Leah http://bit.ly/junoks4	The first shot is an ECU of Juno's fingers on the phone, indicating her anxiety about making the call, we then see Juno standing up, whilst Leah lies down showing how relaxed she is. Leah then sits up and the CU allows us to see her reaction to the news & to make clear their bond, Juno is seen in the next shot in a very similar manner in terms of composition-in the centre of the frame, shallow focus and facing broadly towards the camera. Both bedrooms are excellent in offering ideas relating to the characterisation of both people and offer insights into generic conventions and character types.
The Loring's Divorce http://bit.ly/junoks5	One of the more literal visual ideas in the film: when the Loring's are discussing their divorce, Vanessa sits at a table alone, emphasising her loneliness and foreshadowing her future. She sits opposite an empty chair, symbolic of the lack of a father-figure that Mark represents. There is the use of a table runner as a prop which also acts as a divider across the table, making clear that the couple are now strictly divided. Later in the scene, Mark joins the scene, but never sits at the table, indicating how he is no longer part of this family.

COMPONENT 1 SECTION C:

GLOBAL

NON-ENGLISH FILM

JUNO



Author and title	Specialist writing A [Adapted from The Filmmaker's Eye: Learning (and breaking) the rules of cinematic composition by Gustavo Mercado, 2010	Specialist writing B [Adapted from Studying American Independent Cinema (pp. 18-19), by Rona Murray, 2011, Auteur]	Specialist writing C Juno - Get Real ' (Excerpt) Jim DeRogatis, Chicago Sun Times, January 2008)
Summary	Anything and everything in a shot is there for a reason and therefore important. Every shot matters, even if it doesn't seem to at first glance.	Independent films are different from mainstream films from major Hollywood studios. Audiences expect this and it means that 'Indie' films can do things that are unique in their story, style or purpose.	The film is not as good as others say. Teenagers do not talk like Juno and others in the film, Juno would make better decisions than have unprotected sex and the only honest (genuine) character is Mark.
Key quotes	<p>"...anything and everything that is included in the composition or frame of a shot is there for a specific purpose."</p> <p>"The framing of a shot conveys meaning through the arrangement of visual elements."</p> <p>"Every shot counts no matter how inconsequential it may seem."</p>	<p>"...something that strays artistically from the norm"</p> <p>"...independent cinema does not need to adhere to generic patterns..."</p> <p>"...challenges this cinematic form artistically and looks to create something individual in either its aesthetics or its ideological viewpoint, or both."</p>	<p>"The notion that kids — even smart and sarcastic ones — talk like Juno is a lie..."</p> <p>"Are we really supposed to believe that a girl as intelligent... neglects to bring birth control?"</p> <p>"...simplistic and insulting caricatures drawn by screenwriter Diablo Cody."</p> <p>"Bateman's Loring actually can be seen as a more honest..."</p>

YR 11 FILM STUDIES THE NEA

NEA = 30% of whole GCSE (Production = 20%, Evaluative Analysis = 10%)

PRODUCTION:

An extract from a screenplay for a genre film (800 – 1000 words) and a shooting script of a key section from the screenplay (about 1 min of screen time about 1 page of screenplay)

PLUS...

Evaluative Analysis of between 750 – 850 words. This analyses your production in relation to other professionally produced films/screenplays.

The NEA must be individual – no group submissions are allowed. There are strict controls in place regarding supervision, support and ensuring no plagiarism/copying takes place.

WE ARE WORKING WITH CRIME GENRE

OUR QUALIFICATION IS CALLED EDUQAS GCSE
FILM STUDIES <https://www.eduqas.co.uk/qualifications/film-studies-gcse/>

IMPORTANT INFORMATION ABOUT NEA

The screenshot shows a digital screenplay viewer with a scene from 'The Matrix'. The scene is titled 'EXT. SUBURBAN HOME - NIGHT' and 'INT. SUBURBAN HOME - KITCHEN - NIGHT'. The text includes dialogue from Filbert, Becky, and Tracy, as well as action lines like 'FILBERT comes around the corner, distracted by his fantasy, bumps into the wall his favorite ball slips from his hand.' and 'FILBERT'S POV'. The viewer has a toolbar at the top with icons for search, zoom, and other functions. A 'Study to Project' button is visible in the top right corner of the viewer.

SCENE HEADING
One line description of the location and time of day

ACTION
The description of the actions in a scene

CHARACTER
Identifies the character who is speaking

DIALOGUE
The lines of speech your character says

INTERCUT
Instructions when cutting to multiple locations

SUBHEADER
Used when there are minor changes in a location

FADE IN:
Marks the start of the screenplay.

SCENE NUMBER
Generally numbered only in the shooting script

TRANSITION
Used as transitional instructions for editing

EXTENSION
Clarifies where a character is when they can't be seen

PARENTHETICAL
Provides info on how the actor should say the line

SHOT
Indicates the camera angle or movement in a scene

SCREENPLAY/SEQUENCE - GENRE OPENINGS

Melody – what is the lead line doing?

High or low. **Range**



Big or Small. **Range**



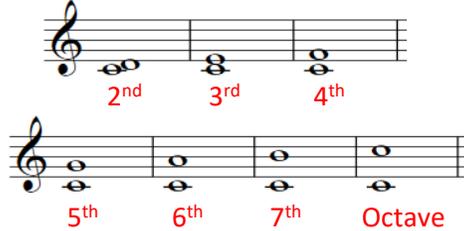
Direction = Ascending Descending



Chromatic The melody uses notes that aren't in the scale / key of the piece.



Interval The distance between two notes

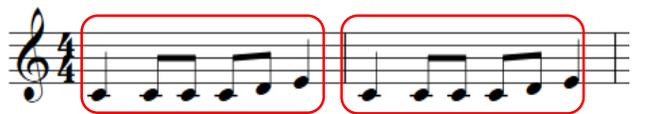


*Count the start note & end note

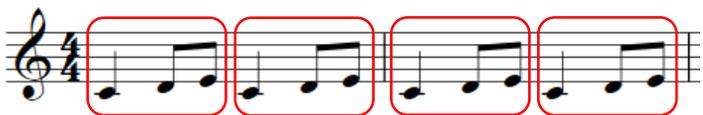
Sequence Doing the same shape idea but at a different pitch.



Repetition Doing the same thing again, without any changes.



Ostinato A short repeated idea.



Ornaments Trills



Mordents



MUSIC GCSE KEY VOCABULARY

Harmony - what are the chords and the tonality?

Key Signature

The sharps or flats at the start of a piece of music, showing what key the music is in.

Modulation

Musical word for key change. Most common changes: to **Dominant** or **relative Major/Minor**.

Identifying The Tonality...

- Tonal** - In a major or Minor Key
- Atonal** - There is no sense of key
- Modal** - Uses 'old-fashioned' scales called modes
- Pentatonic** - The music only uses 5 notes

Chords

- Triad** - A chord with three notes (See below)
- Power Chord** - Only playing the Root and Fifth of a triad (used in Rock music)
- Dissonance** - Clashing notes played together
- Chord Sequence** - The order the chords in a piece of music follow (containing cadences at the ends of phrases)

Cadences

The last two chords in a phrase. Only sounds 'complete' if ends on chord I.

Sounds Complete

Perfect Cadence	V Dominant	I Tonic
Plagal Cadence	IV Subdominant	I Tonic

Sounds Incomplete

Imperfect Cadence	I Tonic	V Dominant
Interrupted Cadence	V Dominant	Minor Chord

Dynamics – how loud or quiet? How is it changing?

Marking	Italian Term	Meaning
pp	Pianissimo	Very Quiet
P	Piano	Quiet
mp	Mezzo Piano	Moderately Quiet
mf	Mezzo Forte	Moderately Loud
f	Forte	Loud
ff	Fortissimo	Very Loud
	Crescendo	Getting Louder
	Diminuendo	Getting Quieter
sfz	Sforzando	Sudden Accent

Baroque Period: Dynamics were rarely used (no crescendos and diminuendos). Use of **Terraced Dynamics**.

Classical Period: Some dynamics, to add contrast.

Romantic Period: Lots of crescendos & diminuendos and a large range of dynamics to add expression.

Describing What You Hear

Comment on any changes - don't sum up the whole example with one word (unless it doesn't change!)

The music starts... then... the music ends...

MUSIC GCSE KEY VOCABULARY

Structure – the way the music is built

Structure – The order that things happen in.

First... then... this is followed by... at the end.

Binary Form - Music in two parts

Section A and Section B.



Section B contrasts Section A in some way. Usually both sections are repeated.

Ternary Form - Music in three parts

Section A, Section B, Section A.



The 2nd Section A can be an exact repeat of the 1st Section A, or a slightly altered version.

You must know the individual structures of each set work.

Beethoven = Sonata Form (see the set work Knowledge Organiser)

Song Form

Intro Verse Chorus Middle 8 Bridge Outro

Instrumentation: The instruments you can hear and what they are doing

Rock and Pop instruments

Electric Guitar



Acoustic Guitar



Bass Guitar



Drum Kit



Synthesiser/Keyboard



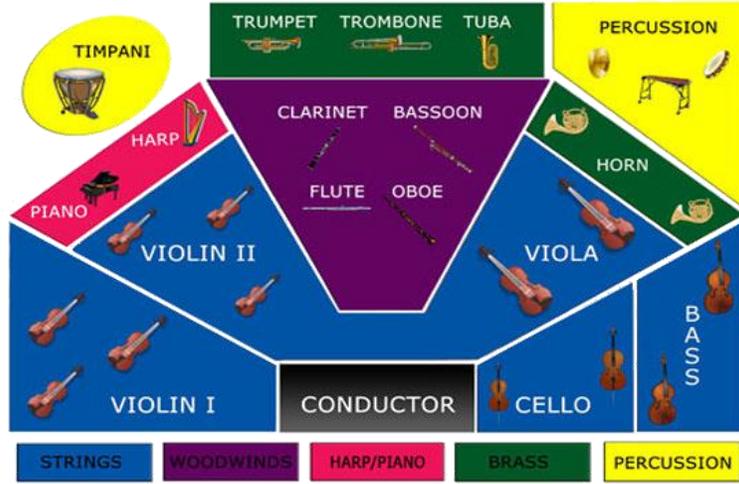
Remember to revise the Gaelic and African instruments in Afro Celt

Instrumental Ensembles

- Solo - 1 performer
- Duet - 2 performers
- Trio - 3 performers
- Quartet - 4 performers

MUSIC GCSE KEY VOCABULARY

Instruments Of The Orchestra



Types Of Voices

- Soprano (Female)
- Treble (Boy)
- Alto (Female)
- Countertenor (Male Alto)
- Tenor (Male)
- Bass (Male)

**SATB Choir: Soprano, Alto, Tenor & Bass*

Other Vocal Terms

- A capella:** Singing without any accompanying instruments.
- Chorus:** Music written for a choir.
- Backing Vocals:** Sing harmonies / support the lead singer.

Tempo and Time: The speed and the timing of the music

Working Out The Tempo

Tap your toe to the pulse of the music and think, 'how fast am I tapping'.

**Don't tap your whole foot – it could be seen as distracting others and an exam violation!*

Rubato **Translates as 'to steal time'*

Not sticking strictly to the tempo - to add feeling (*Romantic Period – especially Beethoven!*)

Syncopation Playing off (or in-between) the beat / pulse

On The Beat

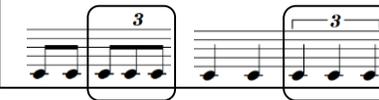
Playing on one of the beats that you would 'tap your toe' to

Off-beat

Playing in-between the beats you would 'tap your toe' to

Triplet

Three notes played evenly in the space of two notes:



Pause

If this symbol is written, stop the pulse of the music & pause on the note.



Marking	Meaning
Allegro / Vivace	Fast or Lively
Allegretto	Quite Fast (Not as fast as Allegro)
Moderato / Andante	Moderate / A Walking Pace
Adagio / Lento	Slowly
Accelerando	Gradually Speed Up
Ritardando / Rallentando rit. rall.	Gradually Slow Down
= 60 (60 bpm)	60 beats per minute
= 120 (120 bpm)	120 beats per minute

Anacrusis: An unstressed pickup or lead-in note(s) that comes before the first beat of the bar.



The Bach starts with an Anacrusis!

Time Signatures and Metre: How is the pulse organised?

MUSIC GCSE KEY VOCABULARY

Style and Genre: Identifying the styles of music

Time Signatures

Written at the start of the music (and anywhere it changes) to show how many beats there are per bar, plus what type of beat

Simple Time Signatures **Each beat can be divided into two equal halves*



4 crotchet beats per bar



3 crotchet beats per bar



2 crotchet beats per bar

Compound Time Signatures **Each beat is dotted and can't be divided into two equal halves*



4 dotted crotchet beats per bar (12 quavers)



3 dotted crotchet beats per bar (9 quavers)



2 dotted crotchet beats per bar (6 quavers)

Listening Examples Go to Youtube to hear some examples of different metres:

2/4	Slaidburn March	<i>*A march is usually in 2/4 (Left, Right, Left, Right... = 1, 2, 1, 2...)</i>
3/4	Shostakovich's Waltz No.2	<i>*A waltz is a dance, usually in 3/4</i>
4/4	All That Jazz (from Chicago)	<i>*Chicago is a Musical</i>
5/4	Take Five (By Dave Brubeck)	<i>*Listen out for the jazz style</i>
7/4	The start of Money (By Pink Floyd)	<i>*Listen out for the opening bass riff</i>
6/8	We Are The Champions (By Queen)	<i>*Queen are a famous British Rock Band</i>
12/8	The Way You Make Me Feel (By Michael Jackson)	<i>*Count 1&a 2&a 3&a 4&a</i>

Baroque Period

1600-1750

Bach, Vivaldi, Handel

Ornaments
Terraced Dynamics
Major & Minor Keys
Harpichord
Small Orchestra
 (Mostly Strings)
Basso Continuo

Classical Period

1750-1810

Mozart, Haydn, Beethoven

Balanced, **regular phrases**
Alberti Bass
 Wider range of **dynamics**
Pianoforte introduced
Wider range of mood
Orchestra got bigger
Elegant/Graceful style

Romantic Period

1810-1910

Chopin, Schubert, Wagner

Use of the **leitmotif**
 Music **more expressive**
 Huge range of **dynamics**
 Use of **chromatic** chords
 Unusual **Key Changes**
Large Orchestra
 Use of **Rubato**

Film Music

***Genre** - Action, Adventure, Horror, Romance, War, Sci-fi, Western...

***Composers** - John Williams, James Horner, Jerry Goldsmith

***Think**, how do the **musical features represent what is happening on-screen?** E.g. Car Chase: Fast tempo, loud dynamics, sudden changes in melody direction...War Film: Military instruments, fanfare, monophonic to represent isolation...Horror Scene: Dissonant chords and use of repeated pattern to build tension...

***Leitmotif** - A short musical idea linked to a specific character / thing

Pop & Rock Music

***Pop** - Commercial music which appeals to lots of people

***Rock** - Generally 'more aggressive' but also includes rock-ballads.

***Instruments** - (See instruments sheet!)

Rock/Pop Song structure:

Intro	The beginning. Sets the mood & style. Usually just instruments.
Verse	Tells the story. Lyrics change each time but tune stays the same.
Chorus	The main message of the song. Same words and tune each time.
Bridge	A section that links two other sections.
Middle 8	A contrasting section of new ideas – usually 8 bars long.
Outro	Extra bit of music to finish off the song.

Fusion -Mixing more than one style of music together. For example... **Bhangra** - Came to UK in 1980s. Mixing traditional Indian music & pop.

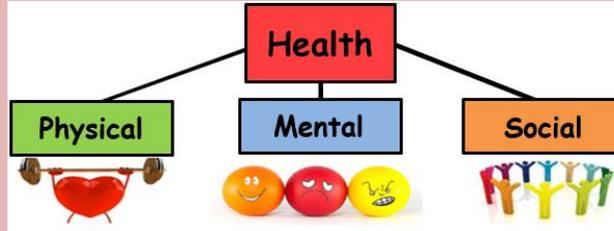
Physical health and well-being

Regular Exercise	Explanation of Health Benefit
Improved heart function	A stronger heart means that it pumps more efficiently so there is less strain on the heart reducing the chance of heart attacks
Improved efficiency of body systems	The musculoskeletal and cardiorespiratory systems are more efficient with regular exercise. Weight bearing exercise increases bone density reducing the chance of osteoporosis
Reduce the risk of some illness	Exercise reduces blood pressure so there is less chance of having a heart attack or stroke. Exercise also improves the immune system so you are less likely to get ill
Ability to do everyday tasks	Due to improved body systems you can function more easily. You can do everyday tasks without getting tired such as gardening, running up the stairs. You are not slowed down by excess weight
Avoid being obese	Exercise burns calories so you are less likely to be overweight or obese. Obesity is linked to several health problems such as heart attacks, stroke and diabetes



6. Health, fitness and well-being

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



Fitness

Regular Exercise	Explanation of Health Benefit
Improved fitness	All components of fitness can be improved through exercise. These improvements in fitness lead to better performance
Reduced chance of injury	Due to stronger bones and muscles and increased flexibility reduces the chance of injury, this means more time can be spent training or performing
Supporting physical ability to work	Due to improved fitness components such as muscular strength and muscular endurance will mean you can cope better with the physical demands of work, for example a bricklayer will have the fitness to cope with demands of carrying, mixing and laying bricks

Mental health and well-being

Regular exercise	Achieved Health benefits
Reduced stress/tension	Taking part in exercise can take your mind of your problems from work, home or school. This helps prevent stress related illness such as depression
An increase in serotonin levels	When you exercise you release a chemical called serotonin also known as the 'feel good hormone'. When serotonin is released it makes you feel good
Ability to control emotions	When playing sport, you need to be disciplined as you need to follow the rules and stick to tactics or roles. This can help you control your emotions, improve confidence and self-esteem
Increase in self-confidence & self-esteem	Exercise can make you feel part of something. Being part of a team can give you confidence. The more you exercise you do the better you perform this can also improve confidence

Social health and well-being

Social Health benefits from exercise
Regular exercise allows us to meet new people and make new friends
Regular exercise allows us to meet and socialise with our current friends
Regular exercise can improve our cooperation skills
Regular exercise can increase our social activities

More People leading a Sedentary Lifestyle

More people use cars and public transport than cycle or walk

Why?

Large amount of time at school or work is spent sitting

More jobs are computer based and are therefore sedentary

Large amount of time at home is spent sitting playing computer games and watching TV

6.2 Consequences of a Sedentary Lifestyle

A sedentary lifestyle is a lifestyle where there is little or no exercise



Obesity

Obesity is a term used to describe people with a large fat content, caused by an imbalance of calories consumed compared to energy expenditure

A person is considered obese if they have a body mass index (BMI) of over or over 20 % above standard weight to height ratio

If body fat gets to this level it can have serious health implications

Health risks due to a sedentary lifestyle	Explanation
Obesity/ excessive weight gain	Due to inactivity and a reduction in metabolic rate
Poor Self-esteem	Being over-weight or obese can lead to depression a lack of brain function and release of serotonin
Hypertension (High BP)	Lack of exercise and poor diet can lead to an inefficient heart and potentially damaged blood vessels
Poor Sleep	Lack of oxygen delivery to cells and excessive weight have been linked to snoring and restless legs. This disturbs sleep, as not doing enough to feel tired at night
Type 2 diabetes	Being overweight can increase the risk of developing type 2 diabetes
Heart disease and stroke	High Bp and cholesterol increase the risk of a heart attack and stroke
Lethargy (lacking energy)	Low oxygen levels can lead to a feeling of fatigue and tiredness

Obesity can lead to ill-health:

Physical	Mental	Social
It is linked to: <ul style="list-style-type: none"> Types of cancer Heart disease Heart attacks Type 2 diabetes High cholesterol levels 	It is linked to: <ul style="list-style-type: none"> Depression Low self esteem Loss of confidence 	It is linked to: <ul style="list-style-type: none"> An inability to socialise (loss of confidence) Inability to leave home (due to mobility)

How Obesity can affect performance:

Limits cardiovascular endurance:

Unable to exercise without stopping repeatedly, due to the excess weight and the drop-in efficiency of the cardio-respiratory system

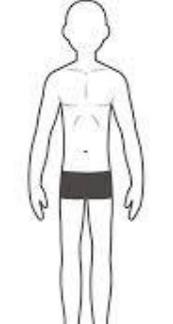
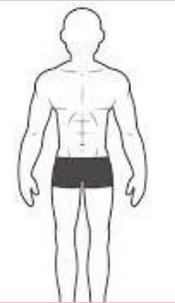
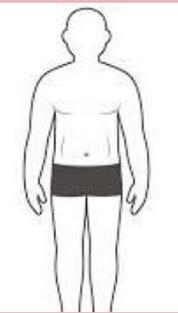
Limits flexibility: Excess fat around the joints restricts movement

Limits agility: Excess weight makes it harder to change direction quickly

Limits speeds/power: Excess weight makes it harder to move fast

6.3 Somatotypes

A method of classifying body types

Ectomorph	Mesomorph	Endomorph
<p>Characteristics:</p> <ul style="list-style-type: none"> Tall and thin Narrow shoulders and hips 	<p>Characteristics:</p> <ul style="list-style-type: none"> Muscular appearance Wide shoulders Narrow hips 	<p>Characteristics:</p> <ul style="list-style-type: none"> Pear-shaped Tendency towards fatness Wide hips Narrow shoulders
		
Suited to endurance events:	Suited to strength agility and speed sports:	Suited to strength sports where their bulk is an advantage:
		

6.4 Energy Use

In order to maintain a healthy weight, the amount of energy taken into the body must be matched by the amount of energy expended.

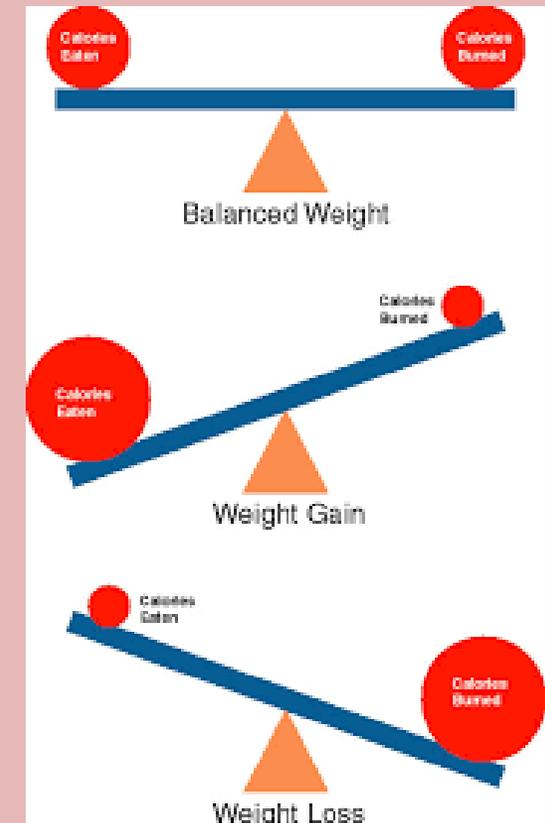
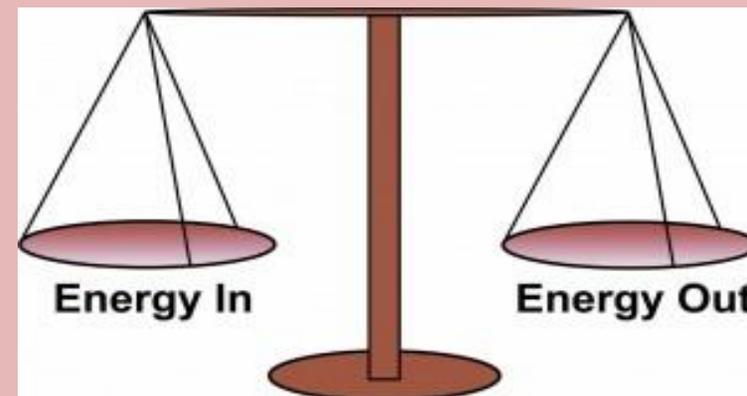
Energy is measured in **calories (KCAL)** and is obtained from the food we eat

Adult Male: 2500 Kcal per day

Adult Female 2000Kcal per day

Factors affecting calories required:

Age	Younger people (U25) need more calories because as you age the body replaces muscle with fat and fat burns fewer calories than muscle
Energy expenditure	The more you exercise, the more energy you need, the more calories you need to consume
Gender	Men tend to need more calories than women because: <ul style="list-style-type: none"> Men tend to have a larger skeleton Men tend to have a greater muscle mass
Height	Taller you are the more calories needed because of the larger skeleton



6.5 Balanced diet

- Eating the right foods in the right amounts. This will allow us to exercise and work properly
- Insufficient nutrients can cause ill health such as anaemia, rickets and scurvy
- No single food contains all of the nutrients the body needs, so you need to eat a variety of foods in the correct proportions

Reasons for a balanced diet

- Any unused energy is stored as fat, which could cause obesity (particularly saturated fat)
- To provide suitable energy that can be used for activity
- To provide the nutrients needed for energy, growth and hydration

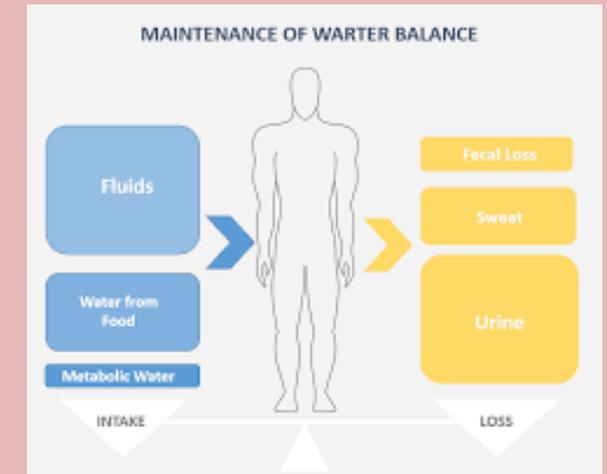
6.6. Maintaining Water Balance - Hydration

- Dehydration:** excessive loss of body water, such that it interrupts the function of the body
- Hydration:** having enough water to enable normal functioning of the body
- Rehydration:** Consuming water to restore hydration
- Water balance:** taking in water (hydrating) to prevent dehydration due to loss of fluids

Nutrition	Explanation	Foods
Carbohydrates 	Carbohydrates are the main preferred energy source for all types of exercise of all intensities (aerobic and anaerobic) A balanced diet should contain 55% - 60% carbohydrate	<ul style="list-style-type: none"> • Bread • Pasta • Rice • Potatoes
Fats 	Fats are an energy source; they provide more energy than carbohydrates but only at low intensity. It is easily stored in the body and can lead to weight gain A balanced diet should contain 25% - 30% fat	<ul style="list-style-type: none"> • Butter • Oil • Fatty meats • Fried food
Protein 	Protein are for growth and repair of muscle tissue. It is used by performers such as sprinters to aid muscle growth (hypertrophy) A balanced diet should contain 15% - 20 % protein	<ul style="list-style-type: none"> • Cheese • Milk • Eggs • Fish • Meat
Vitamins and minerals 	Vitamin and minerals are for maintaining the efficient working of the body systems and general health this includes keeping our bones strong and our immune system working	Vitamins <ul style="list-style-type: none"> • Fresh fruit • Vegetables Minerals <ul style="list-style-type: none"> • Meat • Vegetables

Effects of dehydration

Blood thickening (increased viscosity)	Slows blood flow which preventing the delivery of oxygen
Increase in heart rate causing irregular rhythm	The heart has to work harder to deliver oxygen to the working muscles
Increase in body temperature	Causes overheating, leading to heat exhaustion
Slowing of reactions	Increases reaction time, which can slow the time to make important decisions
Muscle fatigue	Causes cramp in muscles



NCFE Technical Award in Health and Fitness

Unit 2: Preparing and planning for health and fitness

LO1: Understand the impact of lifestyle on health and fitness

1.1 Lifestyle factors

1.1.1 Activity Levels

A person's lifestyle involves a series of choices. There are many factors that could affect a person's lifestyle choices:

- Disposable income
- Where you live
- Family, friends and their lifestyles
- Opportunities and facilities
- Education levels

If a person decides to adopt a lifestyle that involves little or no exercise, this is known as a '*sedentary lifestyle*'.

NHS guidelines state that '*to stay healthy or improve health, adults need to do two types of physical activity each week*':

- Moderate aerobic exercise or vigorous exercise
 - Brisk walking
 - Playing team sports recreationally
- Strength exercises
 - Lifting weights
 - Use of resistance bands

1.1.2 Diet

Nutrients:

A nutrient is a substance that is essential for our bodies to grow, repair and work properly.

Nutrients	Specific need
Carbohydrates	Main and preferred energy source for all types of activities Provided within bread pasta, potatoes
Fats	Also an energy source Comes in two forms; saturated fats (animal fats) and unsaturated fats (vegetable fats)
Protein	Required for tissue growth and repair
Minerals	Needed in small quantities.
Fibre	Adds bulk so food passes through the digestive system quickly.
Water	Keep hydrated and ensure body temperature doesn't rise too high due to sweating.

Recommended Daily Allowance

Guidelines that state the amount of each nutrient that is needed per day to meet the needs of nearly healthy people.



Dietary changes to support a healthy lifestyle:

- **Portion size** – what happens when these are too big?
- **Energy balance** – What happens if you consume too many or too little?
- **Eating habits** – NHS provides guidelines to support healthy eating habits.

1.1.3 Rest and Recovery



Active individuals need enough:

- **Sleep**
 - Lack of sleep can reduce energy levels or an individual's ability to concentrate.
 - Make you feel angry quicker
 - Speed and reaction times are affected
 - Quality and amount of sleep are important
 - Lack of sleep can cause depression
 - Enough sleep can help the body fight infections
- **Recovery from different health and fitness activity sessions**
 - Body needs time to recover
 - Need to replace fluids lost during the training session
 - When training small tears occur in the muscles and these need time to repair and grow stronger
 - Energy stores in muscles are used and time is needed to replenish
 - Decreases the risk of overtraining
 - Provides a good balance between work, rest and training demands
- **Rest between health and fitness activity repetitions.**
 - Muscles are too fatigued that technique deteriorates
 - Rest allows muscles to clear waste products such as lactic acid
 - Rest allows muscles to replenish their energy stores
 - Rest allows the body to repay 'oxygen debt'

1.1.4 Other factors

Factors that can negatively affect health and fitness:

Recreational Drugs:

These can negatively affect an individual's physical, social and mental health.

- Hallucinogens
- Relaxants
- Stimulants

Performance Enhancing Drugs:

Some individuals may choose to take performance enhancing drugs to improve their sporting performance, however the side effects can have a negative affect on health and fitness.

Performance Enhancing Drug	Improvement on performance	Negative affect on health
Stimulants	Increases alertness	Heart Failure Addictive
Anabolic agents	Increases muscle mass Can train harder	Kidney damage Aggression
Narcotic analgesics	Pain relief from injuries	Injury being made worse Addictive
Peptide hormones (EPO)	Increases the production of red blood cells and oxygen carrying capacity of the blood	Heart attack Stroke
Diuretics	Removes fluid body via urine production	Dehydration
Beta blockers	Decreased heart rate	Heart failure



Alcohol:

Consuming too much alcohol can affect the body in different ways:

1. Balance and coordination are reduced.
2. Blood vessels dilate at the surface of the skin.
3. Muscle glycogen levels are reduced
4. Alcoholism can lead to liver, bowel and mouth cancer, as well as increased risk of heart disease and stroke.

Stress:

Stress is felt in situations when we feel under pressure. We may feel anxious and not able to cope leading to:

- Feeling anxious
- Loss of sleep
- Lacking energy
- Muscular tension
- Depression
- Loss of appetite
- High blood pressure

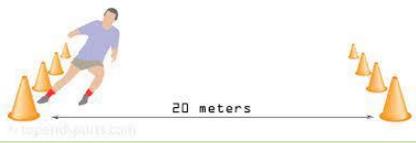
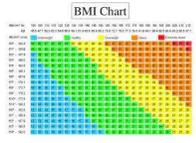
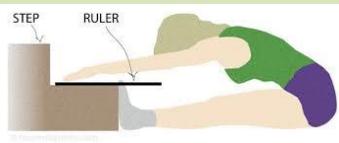
Smoking:

Half of smokers will die from smoking-related disease.

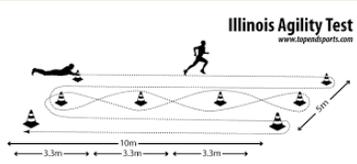
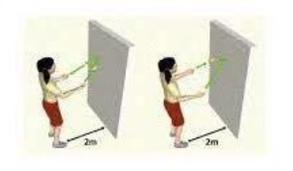
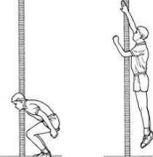
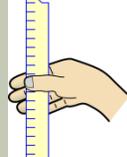
LO2: Understand how to test and develop components of fitness

2.1 Fitness Testing

2.1.1 Health-related fitness tests

Cardiovascular endurance test		Body Composition		Flexibility Fitness Test	
Fitness Test	Test Procedure	Fitness Test	Test Procedure	Fitness Test	Test Procedure
Multi stage fitness test	<ul style="list-style-type: none"> Measure out 20 metres Place cones to mark the distance Start the audio recording Run from one cone to the other until you cannot continue Record result and compare to a rating chart 		<ul style="list-style-type: none"> Warm up Lift the maximum weight you can in one attempt Record result and compare to a rating chart 	Sit and reach test	<ul style="list-style-type: none"> Sit with your legs straight and the soles of your feet flat against the box With palms face down, one hand on top of the other, stretch and reach as far as possible Record result and compare to a rating chart
Used by badminton and cricket players		Used by performers such as power lifters, rugby players and boxers		Used by performers such as gymnasts and divers	
					
Muscular endurance Fitness Test		Muscular endurance Fitness Test		Muscular Strength Fitness Test	
Fitness Test	Test Procedure	Fitness Test	Test Procedure	Fitness Test	Test Procedure
Sit-up bleep test	<ul style="list-style-type: none"> Lie on a mat, knees bent, feet on the floor. your hands across your chest on shoulders Start the audio recording Sit up until you can no longer continue Record results and compare to a rating chart 	Press up Test	<ul style="list-style-type: none"> Hands and toes touching the floor, body and legs in a straight line. Keep the back and knees straight, lower the body to a 90 degree angle at the elbow, then return to starting position. Continue the action until you can no longer continue. 	Hand grip dynamometer	<ul style="list-style-type: none"> Adjust the grip to your hand Keep your arm beside you at a right angle to your body Squeeze the handle as hard as you can Record result and compare to a rating chart
Used by tennis and football players		Used by performers such as climbers (to lift body weight)		Used by performers such as climbers (to lift body weight)	
					

2.1.2 Skill-related fitness tests

Agility Fitness Test		Balance Fitness Test		Coordination Fitness Test		
Fitness Test	Test Procedure	Fitness Test	Test Procedure	Fitness Test	Test Procedure	
Illinois run	<ul style="list-style-type: none"> Set up the course as shown in the picture Lie face down on the floor, by the first cone On 'Go' run around the course as fast as you can Record result and compare to a rating chart 	Stork test	<ul style="list-style-type: none"> Place hands on your hips & foot on your knee Raise your heel from the ground so you are balancing on your toes Time starts when you lift your heel Record result and compare to a rating chart 	Wall toss test	<ul style="list-style-type: none"> Stand 2 meters away from a wall Throw a tennis ball underarm against the wall Throw with the right hand and catch with the left hand; then alternate hands Record result and compare to a rating chart 	
Used by performers who change direction quickly		Used by gymnasts and games players		Used by badminton and cricket players		
						
Power Fitness Test		Reaction Time Fitness Test		Results:		
Fitness Test	Test Procedure	Fitness Test	Test Procedure	Fitness Component	Score 1	Score 2
Vertical jump	<ul style="list-style-type: none"> Stand side onto the wall, feet flat on the floor Mark the highest point that the tips of your fingertips can reach Holding a piece of chalk, jump as high as you can Mark on the wall the top of your jump Measure the distance between the 1st and 2nd 	Ruler Drop	<ul style="list-style-type: none"> Stand with your hand open around the ruler, with the 0 cm mark between thumb and forefinger The assistant holds and drops the ruler Catch the ruler as quick as possible Record results and compare to a rating chart 			
Used by sprinters, rugby players and long jumpers		Used by basketball, rugby and badminton players		CV Endurance		
				Body Composition		
				Flexibility		
				Muscular endurance		
				Muscular strength		
				Agility		
				Balance		
				Coordination		
				Power		
				Reaction		

LO2: Understand how to test and develop components of fitness

2.1.3 Using data

You need to know how to collect, use and analyse data to evaluate levels of fitness.

Normative data

- Normative data is usually taken from a large, randomly selected sample of people.
- Good way for individuals to compare themselves against national standards.
- A way to identify strengths and weakness in their fitness levels.

Test and re-test

- Testing is used to measure current fitness levels.
- After identifying strengths and weaknesses of the various fitness components, an athlete will often design a training programme to improve.
- It is important to complete a re-test in order to gauge whether the training has made an impact.
- Results can then determine future training.

Application to health and fitness activities

- A midfield football player could complete the 'bleep test' and identify that their level of cardiovascular endurance is only rated as average compared to normative data.
- They decide to design a six-week interval training programme to improve this.
- At the end of the programme they re-test to find they are now rated good. The training has had a positive effect.

2.2 Training Methods

Training Method	
Interval training	This involves alternating periods of high-intensity effort with periods of low intensity effort or rest, which is called recovery. This can improve both aerobic and anaerobic.
Circuit training	This involves a series of work stations where the performer works for a set period of time (for example, 60 seconds). Each station usually exercises different parts of the body and muscle groups. It also involves a rest period between each station (for example, 30 seconds). This can improve aerobic/muscular endurance or anaerobic/strength depending on the intensity and duration of work stations.
Fartlek training	Fartlek is the Swedish word for 'speed play'. It is a form of continuous training that involves changes of speed, incline and terrain to provide changes to the intensity of the exercise. This can be used to train both aerobic and anaerobic energy systems.
Continuous training	This is usually considered to be a minimum of 20 minutes sub-maximal work with no rest. It may consist of activities such as swimming, running or cycling, or a combination of them.
Resistance and body weight training	This is a form of interval training where the participant uses something to resist the contractions of muscles. The resistance can be in the form of body weight, such as press-ups, or free weights such as dumbbells. This form of training is used to improve muscular endurance and/or strength.
Cross training	This involves exercising using two or more different types of training that have been mentioned previously.

2.3 Optimising a Health and Fitness Programme

2.3.1 Heart rate training zones

Heart rate (HR) is the number of times the heart beats per minute and is measured in beats per minute (bpm). Maximal heart rate (MHR) is the maximum number of beats of the heart per minute. You can estimate MHR with the following equation:

$$\text{MHR} = 220 - \text{age}$$

You need to know and understand two heart-rate training zones:

- **Aerobic training zone**- between 60 and 80 per cent of MHR
- **Anaerobic training zone**- between 80 and 100 per cent of MHR

2.3.2 Repetitions and sets

You need to know and understand repetitions and sets, and be able to apply them to support individual goals through a health and fitness programme.

- **Repetitions (reps)**- this is one full completion of the exercise movement.
- **Sets**- are made up of repetitions of an exercise followed by a rest period before another set is completed.
- **1 rep max (1RM)**- 1RM is the maximum amount of weight that can be lifted when doing one repetition of an exercise.

LO3: Understand how to apply health and fitness analyses and set goals

3.1 Health and Fitness analysis and goal setting

3.1.1 Health and fitness analysis tools

You need to know and understand health and fitness analysis tools, what information they collect, how to administer them and why they are used. Before starting a fitness programme, it is important to collect a participant's medical history to make sure it is safe for them to exercise. There are a range of health and fitness tools that can be used and you need to know how to collect, use, analyse and evaluate data to suggest improvements.

	Food (type and amount)	Drink (type and amount)	Portion size
Breakfast			
Morning			
Lunch			
Afternoon			
Dinner			
Evening			

PAR-Q- The PAR-Q (physical activity readiness questionnaire) is a screening tool that is used by someone who is planning to start an exercise programme.

Lifestyle questionnaire- A lifestyle questionnaire is a list of questions about the health and lifestyle of a person.

Food diary- A food diary is a very effective tool for weight and diet management in health and fitness activities.

Client progress review- During any health and fitness programme it is important to review the progress of the participant regularly to see the impact it is making. This will help to inform any changes that may need to happen.

LO3: Understand how to apply health and fitness analyses and set goals

3.1.2 Goal setting

You need to know and understand the acronym SMART in relation to goal setting. Goal setting is important in order to maximise performance. The goal setting process helps sports people set future aims to increase their motivation and confidence. Goals should be challenging but attainable. Applying the SMART principle allows you to do this.

Principle	Explanation	Example
Specific	Detailed and precise	Run a half-marathon
Measurable	Quantifiable to track progress	Complete the distance in less than two hours
Achievable	Challenging but attainable	The last half-marathon took me two hours five minutes
Realistic	Within the availability of resources, knowledge and time	The next race is in six months time, allowing time to train
Time bound	Set period for completion	Six months

An effective way to achieve your ultimate goal is to break it up into smaller goals that are time-phased:

Long-term goal (six months plus)- this is your ultimate aim and is usually more difficult, for example scoring a set number of points in basketball by the end of the session.

Medium-term goal (one to six months)- this should be the result of achieving your short-term goals, for instance scoring a set number of points by the midseason break.

Short-term goal (one day to one month)- this should be completed over a shorter period of time, and is usually less difficult. These goals are important because they provide you with the motivation and confidence to aim for the medium-/long-term goals- for example, 'Score two points in the next game'.

Specific	
Measurable	
Achievable	
Realistic	
Time bound	

How can I use this in my project?

You need to be able to apply the SMART principles to set health and fitness goals based on the fitness test data that you have collected.

LO4: The structure of a Health and Fitness Programme

4.1 The structure of a Health and Fitness Programme

An overview of the whole training programme:

- What is going to be done during the training?
- What needs to be achieved? Linked to the performers own targets or goals
- Rest days – how many, when are they?

Session Cards:

Information given to the athlete with instructions about what activities to do in activity session and how hard to work .

A health and fitness programme should include:

Fitness test results (completed before training) to:

- Determine which components of fitness should be improved.
- Compare with fitness tests completed during training to see if the training is having the impact (changes to training could be made if fitness tests indicate the need to).
- Compare post-training fitness tests to see if training has been effective.

A lifestyle analysis and action plan to make sure it is safe for an individual to begin training and to identify changes that need to be made to benefit an individual's health and fitness. This could include a PAR-Q and the following questions:

- Are they active or sedentary?
- Do they smoke, take drugs or drink alcohol?
- What are their stress levels like?
- Do they eat a healthy, balanced diet?
- How much rest and sleep do they get?

4.1.1 The session card:

The session card is all the information given to the athlete telling them what activities to do in each session and how hard to work. .

- Activities for warm-up, main activity section and cool down.
- The training methods that will be used and will muscles will be targeted.
- Type of activity that will be done, for example, treadmill, running, etc.
- How to complete each activity:
 - How long to do the activity for
 - Number of sets and repetitions to be completed
 - Which weights to use
 - How hard to work
 - How long to rest between activities
 - Which heart rate zones to work in (Aerobic = 60-80% or Anaerobic 80-90%)

Example PAR-Q

	Yes	No	No contraindication according to physician
1. Has your doctor ever said that you have a heart condition and recommended physical activity only under medical supervision?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. In the past month, have you had pain in your chest when you were physically inactive or active?.....	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Do you have problems in breathing when you are physically inactive or active?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Did you ever fall down because of dizziness or have you ever lost consciousness?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Do you have bone or joint problems that could be made worse when being physically active?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Has a doctor ever prescribed you drugs for high blood pressure or heart or breathing problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Do you not feeling well because of a temporary illness such as cold or fever?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Are you or may you be pregnant?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Do you know of any other reason why you should not do physical activity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

LO4: The structure of a Health and Fitness Programme

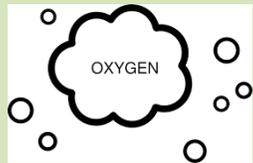
4.1.2 Warm-up

Warm-up:

A series of activities done to ensure an individual is ready to perform their main activity session safely. It is broken into four parts.

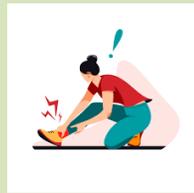
Benefits of a warm-up are:

- Gradual increase in heart rate increases body temperature
- Increased blood flow to the muscles
- Improved range of movement and mobilisation of joints
- A gradual increase of effort to full pace
- Psychological preparation to prepare for the activity
- Practice of movement skills
- Reduce the chance of injury.



TIMO:

Temperature increase
Injury chances reduced
Mental preparation
Oxygen (more) supplied to working muscles



1. Mobilisation:

In this phase, the joints and muscles that are going to be used in the main activity session are activated and moved. The aim is to lubricate the joints and increase the range of movement at the joints.

Examples: lunges, knee lifts.



Pulse raiser:

An activity designed to increase the heart rate and increase the supply of blood to the working muscles.

Examples: Jogging – different the speeds



Stretches:

Static stretching involves holding a muscle in a still, stretched position for a period of time (approx. 10 secs)

Dynamic stretching involves moving a joint slowly through its full range of motion. The muscle is being stretched while it is moving.

Examples: Lunge with twist



Practice movement:

In this phase involves rehearsing the skills that will be used during the main activity session.

Examples: Tennis player practicing forehands and backhands, Basketball player practicing chest passes and dribbling.



4.1.2 Cool down

Cool down:

A cool down is done after the main activity session and lasts around 10 minutes. It is used to gradually return the body to its pre-exercise state.

Benefits of a cool down are:

- Slowly enables the breathing rate
- Slowly decreases the heart rate
- Slowly reduces the temperature of the body
- Removal of waste products such as lactic acid from the muscles
- Prevents blood pooling/ DOMS
- Psychologically calms the performer down and enables them to reflect on their performance.

Cool down activities:

1. Reduced-intensity activity linked to the main activity session.
Example: jog or walk
2. Stretching to gently relax muscles and return them to their pre-exercise state.
3. Relaxation and breathing exercises.

4.1.3 Main activity section

Methods of training:

When undertaking a health and fitness programme, the methods of training selected must relate to the components of fitness that an individual is trying to improve.

This can be identified by:

- Completing fitness tests to assess individual weaknesses
- Identifying the components of fitness relevant to the participant's chosen sport.

Components of the main activity section:

1. Cardiovascular training

There are many different forms of cardiovascular training (rowing, cycling, jogging, swimming):

- Aerobic activity at around 60-80% of MHR
- Exercising the heart to increase the ability of the heart, blood and blood vessels to continually supply working muscles with oxygen.
- Exercising of large muscle groups
- Completed at least three times a week
- Completed for at least 20-30 minutes

2. Resistance Training

Resistance training is training the body against an external resistance to increase strength or endurance:

- Using any resistance, for example free weights (dumbbells or barbells), fixed weight machines, another individual, a resistance band or water
- Completing sets of repetitions of a specified exercise
- Rest periods between sets of repetitions
- Using alternate muscle groups to allow working muscles to rest and recover
- 'Balancing out' the training of paired muscles (biceps and triceps)

3. Core Training

- Exercising to strengthen the core muscles around the trunk and pelvis area, core training can involve static (still positions) or dynamic (moving) actions:
- Increase stability and balance when performing other activities and exercises
- A 'balancing out' of muscles on all sides of the body – abdominals and back muscles
- Better posture, reducing the chance of injury

Principles of Training:

Individuals need to apply the principles of training and principles of FITT to ensure training is effective and to reduce the chances of injury.

Principle of training	Application
Specificity	Making your training 'match' or 'suit' your sport to develop the components of fitness required for that sport.
Progressive	Increasing the amount of training you do gradually to prevent an injury, for example increasing the length of time a plank is performed as core training continues.
Overload	Making your body work harder than it normally does to improve certain components of fitness, for example increasing the percentage of MHR you are working at during a cardiovascular training session.
Reversibility	If you reduce training due to motivation levels or an injury or illness, the fitness gains that you have made will be reduced or lost; try to make sure all sessions planned are completed when possible.
Tedium	Make sure your training is interesting and motivates you; by including cardiovascular, resistance and core training within your programme, the chances of tedium occurring are reduced.

Principle	Application
Frequency	As training progresses, increasing the number of times per week that you train.
Intensity	As training progresses, increasing how hard you work in each session.
Time	As training progresses, increasing the amount of time you train for.
Type	Make sure the type of training you complete is linked to the components of fitness you wish to improve.

4.2 Health and Safety

Ensuring the activity environment is safe:

The individual's involved must check that the space, surfaces and conditions within the training environment are safe.

For example, water on a sports area floor could cause an individual completing circuit training exercises to slip and injure themselves.

Performing equipment:

The equipment being used during a health and fitness programme must be in good working order.

For example, a bike being used for continuous training must have fully functioning brakes, if they are not working correctly the cyclist could crash and sustain serious injuries.

Equipment set-up checks:

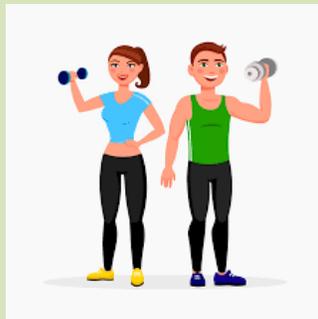
If equipment must be set up prior to the training, it is important to check that it has been set up correctly.

For example, ensure weights being used are secured to the bar correctly, if they were to fall off during the activity, they could cause an injury.

Appropriate clothing and footwear:

It is very important to make sure that appropriate footwear and clothing is worn during a health and fitness programme.

For example, individuals training on muddy terrain without studs could slip and break a wrist on landing. A skier training in cold conditions must ensure they have clothing that will provide suitable warmth.



Risk assessment:

A risk assessment is a series of checks done to identify hazards within an environment to reduce the chances of such hazards causing someone harm. A risk assessment aims to increase the safety of an environment by following a series of simple steps.

Risk Assessment

1. Identifying hazards:

Look for anything in the environment that might increase the chance of an accident or injury happening, for example glass on a Netball court.

2. Identifying who is at risk:

Identify who might be harmed by the hazard, for example a Netball player falling on broken glass on the court.

3. Assessing the likelihood of an injury and the severity, should one occur:

How likely is it that an accident or injury may actually happen?

If an accident did occur, how serious could the consequences be?

What would the outcome be?

A cut or a bruise?

Could it result in a more serious injury or death?

4. Inputting controls:

Steps that are taken to prevent an accident or injury happening, for example goalposts being secured to the wall or floor of a sports hall.

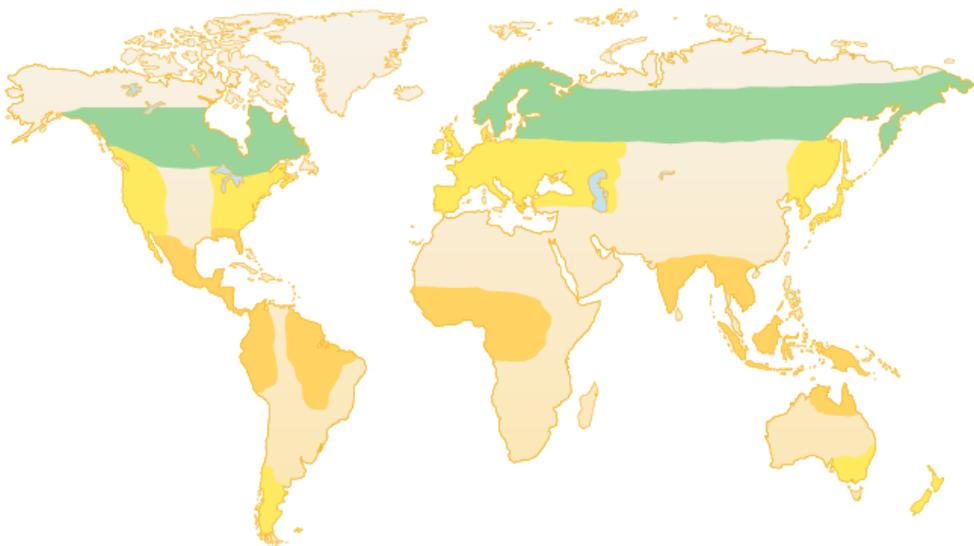
5. Review:

Once a risk assessment has been completed, regular checks must take place to ensure that the controls are being followed, for example, are staff ensuring that fixed-weight machines are working correctly?

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.



■ 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

Type	Description	Advantages	Disadvantages	Common uses
Oak		<ul style="list-style-type: none"> Strong and durable Has an attractive grain when well finished 	<ul style="list-style-type: none"> Expensive Becoming rarer Harder to work with than some woods Corrodes iron and steel 	<ul style="list-style-type: none"> Used a lot for building houses and boats in the past Now used for high-end furniture and wine and whisky barrels
Mahogany		<ul style="list-style-type: none"> Has a very attractive finish Quite easy to work 	<ul style="list-style-type: none"> Expensive Environmental problems with sourcing from tropical forests Oils in the wood can give some people a skin rash or breathing problems 	<ul style="list-style-type: none"> High-quality furniture, jewellery boxes, windows
Beech		<ul style="list-style-type: none"> A tough wood Does not crack or splinter easily Hard 	<ul style="list-style-type: none"> Expensive Not very resistant to moisture Not suitable for exterior use 	<ul style="list-style-type: none"> Toys, cooking implements, solid and laminated furniture
Balsa		<ul style="list-style-type: none"> Very lightweight Easy to cut 	<ul style="list-style-type: none"> Much too soft and weak for most products 	<ul style="list-style-type: none"> Model making, primary school projects, surf board cores Used for rafts in ancient times

Jelutong		Even, close grain is easy to cut and shape	Soft and not very strong, so not good for structural uses	Model making, moulds for casting or vacuum forming
Birch		Regular, even grain and easy to work	Low resistance to rot and insect attack	Veneers: to make plywood and to surface cheaper materials that are used for interior door and furniture
Ash		Strong, tough, flexible and finishes well	Low resistance to rot and insect attack	Handles for tools, sports equipment, ladders

Natural timbers: softwoods

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

Manufactured timbers

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

Key term

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

Type	Description	Advantages	Disadvantages	Common uses
Plywood	<ul style="list-style-type: none"> A tree trunk is sliced into thin layers called veneer These layers are glued together with the grain lines going in alternate directions 	<ul style="list-style-type: none"> Flat and structurally strong Surface looks like wood Resistant to warping, cracking and twisting 	<ul style="list-style-type: none"> Quite expensive Edges can look rather rough Susceptible to water damage if wrong grade is used 	<ul style="list-style-type: none"> Building and furniture panels that need some strength
Medium density fibreboard (MDF)	<ul style="list-style-type: none"> Wood dust and fibres are mixed with a glue and pressed into flat sheets under extreme heat and pressure 	<ul style="list-style-type: none"> Cheap (made from waste wood) Smooth ungrained surface is good for painting or staining Easy to machine 	<ul style="list-style-type: none"> Does not look good, so needs coating Weak compared to real wood or plywood Tools blunt quickly due to the glue 	<ul style="list-style-type: none"> Cheap flat-pack furniture, wall panels, display cabinets, storage units
Chipboard	Wood chips are mixed with glue and pressed into flat sheets	Uses waste materials so is cheap to produce	<ul style="list-style-type: none"> Not much structural strength, especially in damp conditions Surface is very rough, so usually plastic coated 	Desktops, kitchen worktops, cheap flatpack furniture

Type	Description	Advantages	Disadvantages	Common uses
Pine		<ul style="list-style-type: none"> Very durable Easy to work Quite cheap as it grows quickly enough to be forested Reasonably strong, lightweight and easy to work with 	<ul style="list-style-type: none"> Can warp, crack and splinter more than some other woods 	<ul style="list-style-type: none"> House construction, for roof joists and floorboards Furniture, doors, interior woodwork
Cedar		<ul style="list-style-type: none"> Natural oils make it resistant to water and fungal growth 	<ul style="list-style-type: none"> More expensive than pine and not as strong 	<ul style="list-style-type: none"> Outdoor furniture, fences, sheds, boats

Larch		<ul style="list-style-type: none"> Tough, durable and resistant to water It can be used outside untreated, and fades to a silvery grey 	Costs more than some other softwoods	Small boats, yachts, exterior cladding on buildings
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Term	Properties
Hardness	Ability of a material to withstand cutting and scratching. Timber is generally quite a soft material. It can easily be scratched and cut with metal tools, which are much harder.
Toughness	Ability of a material to be hit. A tough material can be quite soft, and might bend and deform when hit. Timber is quite a tough material. If you hit it with a hammer it may dent.
Durability	Ability to last a long time. Timber that has been dried out and is kept dry is durable. However, wood that is left wet can rot quite quickly and won't then be durable.

Selection of timber

Aesthetics factors

Form
Colour and texture

Environment Factors

Sustainability
Genetic engineering
Seasoning
Upcycling

Availability Factors

Use of stock materials
Use of specialist materials
Hurricanes, storms and disease

Cost Factors

Quality of material
Manufacturing processes necessary
Treatments

Social Factors

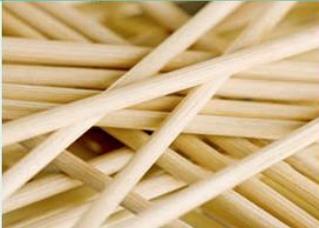
Use for different social groups
Trends, fashion and popularity

Cultural and ethical factors

Avoiding offence
Suitability for intended market
The consumer society
The effects of mass production
Built in product obsolescence

Stock forms/types

Timber is available in a variety of stock forms.

Name	Availability	Picture
Regular sections	<ul style="list-style-type: none">Timber is sold in a standard range of cross-sectional shapes and sizes – sawmills do this for convenience, so there is a limited range of sizes to cutDesigners can use the standard sizes when designing products	 <p>Commonly available sizes and shapes of timber</p>
Mouldings	<ul style="list-style-type: none">Lengths of timber cut into decorative shapesThere are lots of shapes available for different purposes, such as skirting boards or decorative edgingSaves time but can be relatively expensive	 <p>Common moulding shapes</p>
Dowels	<ul style="list-style-type: none">Wooden rods that are round in cross-sectionHave a variety of uses, from model making to furniture construction – can be used to strengthen simple jointsShort lengths of dowel are used to join pieces of wood with a dowel jointRequires accurate drilling of holes	 <p>Different-sized dowels</p>
Sheets	<ul style="list-style-type: none">Manufactured boards come in standard-sized sheets in a range of thicknessesAvailable in large sizes but large sheets are relatively difficult to cut and edges may splinter	 <p>A stack of manufactured boards in a warehouse</p>

The Physical characteristics of timber

Knots
Colour
Grain structure and density

Working properties

Elasticity
Tensile strength
Compressive strength

Mechanical properties

Hardness
Toughness
Durability

Social Footprint

Trend forecasting
Impact of logging on communities
Recycling and disposal

Ecological Footprint

Sustainability
Deforestation
Habitat destruction and loss
Processing
Transportation
Wastage
Pollution

Name	Appearance	Use	Advantages	Disadvantages
Twist drill		<ul style="list-style-type: none"> Drilling smaller-sized holes in most materials The flutes lift the swarf out of the hole 	Readily available in a wide range of sizes from very small up	<ul style="list-style-type: none"> Usually only up to 13 mm diameter Deep holes can block up the flutes
Flat bit		Drilling larger holes in wood	<ul style="list-style-type: none"> Centre spur gives an accurate starting point Drills quickly 	Cannot be used to make an existing hole bigger
Forstner bit		Drilling flat-bottomed holes in wood	Small centre spur can make a blind hole with a flat base	Slower than a flat bit
Auger		Drilling deep holes in wood	Can bore deep holes	Needs to be used at a slow speed
Hole saw		Cutting large holes	Can make a large hole in a sheet of manufactured board	<ul style="list-style-type: none"> Only good for quite thin materials Limited range of sizes available

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

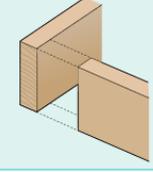
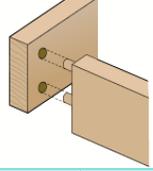
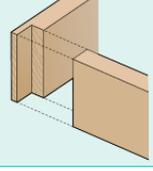
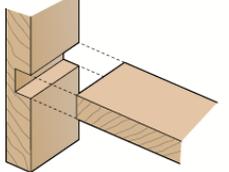
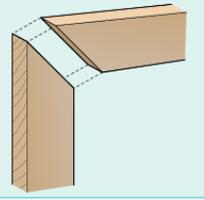
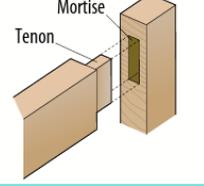
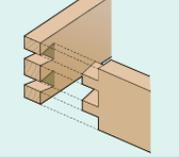
Drilling

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	Advantages	Disadvantages
Butt		Easy to make, it is just square ends glued together	<ul style="list-style-type: none"> Weak: there is no mechanical strength, just the glue Not aesthetically pleasing
Dowel		Automated machines can drill the dowel holes quickly and accurately	Hard to line up the dowels accurately by hand
Lap		Quite easy to cut	Not very strong
Housing		<ul style="list-style-type: none"> Holds a shelf or divider securely in the middle of a carcass (frame) Pairs well with corner lap joints 	<ul style="list-style-type: none"> Can be tricky to cut neatly on a wide board Very accurate marking out and cutting required to ensure a shelf is exactly level
Mitre		<ul style="list-style-type: none"> Looks good because no end grain shows Good for picture frames 	Weak, it is only a butt joint at 45°
Mortise and tenon		<ul style="list-style-type: none"> A strong joint Good for joining a table or chair frame to legs 	Time consuming to cut by hand
Dovetail		<ul style="list-style-type: none"> A very strong joint – the dovetails lock together securely Good for a drawer front that will get pulled hard 	Very tricky to cut accurately by hand

Use of a mortiser

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

Use of a bag press

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

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.

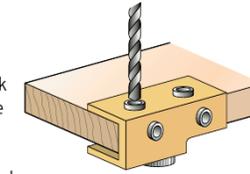


Figure 7.6.2 A drilling jig that has been clamped to the corner of the workpiece to get the holes in the correct place

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.

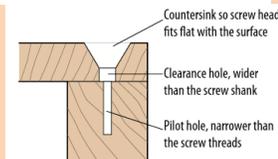


Figure 7.7.3 Drilling timber parts ready for a countersunk screw

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

Name	Appearance	Use	Advantages	Disadvantages
Hand saw		Used to cut larger pieces of wood	Can cut long, deep cuts through big planks	<ul style="list-style-type: none"> Blade can bend, so it's important to saw straight Harder work than a power saw
Tenon saw		Used to cut smaller pieces of wood and accurate detail like joints	Stiffened blade makes it easier to make precise, straight cuts	Stiffened blade back means it cannot cut deeper than the blade, as the spine that keeps the blade stiff is thicker than the blade
Coping saw		Used to cut shapes out of thin wood and manufactured boards	<ul style="list-style-type: none"> Thin blade can go around curves Blade can be taken out and put through a hole to cut internal shapes 	<ul style="list-style-type: none"> Blade snaps quite easily Small teeth saw slowly
Scroll saw		Used to cut shapes out of thin wood and manufactured boards	Can cut fine, accurate details	Large pieces of wood cannot be cut with it
Jigsaw		<ul style="list-style-type: none"> The blade goes up and down Used to cut large thin pieces of wood clamped to a bench 	<ul style="list-style-type: none"> Can cut quite quickly Thin blade can cut curved shapes 	<ul style="list-style-type: none"> Difficult to cut straight lines Blade can wander in thicker materials

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

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		<ul style="list-style-type: none"> Large individual teeth Available in different shapes, usually flat, half-round and round 	<ul style="list-style-type: none"> Big teeth cut soft woods quickly Good for rough shaping 	Big teeth leave marks in the wood that need removing with a file or sandpaper
Surform		A frame holds the blade with pressed metal teeth, rather like a cheese grater	<ul style="list-style-type: none"> Good for rough shaping of soft materials Blade can be removed from frame and replaced 	<ul style="list-style-type: none"> Leaves a rough surface Hard work on harder woods

Mechanical properties		Physical properties	
Strength	Ability to withstand force, e.g. by resisting squashing (compression) or stretching (tension)	Density	Compactness of a material, defined as mass per unit volume
Elasticity	Ability to return to original shape once deforming force is removed	Electrical conductivity	Ability to conduct electricity
Plasticity	Ability to permanently deform without breaking when subjected to a force	Thermal conductivity	Ability to conduct heat
Malleability	Ability to be permanently deformed in all directions without fracture	Size	Dimensions of the material
Ductility	Ability to be deformed by bending, twisting or stretching	Corrosion	Metal is eaten away as it reacts with oxygen and water in the air. Rust is formed through the corrosion of iron or steel
Hardness	Ability to resist deformation, indentation or penetration	Aesthetics	Appearance of a material, e.g. grain
Toughness	Ability to withstand sudden stress or shocks	Optical	Ability to absorb or reflect light
Brittleness	Inability to withstand sudden stress or shocks	Joining	Ability to be joined to other materials
Durability	Ability to withstand deterioration over time	Magnetism	Attraction to magnetic material
Stability	Ability to resist changes in shape over time		
Stiffness	Ability to resist bending		

	Description	Advantages	Disadvantages
Painting	<ul style="list-style-type: none"> A coloured pigment in liquid that dries out 	<ul style="list-style-type: none"> Available in a range of colours 	<ul style="list-style-type: none"> Covers up the natural wood grain
Staining	<ul style="list-style-type: none"> A coloured liquid that soaks into the wood surface 	<ul style="list-style-type: none"> Makes a pale-coloured wood like pine a darker colour to mimic more expensive woods like oak or mahogany 	<ul style="list-style-type: none"> Does not look quite like another wood as the pine grain still shows
Varnishing	<ul style="list-style-type: none"> A clear coating that dries to a shine 	<ul style="list-style-type: none"> Gives a hardwearing finish that shows the grain of the wood Can be a high gloss or a matt finish 	<ul style="list-style-type: none"> Can scratch or chip and expose the wood
Wax	<ul style="list-style-type: none"> A soft solid that is rubbed into the surface with a cloth 	<ul style="list-style-type: none"> Easy to apply Gives a plain, natural look 	<ul style="list-style-type: none"> Rubs away and needs reapplying Not a glossy finish
Oil	<ul style="list-style-type: none"> Is rubbed onto the surface and soaks in 	<ul style="list-style-type: none"> Good waterproofing for timber Vegetable oil on kitchen ware is non-toxic 	<ul style="list-style-type: none"> Surface feels oily
Shellac	<ul style="list-style-type: none"> A cloudy liquid made from a resin secreted by a beetle Lots of layers are rubbed on and polished to create a finish called French polish 	<ul style="list-style-type: none"> Traditionally used on expensive furniture for its glossy lustre 	<ul style="list-style-type: none"> Easily damaged by water and heat
Veneering	<ul style="list-style-type: none"> A thin layer of wood glued onto the surface 	<ul style="list-style-type: none"> An expensive, decorative wood like mahogany can be put onto a cheaper wood like pine or chipboard 	<ul style="list-style-type: none"> The veneer is natural wood, so it still needs a finish applied

Scale	Description	Advantages	Disadvantages
One-off	One product made at a time, either for a specialist product or to test an idea	<ul style="list-style-type: none"> No set-up cost Made with existing equipment Product can be customised to the user's needs 	Slow, so expensive to make several
Batch	Several copies of the same product are made at the same time	<ul style="list-style-type: none"> Jigs, templates and moulds speed up the process and can be kept for future use Special machinery is not needed, so set-up cost is not high 	<ul style="list-style-type: none"> Labour intensive, so it is quite expensive per product Takes time to make jigs, moulds and templates
Mass	Factory machinery set up to make lots of identical products	Can make a product quickly and cheaply	Machinery expensive to set up, so only worthwhile for making a lot of products
Continuous	Factory machinery making the same thing 24/7	Makes the product very quickly and cheaply	Machinery very expensive to set up, so only worthwhile for making huge quantities of a product

AQA Design and Technology Textiles 8552 – NEA Controlled Assessment

This project work is the coursework for your GCSE. It covers 50% of your GCSE marks and gives you the opportunity to show your ability to design and make a high quality product in answer to a specific design brief. The controlled assessment is split into three parts, AO1 (research) is 20% of the grade, AO2 (designing, modelling and making) is 60% and AO3 (evaluating) is worth 20%.

Your project will involve **a lot** of work. 30-35 hours in total in class time, plus you will need to put in time after school and at home on your folder work. It is therefore important that you choose to make a product you are interested in. It is expected that you plan and organize your time wisely during lesson time and for homework.

The assessment criteria for the NEA are split into six sections as follows.

	Section	Criteria	Maximum marks
AO1 (Phase 1) Identify, investigate & outline design possibilities	A	Identifying & investigating design possibilities	10
	B	Producing a design brief & specification	10
A02 (Phase 2) Design & make prototypes that are fit for purpose	C	Generating design ideas	20
	D	Developing design ideas	20
	E	Realising design ideas	20
A03 (Phase 3) Analyse & evaluate	F	Analysing & evaluating	20
Total			100

Each section of your coursework folder is worth a different amount of marks.

As you can see, the sections in AO2 covering the Development of your design and the practical (Making) are worth almost $\frac{2}{3}$ of the overall folder grade.

REMEMBER: you should only have 20 pages in your folder so **WHAT you include** in your folder is important.

You can use the coursework guide to help you present your work. The following symbols

HOW TO USE THE GUIDANCE TEMPLATES:

What do the symbols mean on each slide?

Red text must be read then deleted.



Each page will have guidance for you to follow. They will include **details of what to include** in your work. They will always be written in red and **MUST** be deleted.



This icon indicates that you must **add an image, graph or photograph** to help illustrate your work. You **MUST** add appropriate labels to whatever you use.



This icon is used to highlight sections of the project that require **feedback** from your client.



This icon is used to indicate which pages require a **summary / conclusion** needs to be added.



This icon is used to indicate which sections you have sought **inspiration** from other designers on.

AO2: Generating Design Ideas

1. Initial Ideas

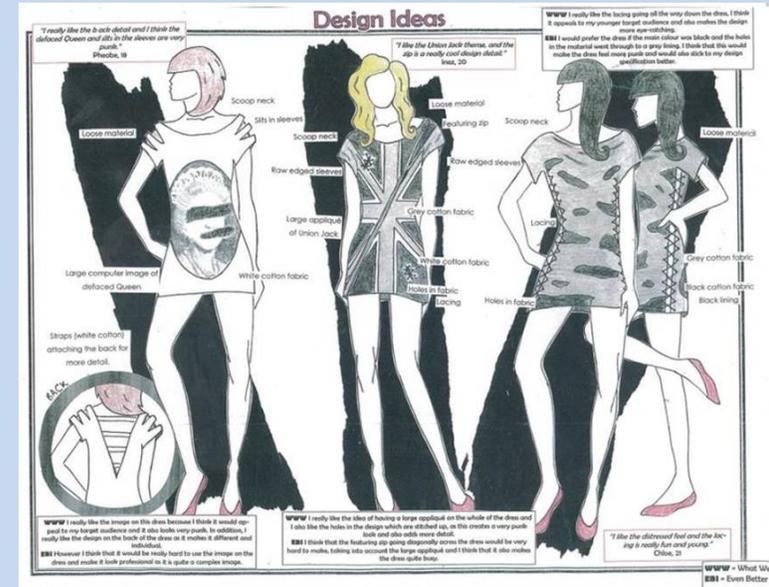
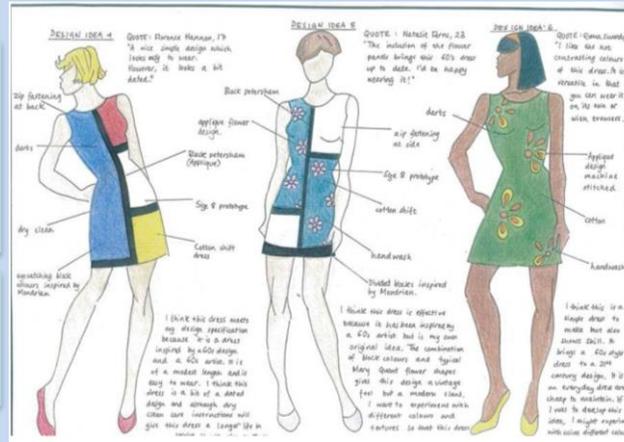
- Re-read your **DESIGN BRIEF**
- Look at your **RESEARCH**
- Re-read your **SPECIFICATION/DESIGN CRITERIA**.

You must be very clear about what it is you are designing and **WHO IT IS FOR!**

Use an **HB** or **2B** pencil to **SKETCH** your ideas. Relax and sketch **FREELY**. Be **BOLD** and **CONFIDENT**. Let the **MODERATOR** see what you are thinking – **LABEL** your ideas, use **KEYWORDS**

The **PURPOSE** of the task is to design something **NEW, ORIGINAL** and **EXCITING!** It must be a product with a **DIFFERENCE** and something your 'Target Audience' will want to buy.

Pick out **SHAPES, PATTERNS** and **ELEMENTS** that appeal to you. **COMBINE** ideas.



If you find this difficult, it is usually because **AO1** - the research element of your coursework **ISN'T GOOD ENOUGH**. Is there any more research you could do that would help?

You will need to get feedback from your client about your first ideas so that you can develop one further into a final product.

GENERATING DESIGN IDEAS concept one

You are expected to produce a range of imaginative, creative and innovative ideas some of which take inspiration from existing designs. A good design sheet will have a mixture of rough sketches, notes/annotations, better-refined sketches, evaluative comments and colour on it.



Evaluation **>>**

- Evaluate your idea making judgments about:
- How well will it work. Good points and bad points?
 - Are its aesthetics appealing to your clients?
 - How difficult will it be to make?
 - Will it be expensive, a reasonable cost, or cheap?

You will need three/four concept sheets.

Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.

GENERATING DESIGN IDEAS concept two

You are expected to produce a range of imaginative, creative and innovative ideas some of which take inspiration from existing designs. A good design sheet will have a mixture of rough sketches, notes/annotations, better-refined sketches, evaluative comments and colour on it.



Evaluation **>>**

- Evaluate your idea making judgments about:
- How well will it work. Good points and bad points?
 - Are its aesthetics appealing to your clients?
 - How difficult will it be to make?
 - Will it be expensive, a reasonable cost, or cheap?

AO2: Developing Design Ideas

2. Review Of Initial Ideas

1. You need to determine which of your designs follow your design brief and specification and should be taken forward for development.

- I. Compare each idea against the **SPECIFICATION** the table shown.
- II. Give each idea a tick or a cross to show whether or not it meets each criteria.
- III. Total up ticks for each idea.
- IV. This will indicate which ideas are the strongest ones.

Review of initial ideas

	Design 1	Design 2	Design 3	Design 4	Design 5	Design 6
Aesthetics						
Customer						
Cost						
Environment						
Size						
Safety						
Function						
Materials & Manufacture						
Total						

2. Client's Opinions Of Your Ideas

Ask your client what they think of your design ideas. Which one is the strongest? Why did they like it? Why did they reject the others? Does this correspond with your comparison against the SPECIFICATION?

3. Evaluation of Initial Ideas

Say which design was your CLIENT's favourite, which meets specification the best and which one you prefer and why.

Explain why you are going to take this design forward and how you can develop it in 3 ways to improve design for your FINAL DESIGN taking on board any of your client's suggestions.

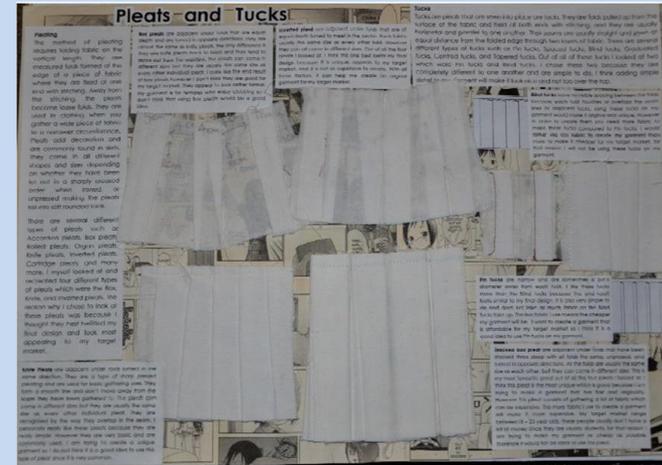
3. Development And Refinement Of Design Ideas

You will now need to continually test, evaluate and refine your ideas. Look at the 2-3 most suitable ideas from your Initial Ideas and refine them so they suit the brief and specification even better.



Develop these design ideas. Evidence everything you do, this should a mix of...

- Prototype modelling
- Client testing and feedback
- Materials testing
- Aesthetics
- Further Research



DEVELOPMENT

Selection

Explain which concept you are going to develop into your final solution. Justify your selection.

You must refine and improve your chosen design idea, using an iterative design (the next improved version) approach.

Produce a range of 2D, 3D isometric and exploded sketches that show developments in the functionality, constructional detail and aesthetics of your design. You will also need to suggest materials, that could be used.

Add lots of notes to your work saying what improvements you have made, and how it more closely meets your specification or user needs.



INSERT PICTURE HERE THAT YOU WILL TAKE INSPIRATION FROM E.G. HINGE ASSEMBLY.

Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.

PHYSICAL MODEL

This next iteration (the next improved version) of your design will be done through modelling.

- Model some aspects of your project to try and find out something you don't know or are not sure of.
- Model one of the techniques you intend to use.
- Make a part that you are not sure will work.
- Make a part that you are not sure how to do.
- Make a small scale version of your whole product to help you visualise it.



Model Construction

Describe the materials and joining methods used to make your model.



Model Evaluation

Explain what you have learnt from making this model. How will this change your design as you move forward?

AO2: Developing Design Ideas

4. Modelling Ideas

Produce a fully detailed model of your final prototype. The functionality, constructional detail and aesthetic appearance of your design should be finalised.



Use good technical knowledge and effectively use modelling to make quality refinements of your design ideas so that they fully meet the requirements of the design specification.

VIRTUAL MODEL

This iteration (the next improved version) of your design will be done through modelling – testing.

Produce a fully detailed model of your final prototype. The functionality, constructional detail and aesthetic appearance of your design should be finalised. Your model will be used to create a materials and equipment list, overall project cost and manufacturing specification. It is a massively important part of the project.



SCREENSHOT OF YOUR FINAL PROTOTYPE (FULL VIEW)



SCREENSHOT OF YOUR FINAL PROTOTYPE (EXPLODED VIEW)



SCREENSHOT OF YOUR FINAL PROTOTYPE (CROSS SECTION VIEW)

Feedback

Add some feedback from either your client or users at this stage. As well as positive comments it should include at least one thing that they think could be improved.

Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.

5. MATERIALS AND EQUIPMENT LIST

MATERIALS AND EQUIPMENT LIST

Produce a list of materials, components, and other times you will use to make your product. Create a costings chart to show total cost of product.



INCLUDE AN IMAGE OF YOUR PATTERN ENVELOPE – FRONT AND BACK.



INCLUDE A LAYPLAN (LAYOUT) OF YOUR PATTERN PIECES.

Justification

Explain the purpose of the pattern, layplan and material list.

Summary

Comment on whether you feel the price is reasonable. What did your client specify? Have you been successful?

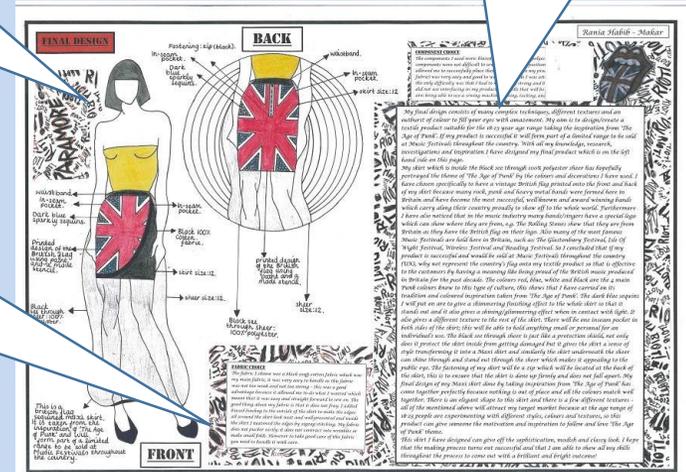
6. Final Design Idea

Present your final design idea. From your final design ideas:

Choose the idea you want to make into a prototype and produce a presentation drawing or CAD image.

Make sure you get feedback from your client or end users regarding their thoughts on the chosen design.

Make sure you have given consideration given to the materials, techniques and processes required to produce the chosen design.



Produce a list of materials, components, and other times you will use to make your product. Create a costings chart to show total cost of product.

Your modelling will be used to create a materials and equipment list, overall project cost and manufacturing specification. It is a massively important part of the project.

AO2: Realising Design Ideas 7. Production of a prototype

You now need to start making the prototype of your final design.

Annotate all of your work.
 Explain what you did and importantly why you did.
 Say what went well, what went wrong and why

As you make your prototype take photographs to evidence the processes and techniques you use.

Include information on....
 Safety
 Quality control
 Material choices
 How you fixed problems

Part name - add
 Process used - add



Quality checks applied
 Describe the quality checks you did to check you had completed the task accurately / that it worked / looked good, etc. Name any checking equipment used, and focus on any tolerances applied.

Description of process
 Health & Safety
 Describe how you completed the work here naming the tools used.
 Describe how you applied health and safety procedures to ensure the processes did not cause injury to you or others.

	Process	Photo	Equipment	Time	Health & Safety	Problems	How I made sure I produced a 'Quality' Product
1	I cut out pattern pieces I needed to make my dress		Felt tipped pen, paper scissors, pattern pieces	45 minutes			I selected the correct size for my TARGET AUDIENCE , I drew around the line I was cutting on in felt tip so that I made no mistake and cut out slowly and carefully.
2	I pinned down pattern pieces and cut them out in fabric (COTTON and VISCOSE) and interfacing.			1 hour & 15 minutes	I tied my hair back and worked in a clear area. I put equipment away after I had used it.		I pinned down making sure there were no creases which could alter the shape and size. I made sure that the GRAINLINE was parallel with the SELVEDGE of the fabric. I cut out all of the pattern pieces slowly and remembered to cut out NOTCHES on the patterns.
3			Needle, thread, fabric scissors, appropriate pattern pieces attached to its fabric	15 minutes	I tied my hair back and worked in a clear area. I put away NEEDLES and other equipment after I had used it.		I made sure that I had transferred all markings and that the loops were small and the ends were long on the TAILOR TACKING .
4	Using CARBON PAPER and a TRACING WHEEL , I marked on the DART pattern markings.		Carbon paper, tracing wheel, pattern pieces with its fabric attached	5 minutes	I tied my hair back and worked in a clear area. I put away needles and other equipment after I had used it. I used the TRACING WHEEL carefully as it is sharp.		

8. Finished Prototype

Summarise what you think of your work and how the final prototype meets the end user needs.

To get top marks ensure you produce a fully functioning prototype that fully meets the end user and meets the requirements of the specification.

Annotate each photograph to include which tools were used and what features have been produced.

Make sure your prototype is accurately made and finished to a high quality.

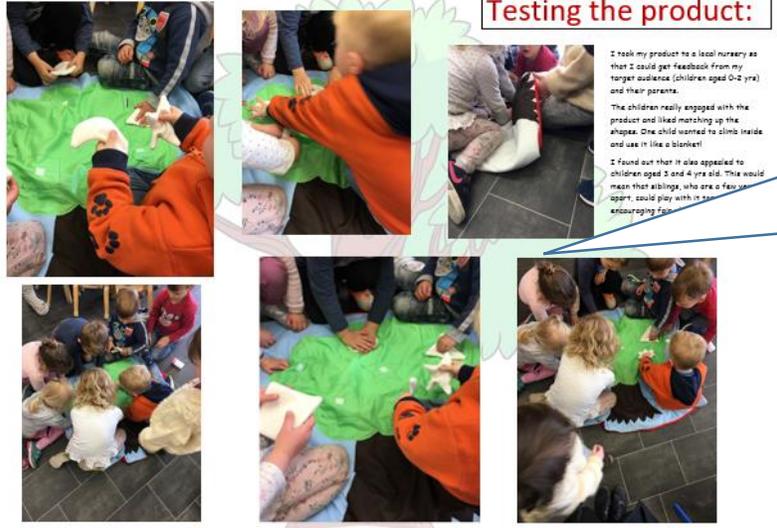
Set-up and take at least one high quality presentation photograph.



Use the **Coursework guidance** to help you and always refer to the **coursework mark scheme** to make sure you are on track.



Now you have made the prototype you need to test and evaluate it. You must evaluate the PRODUCT and the PROCESS (how you made it) and NOT the project (how hard you worked).



Testing the product:

I took my product to a local nursery as that I could get feedback from my target audience (children aged 0-2 yrs) and their parents. The children really engaged with the product and liked matching up the shapes. One child wanted to climb inside and use it like a blanket! I found out that it also appealed to children aged 3 and 4 yrs old. This would mean that siblings, who are a few years apart, could play with it so encouraging family time.

Test your product! Use it for its intended purpose where possible and ask potential end users for feedback.

Explain the results.

Product testing

Comparing against a commercial product

I have chosen a commercial product from Mothercare as I think my product would be sold here if it were made for mass production.

Specification criteria	Did I meet the criteria Y/N	Test /Observation	What I found	Modifications
Must appeal to 0-4 year olds.	Y	I gave it to children in this age range to see if they liked.	All the children liked it and play with it as I think it was a hit and appealing for the correct age range.	I would add more interactive parts to the both sides so that it would be even more appealing and suitable. I could have parts that make a noise or showed their reflection.
Must have bright colours.	Y	My product looked bright and I asked parents and found out what they thought.	People said that they thought it was bright and colourful and liked the colour combinations.	I might add more contrasting colours.
Must cost around £10-£20.	Y	I asked people how much they would pay, and bought my fabric so that it was inside this budget.	My product cost £19.71 so was just inside my budget.	I would make it so it is reversible so that it is simpler to make.
Must be made from an easily washable material.	Y	I only used materials that I knew could be machine washed from my testing.	Washing did not change their appearance and did not leave any small things behind. It would probably have to be hand washed.	I would make it from more durable material to cope with a more vigorous machine wash.
Must be big enough for a 0-4 year old to lie on.	Y	I gave it to some young children use and lie on to see if it was the correct size.	It was the right size for 1-2 children to use at the same time but I would need it to be bigger for older children to use together.	I would make it bigger so that more children could play on it and would be softer.
No small parts that could be a choking hazard.	Y	I asked people if they thought there could be any potential hazards on my product.	There was not any very small parts so on the whole it is safe. The materials did not fray or have any loose fibres.	For very young children I would make the parts attached so that it would be safer and they could not choke.
Must teach children basic knowledge.	Y	I used a questionnaire and asked people if they thought it was educational.	Parents liked the shapes on my product which had to be matched up so taught 'matching' skills and hand-eye co-ordination.	If I were to do it again then I would add more educational parts to it, such as numbers for counting so to be more appealing.
Must be made from a soft comfortable material.	Y	I gave it to some young children to see if they liked it, and also asked parents what they thought.	I used polar fleece and cotton materials which are very soft and comfortable for young children.	If I would do it again then I would add different textured materials, some softer than others.

Commercial product

This product costs £29.99, is rectangular and is quilted with printed pictures. It measures 1.45m x 95cm. This is a simple construction and a printed design that makes it suitable for mass production.

My Final Product

My product cost £19.71, is square and padded with applique shapes. My product measures 100cm x 100cm, is reversible and has applique patterns on. This would take more time and would be difficult for mass production.

Both products are suitable for young children. The commercial one suitable for children from birth as it has no loose parts that could be a choking hazard. I have used Velcro and stitched securely making sure no parts can be undone but the applique shapes would suggest being appropriate for a child a few months old. Both are a good size and are comfortable because they are padded. My product is more interactive and allows a child to explore more sensory and fine motor skills to help them to develop.

Compare your product your Design Criteria/ Specification

TESTING

Carry out several tests (at least 3) on your product and explain in detail how well it worked. Make sure you add positives and any negatives issues that are evident.

Test 1

Test 2

Test 3

MARKET TESTING

Get some comments from your client and or your target population about how well they think it works, how good it looks, ease of use, safety, cost and whether they would buy it or not. Use their "Quotes" then write a conclusion.

Collect feedback from your clients. What did they think?

Use the Coursework guidance to help you and always refer to the coursework mark scheme to make sure you are on track.

Questionnaire evaluation

I asked 10 parents of my target audience, a set of questions about my product to see what they thought of it and that it is finished.

Firstly, I asked whether they liked the colours of the product and 90% of people said "Yes", they did like the colours. However, 10% said "No" because they wanted more contrasting colours like black and white.

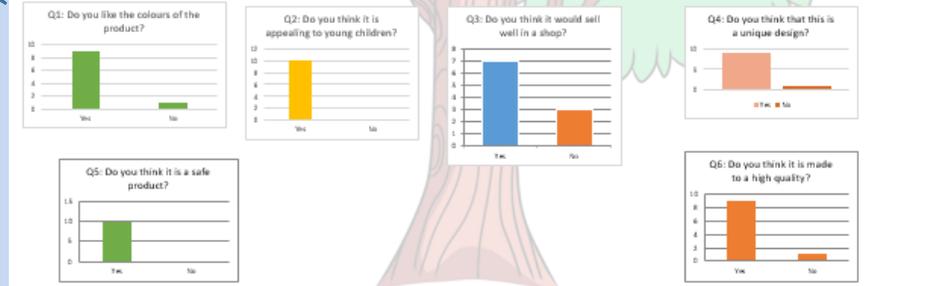
I asked if they thought it was appealing to young children and everyone said "Yes" because it had bright colours and was interactive so that the children could play with and it was comfortable for newborns to lie on.

In addition to this, I asked if they thought it would sell well as a gift in a shop and 70% said "It would" but 30% said that "It might not" because it is not very interactive but that could be a choking hazard. My concerns about the Velcro shapes were not the same as the parents and they thought they would be okay for young children.

My fourth question was "Do you think that this is a unique design?" 9/10 people said it was unique because it was reversible and they had not seen anything inspired by nature. One person said it was not but could not give me any real reason why not. It could have been that it just did not appeal to them.

In addition to these questions, I lastly asked whether they considered it a safe product and everyone said "Yes" it was safe because there were no loose threads or small parts that could be choking hazards. My concerns about the Velcro shapes were not the same as the parents and they thought they would be okay for young children.

Lastly, I asked if they think it is made to a high quality and 9/10 people said it was, however 1/10 people said that "...Even though it is well made, it might be a bit difficult to turn the product inside and poke the corners out." I would need to completely sew both bits of fabric together if I was to do it again so it would be easier to turn inside out.



Types of establishment

Commercial – Residential (A place that you can stay at overnight)	Commercial – Non – Residential (A place you cannot stay overnight)	Non-commercial (non-profit) (Providing a service rather than trying to make money)
Hotels Guest houses Bed and breakfasts Farmhouses Motels Holiday parks Some public houses	Restaurants Fast food outlets Public houses Bars Delicatessens Take away outlets School meals Burger vans	Hospitals Prisons Meals on wheels Residential care homes Armed services

Chefs

Head Chef: The boss. The head chef is responsible for menu planning, food production, costing and purchasing, staff work rotas and training, hygiene of the kitchen and staff, stock control

Sous Chef - The Sous chef (sous=under in french) is directly in charge of food production, the minute by minute supervision of the kitchen staff, and food production

Pantry chef - aka garde manger - A pantry chef is responsible for the preparation of cold dishes, such as salads and pâtés

Pastry chef - aka le pâtissier - The King or Queen of the pastry section; baked goods, pastries and desserts are this chefs forte.

Sauté chef - aka saucier or sauce chef - They're responsible for sautéing foods, but their most vital role lies within the creation of the sauces and gravies that will accompany other dishes.

Soup Chef - aka le potager - Responsible for making soups and preparation of accompaniments for the dishes

Vegetable Chef - aka le legumier - The vegetable chef prepares all vegetables for dishes, in smaller restaurants the vegetable chef would also make soups.

Fish chef - aka le poissonnier - An expert in the preparation of fish dishes, and often responsible for fish butchering as well as creating the appropriate sauces.

Key questions to check your learning for Learning Objective 1:

1. Recap what makes a business successful e.g. social media, prices of food, customer service and the atmosphere of the restaurant
2. What are the different salaries for jobs in the H&C industry?
3. What are the different types of service available?
4. What is the difference between commercial and non commercial?

Styles of service

TABLE SERVICE	COUNTER SERVICE	PERSONAL SERVICE
<p>Plate: Pre-plated meals from the kitchen. Can be a basic plated meal or a decorated nouveau cuisine style</p> <p>Family: Dishes are put on the table where spoons are provided and the customers serve themselves. Suited to ethnic restaurants such as Indian, Chinese and Spanish tapas</p> <p>Silver: Food is served by the staff using spoon and fork</p> <p>Gueridon: Food is served from a side table or a trolley using a spoon and fork. Sometimes dishes are assembled or cooked in front of the customer</p>	<p>Cafeteria: A single long display counter but can sometimes be multiple counters</p> <p>Buffet: Set up in a room usually along one long table. It can be self service or staff can serve customers. Carvery service is where joints of meat are carved in front of customers and plated</p> <p>Fast Food: Takeaway with eat-in areas where customers collect food from one small counter</p>	<p>Tray or Trolley: An assembled meal provided or a choice of food and drink from a trolley</p> <p>Vending: Sold from a machine</p> <p>Home Delivery: Delivered to house individually or on a round</p>

Suppliers to the hospitality and catering industry:

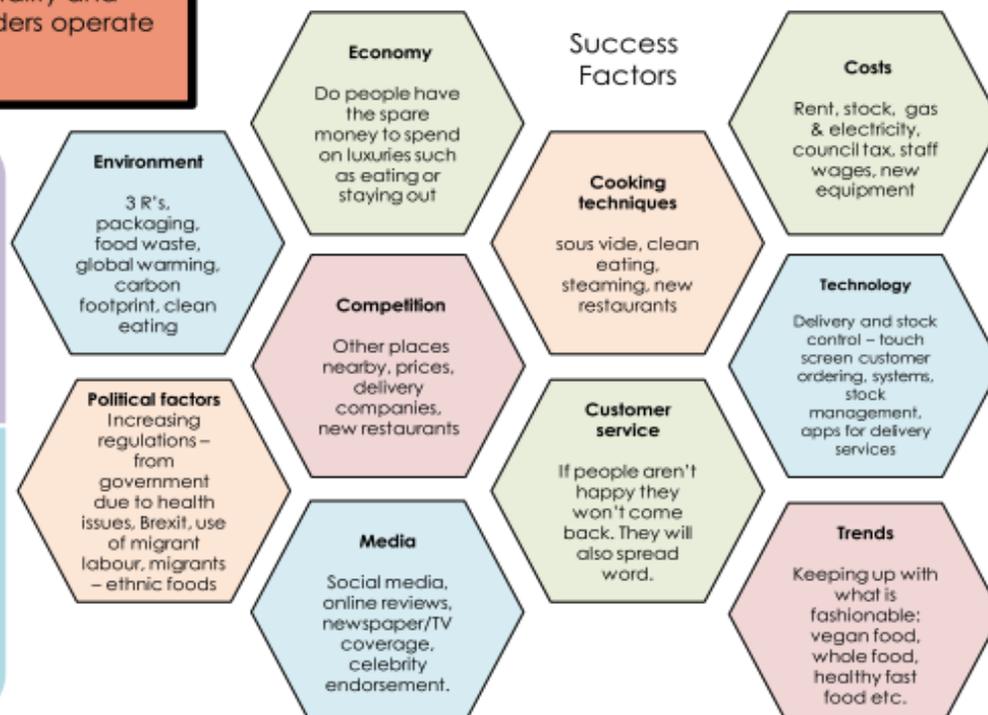
- Specialist markets – e.g. butchers, fish markets. Some deliver
- Local suppliers – local deliveries are better for the environment but might not have a wide selection of stock
- Equipment suppliers – provide equipment and appliances to the catering industry
- Large wholesalers – large quantities of stock, can buy pre-made and proportioned food but can be expensive
- Independent suppliers

Hotel job roles
Hotel manager
Barmen/maids
Supervisor
Waiter/waitress
Housekeeper
Chambermaid
Receptionist
Porter
Concierge

Minimum Wage

21-24 £7.70 p/h
18-20 £6.15 p/h
16-17 £4.35 p/h
Under 19 £3.90 p/h

LO1 The environment in which hospitality and catering providers operate



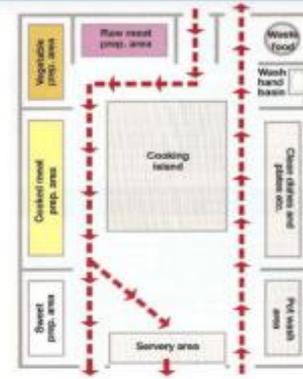
Kitchen

Documentation					
Temperature charts: fridge, freezer, display, point of sale. Taken at least twice per day.	Time sheets: logging staff working hours	Accident report forms: used to report any accidents and near misses	Food safety information: blast chill records, food related incidents and cleaning rotas	Equipment fault reports: What was the issue and how was it dealt with.	Stock usage reports: order books, stock control sheets, invoice, delivery notes
Bookings/reservations: Electronic booking system, electronic reservations system, diary with bookings and reservations Feedback forms	Personnel records: Hours worked, personal details, Wages, Taxation, National insurance, Training, Accidents, Staff rotas and timetables	Financial records: Incomings and outgoings for Income tax, VAT, Wages, Insurance, Profit & loss, Staff costs, Heating, lighting	Health and safety: Fire certificate, Staff training records, Accident book, Food hygiene checks, Cleaning checks, First aid records	Purchasing: Food and drink orders Packaging orders, equipment Tables, chairs etc, Consumables and disposables, Cutlery and crockery, Staff uniforms	Stock control: Monitor stock levels for re ordering, Decide frequency of stock check, First in First out for items with a shelf life

Front of House

Documents should be:
Legible (readable)
At correct interval (daily, hourly),
Completed accurately,
Signed and dated.

Remember
Some information is confidential or sensitive i.e. staff personal information. There is a legal requirement under the data protection act to store this type of information securely



Kitchen Workflow
Workflow in the kitchen should follow a logical process by using different areas so that the clean stages in food production never come into contact with the "dirty" stages

1. Delivery
2. Storage
3. Food preparation
4. Cooking
5. Holding
6. Food service area
7. Wash up
8. Waste disposal

Customer needs

Local Residents	Business Customers	Leisure Customers
<ul style="list-style-type: none"> • Value for money • Good standard of customer service so they return • Catering for local needs (culture, religion) • Consistent dishes served • Loyalty schemes • Recognised by staff- feel welcome • Menu specials • Theme nights • OAP discount day • Child friendly • Entertainment • Mailing list or email for special offers 	<ul style="list-style-type: none"> • Dedicated corporate (business) contact at establishment • Discounted rates • Meeting rooms • Water, juice on tables • Presentation equipment, projector, tv, • Office facilities- printer, phone, fax, internet, stationery • Tea and coffee for breaks • Lunch or other meals- buffet or restaurant • Accommodation if attendees are from a long distance • Quick service for lunch meetings 	<ul style="list-style-type: none"> • Value for money • Good facilities • Families want child menus, play area, child friendly • Tourists want local food, easy to communicate • Older people may want more formal service • Good customer service • Varied choice of menu • Dietary needs eg allergies, intolerances, vegetarian catered for without having to ask for special foods • Facilities for physically impaired customers

LO2 Understand how hospitality and catering provisions operate



Sous Vide



Blender



Oven



Hot plate



Bain Marie



Fryers



Blast Chiller



Percolator

Customer Rights

1. The right to be protected (against hazardous goods)
2. The right to be informed (about quality, quantity, allergies etc)
3. The right to have their complaints be heard
4. The right to seek redressal (compensation.)
5. the right to receive satisfactory goods that match their product description



POS Till Point



Grill



DRESS CODE:
White shirt
Formal trousers
Formal shoes
Apron
Tie



DRESS CODE:
Chef's jacket
Chef's pants
Hat
Neckerchief
Apron
Hand towel
Slip-resistant shoes

Key questions to check your learning for Learning Objective 2:

1. *What documentations are used in an establishment by law?*
2. *What is the workflow of a kitchen?*
3. *What are the different types of customers you may come across in an establishment and what do they require?*
4. *What are customer rights?*
5. *What is a correct dress code to have when working in a kitchen?*

HASAWA – Health and safety at work act

- Employers must:
- To protect the health, safety and welfare of staff
 - Carry out risk assessments
 - To provide and maintain safe equipment and safe systems of work
 - Safe use, handling, storage and transport of articles and substances
 - Provide a safe workplace with a safe entrance and exit
 - Provide information, instruction, training and supervision on how to work safely
 - Provide a written safety policy
 - Make sure there are toilets, places to wash and drinking water for workers
 - Make sure that there is first aid provision
 - Provide PPE for jobs if needed
 - Have insurance to cover injury or illness at work
 - Ventilation lighting and emergency exits
 - Provide a health and safety law poster entitled "Health and Safety law: What you should know" displayed in a prominent position and containing details of the enforcing authority.

COSHH – control of substances hazardous to health regulations

- SUBSTANCES COVERED BY COSHH:
- Chemicals including cleaning chemicals
 - Micro-organisms
 - Dusts
 - Medicines, pesticides, gases
 - HSE list (Health and safety executive)
- Employees must:
- Use control measures and facilities provided by the employer
 - Ensure equipment is returned and stored properly
 - Report defects in control measures
 - Wear and store personal protective equipment (PPE)
 - Removing PPE that could cause contamination before eating or drinking
 - Proper use of washing, showering facilities when required
 - Maintaining a high level of personal hygiene
 - Complying with any information, instruction or training that is provided

RIDDOR – Reporting injuries, disease and dangerous occurrences regulations

RIDDOR is the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013. The law requires employers and other people in control of work premises (known as the 'responsible person') to report to the Health and Safety Executive (HSE) and keep records of the following:

- Death
- Injuries resulting in over 7 days off work (7 day injuries)
- fractures (except fingers, thumbs and toes);
- amputation of limbs or digits
- loss or a reduction of sight;
- crush injuries
- serious burns (over 10%)
- unconsciousness caused by a head injury or asphyxia;
- any other injury needing admittance to hospital for more than 24 hours.
- Hypothermia

Manual handling operations regulations

- Require you to avoid any manual handling operations at work which involve a risk to health – so far as reasonably practicable.
- If it is not reasonably practicable to avoid any manual handling operations, you must carry out a manual handling risk assessment to identify how the risk is caused, so each factor can be addressed and measures taken to control the risk.
- Provision of information, instruction and training to staff are legal requirements

What is manual handling:
Any transporting or supporting of a load by hand or bodily force
Lifting, putting down, pushing, pulling, carrying or moving

PPER – Personal protective equipment at work regulations

PPE is equipment that will protect the user against health or safety risks at work. Includes clothing and other items worn by staff to protect themselves from work hazards
It can include items such as Gloves, goggles, hard hats, hearing protectors, warm clothing (in cold conditions), safety shoes or boots, respirators etc
Hearing protection and respiratory protective are not covered by these Regulations there are specific regulations that apply to them. these items need to be compatible with any other PPE provided.
PPE could include:
• non-slip shoes where there is a slipping risk;
• 100% cotton garments (for example, chefs' whites) where there is a risk that the material may aggravate burns in the event of a fire
• where caustic cleaning substances are used, long-sleeved vinyl gloves, goggles, a visor and possibly respiratory equipment.

Key questions to check your learning for Learning Objective 3:

Can you recap all of the different health and safety requirements for each of these:

- HASAWA*
- COSHH*
- RIDDOR*
- Manual handling operations*
- PPER*
- What is a risk assessment?*
- What are security hazards?*

LO3 Meeting health and safety requirements

Security hazards

- Workers can be at risk from security hazards in the same way they are from safety hazards. Security risks include
- Disagreements between customers
 - Customers being intoxicated (alcohol)
 - Customers who have used drugs
 - Verbal abuse
 - Physical assaults

Prevention

- Brightly lit areas
- CCTV
- Easy escape routes
- Area for handling larger sums of money
- Appoint more senior staff to deal with problems and complaints
- Train staff to diffuse angry customers
- Contact local police if necessary
- Make sure lone workers are aware of risks
- Keeping doors and windows secure and locked

RISK ASSESSMENTS:

When you carry out a risk assessment you need to think about how likely it is to happen and what the consequence might be if it did. E.g. A spillage is very likely to happen in a restaurant kitchen.

	Probability	Severity
1	Not very likely to happen	1 If it did happen the harm would be minimal and could be dealt with by an untrained person (e.g. might just need a plaster)
2	1 in 4 (25%) chance	2 Might need to visit a professional for advice or treatment (e.g. might need stitches)
3	2 in 4 (50%) chance	3 Would take a few weeks to heal, but not a serious injury.
4	3 in 4 (75%) chance	4 Could cause serious injury or damage, but would eventually be resolved (e.g. broken leg)
5	Very likely to happen	5 The result could be permanent disability, destruction of a building or in extreme cases, death.

Allergies
 A food allergy is a rapid and potentially serious response to a food by your immune system. It can trigger classic allergy symptoms such as a rash, wheezing and itching. Anaphylaxis is most commonly caused by food allergies, but can also be caused by other things, such as insect bites and drug allergies.
 Wait staff should have a good knowledge of which allergens are present. When using pre prepared ingredients, kitchen staff should check the labels carefully to identify any allergens



Intolerances
 Food intolerances are more common than food allergies. The symptoms of food intolerance tend to come on more slowly, often many hours after eating the problem food.

Lactose intolerance

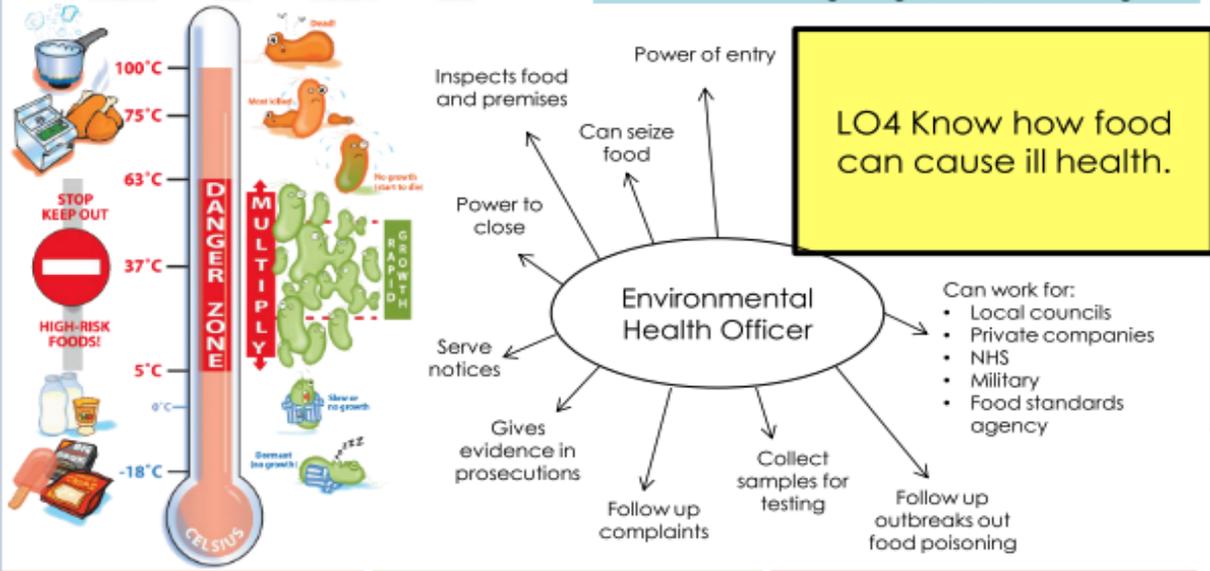
- Avoid milk and milk products
- Experience nausea, bloating, pain in the abdomen and diarrhoea
- Eat lactose-reduced products or alternatives such as goats cheese, soya milk, feta cheese, rice milk

Celiac disease/gluten intolerance

- Causes diarrhoea, anaemia, weight loss
- Gluten is found in many cereals plants primarily wheat, rye, barley and some oats
- Avoid pasta, bread, cereals flour based foods

Yeast intolerance

- Yeast is present in a variety of foods, commonly bread, baked products and alcoholic beverages. Very ripe fruits contain natural yeasts
- Symptoms include flatulence, bad breath, fatigue, irritability, cravings for sugary foods, stomach cramps, bad skin and indigestion.
- Fermented foods e.g. vinegar, wine, salad dressing



Food Safety Act
 Food businesses:
 - Must ensure that the food served or sold is of the nature, substance or quality which consumers would expect
 - Ensure that the food is labelled, advertised and presented in a way that is not false or misleading, e.g. photos on menus that do not look like the dishes served to customers

Food Safety (General Food Hygiene Regulations)
 - Food premises
 - Personal hygiene of staff
 - Hygienic practices
 Food businesses must:
 - make sure food is supplied or sold in a hygienic way;
 - identify food safety hazards;
 - know which steps in your activities are critical for food safety;
 - ensure safety controls are in place, maintained and reviewed.

Food Labelling Regulations
 This information is required on packaging by law:
 • the name of the food
 • weight or volume
 • ingredient list & allergen information
 • genetically modified ingredients
 • date mark and storage conditions
 • preparation instructions
 • name and address of manufacturer, packer or seller & place of origin
 • lot (or batch) mark
 • nutrition information

	Found in	Symptoms	Onset	Duration
Campylobacter	Poultry, raw meat, unpasteurised milk products, water	Headache, abdominal pain, bloody diarrhoea	2-5 days after infection	Up to 10 days
Salmonella	Raw meat, unwashed vegetables, eggs undercooked chicken	Fever, diarrhoea, vomiting, abdominal pain, blood in poo	12-72 hours	4-7 days can be up to 3 weeks
E-Coli	beef, chicken, lamb, unpasteurised milk cheese, spinach, salads, raw veg	Abdominal cramps, bloody diarrhoea, nausea	Up to 24 hours	Up to 24 hours
Clostridium perfringens	Undercooked meats, large volumes of food, casseroles, gravies	Stomach cramps, fever, diarrhoea (not usually vomiting)	6-24 hours	4-7 days can be up to 3 weeks
Listeria	Raw foods, fridge temperatures, unpasteurised milk, cheese, smoked salmon, pate, raw sprouts	Headache, stiff muscles, confusion, fever, convulsions	3-70 days (21 typical)	3 weeks
Bacillus cereus	Rice, leftover food, foods at room temperature, sauces and soups	1) Watery diarrhoea, cramps, 2) vomiting and nausea	1) 30 min-6 hrs 2) 6-15 hours	24 hours
Staphylococcus aureus	Foods made by hand and no additional cooking Salads, ham, tuna chicken, cream pastries, sandwiches, dairy products, meat, eggs	Projectile vomiting, diarrhoea, abdominal cramps, fever	1-6 hours	24-48 hours

Food related causes of ill health
 Microbes - Some microorganisms cause food borne illness which is not classified as food poisoning because of other symptoms they cause. The two main ones are: Norovirus From leafy greens such as lettuce, fresh fruits and foods that are not washed before eating and Toxoplasmosis From infected meat (also cat poo but you wouldn't eat that)
 Chemicals - Some chemicals can end up in our food and potentially make us ill. These chemicals could come from: hormones, pesticides, fertilizer, packaging additives, cleaning fluids
 Metals - When ingested metals can be extremely harmful to the body. Some metals can be found in food because they occur naturally, they enter the food chain or residues of metals can be found in food.
 Poisonous plants - Some plants can be poisonous when eaten, these could be contaminants such as weeds or naturally occurring foods such as rhubarb leaves, raw potatoes and uncooked kidney beans.

Key questions to check your learning for Learning Objective 4:

- Name at least 4 different types of food poisoning bacteria, give the symptoms and where they are found*
- What does it mean to have an intolerance and what foods can this be for?*
- What is the Food safety act?*
- What are the food related causes of ill health?*
- What is an allergen? Name some*
- What is the danger zone?*

Commodities - Fruit and Vegetables

Vegetables

Vegetables are classified according to which part of the plant they come from. Examples include fruit vegetables which are aubergines, tomato and cucumber or seed and pods which are peas and beans.

Fruit

Fruits contain a variety of vitamins and minerals, they are also a good source of fibre. Fruits are classified into groups. Examples are soft fruits such as raspberries and blackberries. Citrus fruits such as orange and lemon and tree fruits such as apples and pears.



Potatoes

Although potatoes are vegetables, a potato is actually a tuber. Tubers grow from the roots. In the Eatwell guide, potatoes are included in the starchy food section.

Farming Fruit and Vegetables

Intensive farming

Increase food production.
Pesticides, fertilisers are used to grow **high-yield** crops.

Organic farming

Natural food production with no chemical or synthetic treatments – **low yield**.
Natural compost and manure used as fertilisers.
GM-free
No evidence that organic food is more nutritious – it is a lifestyle choice.

Seasonal Fruit and Vegetables

Cheap
Good for the local economy reduces air miles and carbon footprint
Most nutritious



Nutritional Value

Carbohydrates- starch/sugar
Vitamin A (retinol for your retina_ in orange/yellow
Vitamin C – most - citrus fruit
Iron – green leafy vegetables
Dietary Fibre – found in the skins



Cooking Fruit and Vegetables

Colour: brightens but goes dull if overcooked

Flavour: flavour intensifies and sweetens as starch converts to sugar

Texture: softens due to starch degradation

Nutrition: water and fat soluble vitamins lost depending on method used so if you boil vegetables the vitamins B and C dissolve, if you fry then the vitamins A and D dissolve.

Avoiding Vitamin loss

Prepare close to time
Do not soak
Use as little water as possible
Cook quickly/short time
Use cooking liquid

Preserving

Freeze, dried, bottled, canned, MAP (modified atmosphere packaging)



Commodities – Dairy Products

Secondary processing

Milk is used to make a number of products during secondary processing.

These are known as dairy products

- butter
- cheese
- cream
- yoghurt



In the UK milk is supplied by dairy cows but is also available from sheep and goats. A dairy herd is usually milked twice a day.

Milk is the ideal substance for **bacteria** to grow in.

To **prevent food poisoning and extend the shelf life** of the milk, heat treatments are used. The **heat treatment** is carried out as soon as possible after the milk is collected.

Cream is the concentrated fat, which has been skimmed from the top of milk.

Types of cream:

Single cream

Double cream

Whipping cream

Clotted cream

Ultra heat treated (UHT)

cream

Flavoured cream – like

Chantilly cream

Cheese and yoghurt

Cheese and yoghurt are made from milk. Making milk into cheese and yoghurt is secondary processing. Bacteria are needed to make both cheese and yoghurt. These bacteria are called the starter culture, and are added to warm heat-treated milk. During cheese and yoghurt making, the starter culture causes the sugar in milk, called lactose, to turn into lactic acid. The acid gives more flavour to the cheese and yoghurt, and makes them last for longer.

Type of milk	Temperature, time and processing needed	Storage
Pasteurised	Heating milk to 72 degrees for 15 seconds. Most bacteria are destroyed.	In the fridge, use within 5 days
Sterilised	Heating milk to 110-130 degrees for 10 to 30 minutes. All bacteria are destroyed	At room temperature for about 6 months, once opened use within 5 days
Ultra- heat treatment (UHT)	Heating milk to 135 degrees for 1 second All bacteria are destroyed	At room temperature for about 6 months, once opened use within 5 days

Nutritional value

Protein – HBV

Fat –depending on the type

Vitamin A and D – why does the amount of this depend on the amount of fat?

Calcium – for bones and teeth

Carbohydrate – Lactose



Commodities – Eggs

Types

There are many different types of eggs available in the UK:

- Hens
- Ducks
- Quails
- Geese.

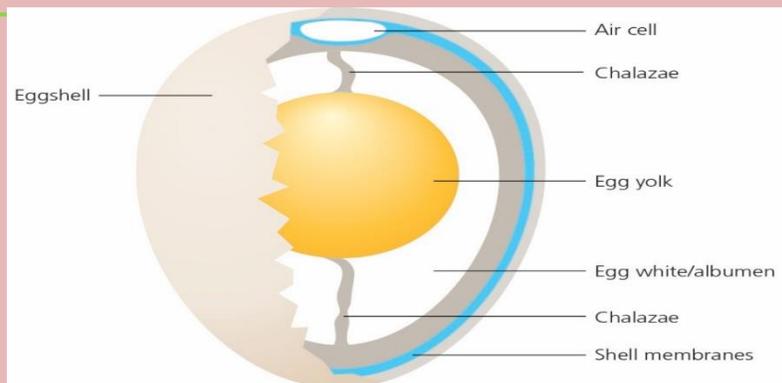
The most popular eggs we consume and use in food preparation and cooking are hens eggs.

Egg Production

Enriched cage production: Hens are kept in small, stacked cages in sheds to promote egg laying.

Free range eggs: This type of farming allows hens to walk around outside, scratch the soil and peck for food, sit up on perches and lay eggs in nests.

Barn eggs: Hens are allowed to roam freely inside, uncaged, and have perches to roost on.

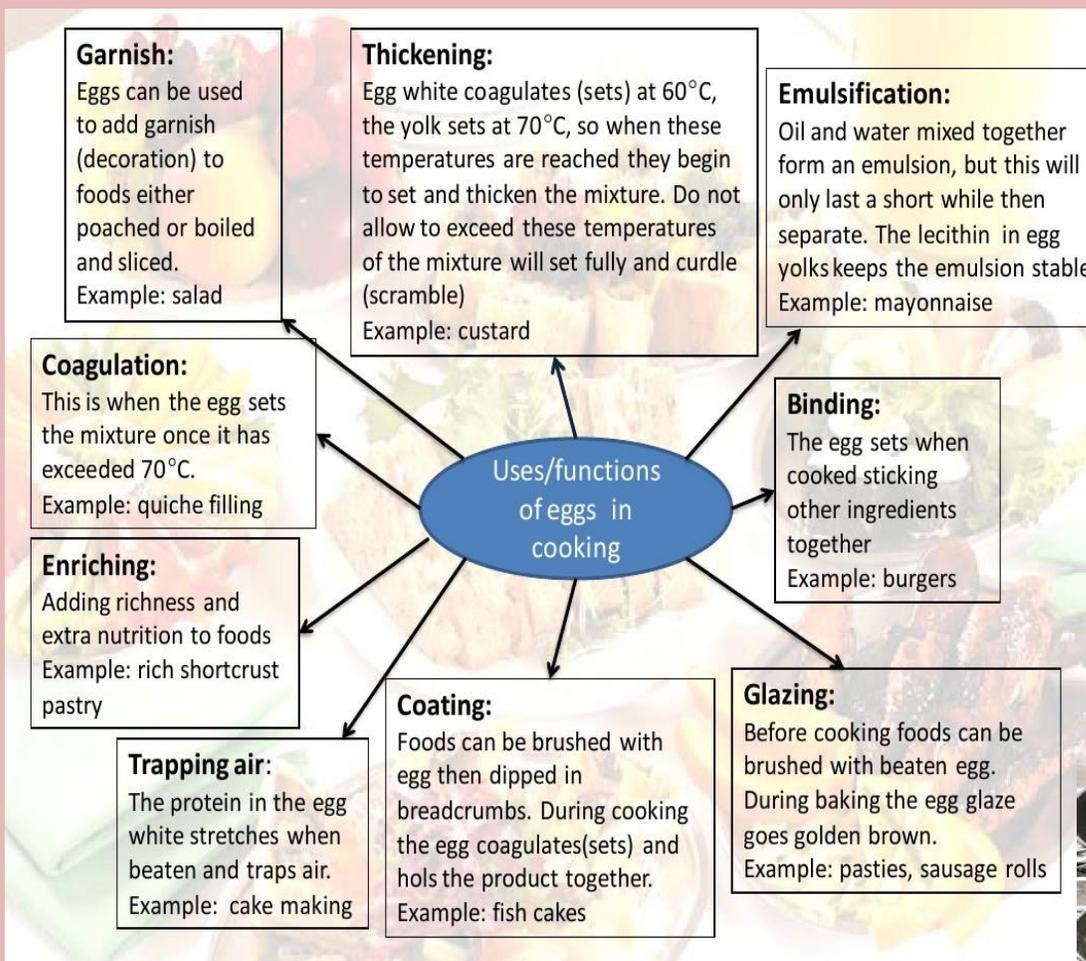
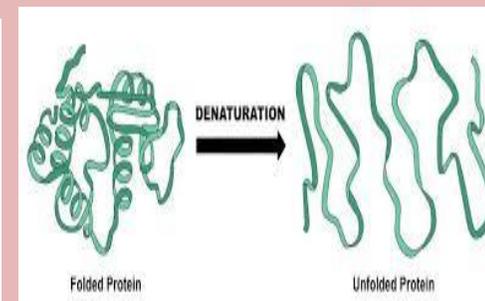


Nutritional Value

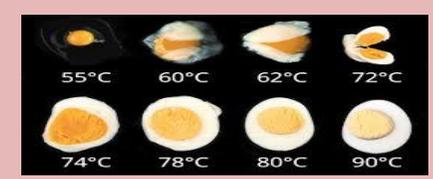
Protein – in both the white and yolk.
 HBV
 Vitamins A, D and E in the yolk; B in the white
 Iron – in the yolk
 Fat – in the yolk
 Water – in both the white and yolk.

Denaturation of Protein

Many of the functions of eggs are related to the principle of denaturation – this is the unfolding of amino acid chains causing a change in the structure of proteins. This is why eggs change form liquid to solid when heated or are able to trap air when whisked



Coagulation



Aeration



Commodities – Protein

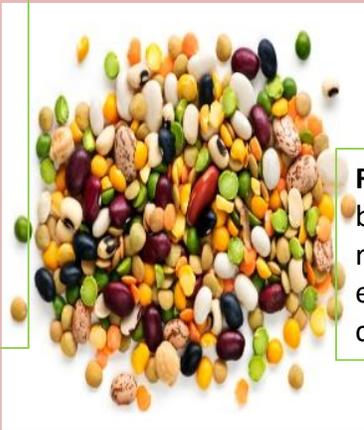
(Alternatives - soya, tofu, beans, nuts and seeds)

Soya

Soya beans are used to develop a textured vegetable protein to replace meat. Even though it is plant based it is HBV protein Low fat



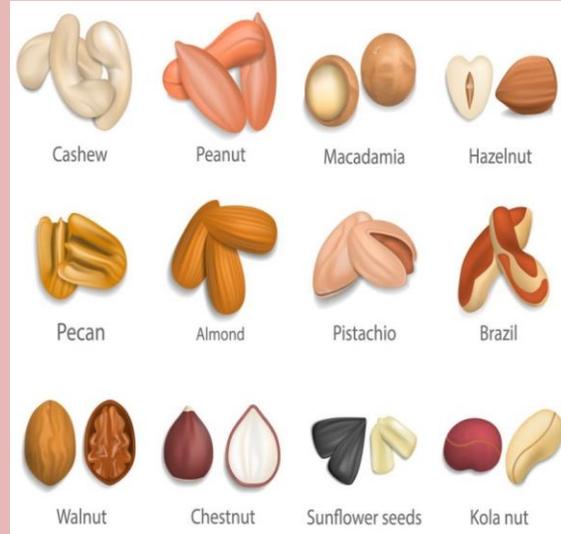
Tofu is a bean curd made from soya milk which has been curdled so it is solid. HBV protein and low in fat. Used in curries, stir fries and desserts



Reasons for use – versatile, health benefits, cost benefits (cheaper than meat), environmental reasons (reduces carbon footprint), moral and ethical issues around reducing meat consumption

Beans are seeds from edible plants, they contain protein and are healthy because they are low in fat and high in fibre. Examples include broad beans, kidney beans and haricot beans. Beans contain some carbohydrates, LBV protein. B vitamins, Iron and Dietary Fibre

Nuts are dry edible kernels within a shell. Nuts contain protein and fat, but the fat is unsaturated so it is good for us. Can cause allergic reactions so care needs to be taken



Seeds

We can eat the seeds of a wide variety of plants, they are a good source of vitamins and minerals. Examples include pumpkin, chai and sesame. They contain

Protein

B and E vitamins

Essential minerals such as iron and zinc



Legumes

A legume is a plant from the Fabaceae family, or the fruit or seed of such a plant.

When dried the seed is also called a pulse

Lentils, beans and chickpeas are examples

High in LBV protein

Good source of Vitamin D

Contains fibre



Commodities – Fats and Oils

Provides energy, insulates organs, source of fat soluble vitamins (A and D)

Saturated fats – animal fats – butter and lard

Saturated fats can increase cholesterol
Solid as they are saturated with Hydrogen molecules
Too much can lead to health problems

Unsaturated fats – plant fats/oils

Polyunsaturated/ monounsaturated , sunflower spread and olive oil

These can help to reduce cholesterol in the blood
Liquid as there are gaps in the molecular structure where hydrogen molecules are missing

Cooking with fats and oils

Adds flavour
Adds moisture
Adds fats
Reduces vitamin A and D
Browning



Cooking with oils

Dressings and Marinades
Used in some baking – moist results
Frying – lubricates
Roasting – keeps moist and lubricates



Cooking with fats – properties

Adds moisture
Plasticity – melts over a range of temperatures
Traps air – cake making
Shortening – pastry
Lamination – trapping air in flaky pastry
Enriching – mashed/jacket potato
Lubricating – frying and spreading on bread/toast



Healthy Fats

Fish Oil

Olive Oil



Cold-exPELLER-pressed plant oils

Such as grapeseed, walnut, sesame



Avocados



Nuts & Seeds



Olives



Coconut



Essential Fatty Acids

Omega 3

Fatty acids are found in oily fish and seeds help our brain function and may reduce the risk of heart disease

Omega 6

Fatty acids are found in foods such as chicken, nuts and vegetable oils, they help to reduce blood cholesterol and reduce inflammation

EAT

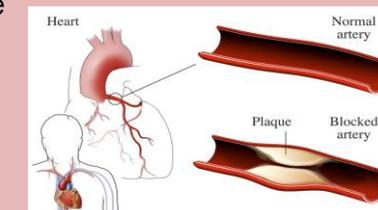


AVOID



Too much fat in the diet

Coronary heart disease
Stokes
High Blood pressure
Obesity
Joint problems
Psychological issues



Commodities – Sugar

Sugar Beet – grown in the UK



Non UK sugar is produced from sugar canes grown all round the world especially in hotter, wet climates such as India, Brazil, Thailand, China, USA, Mexico, Russia Pakistan and Australia



Fairtrade

Sugar plantations run by small-scale farmers produce high quality sugar canes under Fairtrade agreements



Sugar in Cooking

Browns – caramelisation
Aeration – with fat traps air
Flavour – adds sweetness
Delays staling – cakes
Stabilises mixtures – egg whites
Texture - Softens gluten in cakes



Types of sugar

All sugar ingredients are chemically named **sucrose** made from sugar cane or sugar beet

Sucrose is

- ✓ icing sugar
- ✓ caster sugar
- ✓ granulated sugar
- ✓ soft brown sugar
- ✓ demerara sugar
- ✓ molasses
- ✓ treacle and syrup



Too much sugar

Too much sugar can lead to tooth decay, weight gain, obesity, type 2 diabetes



Too little

Lack of sugar, not eating enough or problems with diabetic control can result in hypoglycaemia or very low blood sugar. It causes dizziness and fainting

Sugar Tax

Manufacturers get taxed if they make drinks containing too much sugar, it's called **The Sugar Tax**
The sugar tax pays for extra sport facilities in schools.

