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Knowledge Organiser

KS4 - 2025/26

Student Name: _

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English Language

English Language Paper 1 Section A

Key terms—Language	
Protagonist	The main character in a story.
Setting	The time and place in which the story takes place.
Tone	The feelings or mood created in a piece of
Motif	When a symbol/image/object/idea is
Symbolism	When something concrete represents a larger idea, e.g. blood symbolising guilt in
Foreshadowing	When a writer gives a hint about what is to
Declarative	A sentence which makes a statement, e.g.
Exclamative	A sentence which expresses a strong emotion, e.g. *"I don't believe it!"*
Imperative	A sentence which gives a command or instruction, e.g. "*Sit down there".*
Metaphor	Comparing one thing to another, *e.g. The sky was a blanket of darkness.*
Simile	Making a comparison using like or as, *e.g. The sky was like a blanket of darkness.*
Personification	An object is given human qualities, *e.g. the moon was suffocated by the cloud.*
Semantic field	A group of words which link to the same
Connotations	The ideas, feelings, or associations that a word evokes (e.g. 'holiday' has
Imagery	Visually descriptive or figurative language.

Key terms—Structure	
In medias res	When a narrative begins 'in the middle of things', i.e. without an exposition.
Exposition	Normally the start of a story where important background information is introduced.
Rising action	Series of related incidents building towards the point of greatest excitement/interest.
Climax	The point of highest excitement/ interest/tension in a narrative.
Falling action	Occurs after the climax and reveals the aftereffects or consequences.
Denouement	The final part of a narrative where outcomes are explained, or conflicts are resolved.
Cyclical structure	Where a narrative starts and ends in a similar way – there's link between the start/end.
Flashback	Where a writer shifts the narrative into a reflection of the past (analepsis).
Flashforward	Where a writer shifts the narrative into a scene in the future (prolepsis).
Linear plot	When the events of a narrative take place in chronological order.
Non-linear plot	When there are time shifts meaning events are not always in chronological order.
Cliffhanger	A narrative ending with no resolution, causing heightened suspense.

Approaching Questions 1 to 4:

Question 1 is all about: identifying explicit information.

Read the lines you are directed to.

Read the four mini questions about those lines.

Tick one correct answer for each of the questions.

Question 2 is all about: analysing language in detail.

Underline key words in the question and read the lines you are directed to.

Highlight words/phrases relevant to the focus that are 'doing the work'.

Decide 2 big ideas with 2 moments/evidence for each.

Write 2 detailed paragraphs.

Question 3 is all about: the journey the writer takes readers on – what's the focus at different points, and why then?

Track shifts in focus whilst reading – PACT (place, actions, character, time).

Identify the journey readers are taken on:

- Highlight key quotations that signal where we **begin** – what is established? What's the focus? Note structural devices.
- Highlight key quotations that signal where we **end** – what's changed? What's the focus? What do we/characters now understand? Note structural devices.
- Highlight key quotations that signal a **turning point/catalyst** – how did we get to the end point? Where is the change signalled?

Write 3 paragraphs – beginning, end, turning point/catalyst.

Question 4 is all about: analysing language (and structure) in detail to support your view on a given statement.

Underline key words in the question.

Decide your view on the statement (it's *likely* you will agree).

Highlight words/phrases that are 'doing the work' and support your view.

Decide 2-3 big ideas with 2 moments/evidence for each.

Write 2-3 detailed paragraphs.

English Language Paper 1 Section B

Question 5 is all about: creating a clear narrative that the examiner can follow, whilst writing in an engaging and accurate way.

Structuring Question 5:	
Setting 	Describe the setting in detail. Consider: weather, sounds, sights, colours. Create a positive / negative mood. Be metaphorical - e.g. trees: wooden guardians **Tip:** vary punctuation immediately ; : ( ) - - … ?
Person 	Introduce a character into the setting. Link character to setting - how are they interacting? Describe them in detail - e.g. skin, eyes, movement. **Tip:** your character should be 'portable' – found in a wide range of situations and therefore able to come with you into the exam.
Flashback 	Your character's special object triggers a memory. Describe the special object and the memory. Use past tense for the flashback (*'had been'*). **Tip:** the memory should be concise, but significant enough to change the character's mood after.
Setting 	Describe in detail the original setting again (cyclical). Shift the mood from the opening. **Tip:** your character's memory has impacted their mood. You should either include reference to their changed mood or reflect it through subtle shifts in the setting, e.g. a shift in weather.

Rain	Wind	Sun / light	Temperature
Sheets of rain / icy beads like shards of glass / rainclouds marshalled / hammered / pelted / poured / beat trickled / pattered	Gale / gust / blasts / blustery / violent / tempestuous Breeze / zephyr / wafts / whirls / flurried / swirled Blew in a horizontal blur	Rays / sunbeam / golden / butter-yellow / luminous glow / burnt-orange / reddish hues / blazing / light pooled / light spilled / Apollo's orb	Stifling / oppressive heat / desert-like Pleasant balminess Ice-cold / bitter chill / biting chill / nipped at noses and reddened cheeks / gelid

How do I vary sentence structures?	
No … No… No… But there was…	Simile start
Repeat and reload	Was it…? Was it…? Was it…? Or was it… that…?
List of sounds: 'The ____ was full of sound: the ____, the ____, the ____ and the ____.'	The three thread paragraph
Adjective, adjective, adjective colon	Before, now, soon

How do I write a flashback?

Start with a memory 'trigger'.
Normally, our memories are sparked by something. This could be an object (e.g. a locket), a smell (e.g. a familiar perfume), or even a sound (e.g. laughter). Your character will have a 'special object' that triggers their memory.

Signal the start of the memory.
E.g. *He was young back then, back when… / It was 2004 when it all happened. / Her mind was pulled back to a time when… / The engraving dated 1945 brought it all back to her…*

Describe the memory.
Keep it short, specific, and in past tense ('had been').

Signal the end of the memory and a return to present day.
E.g. *But today, he… / The sound of… wrenched his mind back to…*

Descriptive colour choices

Black	Blue	White	Green	Light/sun
Sooty	Icy blue	Ivory	Leafy green	Honey/butter yellow
Inky	Winter blue	Parchment-pale	Emerald	Burnt orange
Charcoal	Azure	Chalky	Sage	Butterscotch

English Language Paper 2 Section A

Key terms	
Alliteration	Recurrence of initial consonant sounds *e.g. tragedy travelled through our trivial tale.*
Anecdote	A short, real life, relevant story.
Asyndetic listing	Words that are joined without the use of a conjunction, but with commas instead.
Colloquial language	Ordinary, everyday speech and language.
Declarative	A sentence that declares or states something.
Emotive language	Language that evokes emotion in the reader.
Fact	Something that is known to be true.
Opinion	A view or judgement formed about something, not necessarily based on fact or knowledge.
Imperative	A command *e.g. Sit down.*
Repetition	Using the same word or phrase more than once.
Rhetorical questions	Questions that do not require an answer.
Simile	Making a comparison using like or as, *e.g. The sky was like a blanket of darkness.*
Statistics	Numerical facts.
Syndetic listing	Using conjunctions to create a list.
Tripling / Rule of 3	Three linked ideas one after each other e.g. The assembly was super, smashing, great.

Key terms	
Allusion	Short, informal reference to a famous person or event.
Anaphora	Repeating a word or expression while adding more detail to it.
Antithesis	Contrasting relationship between two idea.
Assonance	Similar vowel sounds repeated in successive or proximate words containing different consonants.
Hyperbole	Deliberately exaggerates conditions for emphasis or effect.
Metaphor	Comparing one thing to another, *e.g. The sky was a blanket of darkness.*
Oxymoron	Combines contradictory terms
Personification	An object is given human qualities, *e.g. the moon was suffocated by cloud.*
Explicit	Meaning that is stated.
Implicit	A meaning that is hinted at rather than stated.
Semantic field	A group of words which all relate to the same subject

Approaching Question 1 to 4:

Question 1 is all about: identifying explicit information.

Shade the circle of the 4 true statements from a choice of 8.

Tip: the statements are in the order they appear in the text.

Q2 is all about: making comparisons between the sources and giving detailed inferences. No single words. No methods.

Underline key words in the question – similarities/differences? In *what?*

Decide 2 clear differences/similarities (linked to the focus of the task).

Write 2 comparative paragraphs (no single word analysis / methods).

Tip: 'and' and 'not only…but also' to stretch inferences; 'because' or 'as' to explain them.

Question 3 is all about: analysing language in detail.

Underline key words in the question – source, lines, focus?

Highlight moments you could use, then select your best 4-6.

Decide 2-3 big ideas in answer to the question.

Write 2-3 detailed paragraphs.

Tip: consider patterns such as semantic fields or types of imagery.

Question 4 is all about: comparing the views of the writers themselves, and the methods they use to convey these views.

Underline key words in the question - what are you comparing views *on*?

Highlight moments that reveal the writers' views; select your best 4-6.

Decide what Source A's writer thinks/feels/believes x2-3, then link to B.

Write 2-3 detailed paragraphs with A and then B in each paragraph.

Tip: struggling to identify a method? You can always refer to use of tone.

English Language Paper 2 Section B

Q5 is all about: sustaining your own clear viewpoint on a topic, whilst writing in an engaging and accurate way.

Structuring Question 5:		
PERSONAL		Start with a personal story in which you describe someone affected by the issue.
GENERAL PROBLEM		Show how this issue is a problem across the country or world, describing the problem.
GENERAL SOLUTION		Offer an alternative approach and solutions to the problem.
PERSONAL		Return to the person described in section 1.

Very	Bad (not good enough)	Bad (terrible)	Ridiculous	Good (of a high standard)
Intensely	Unacceptable	Disgraceful	Preposterous	Outstanding
Exceedingly	Substandard	Atrocious	Laughable	Magnificent
Exceptionally	Inadequate	Deplorable	Senseless	Exceptional
Tremendously	Unsatisfactory	Execrable	Nonsensical	Splendid
Immensely	Incompetent	Appalling	Ludicrous	Wondrous
Vastly	Flawed	Harmful	Asinine	Glorious
A lot of	**Shocking**	**Argue**	**Disagree**	**Positive (showing progress)**
Numerous	Astonishing	Assert	Resist	Favourable
A plethora of	Astounding	Declare	Rebut	Promising
A multitude of	Staggering	Proclaim	Dispute	Encouraging
A myriad of	Bewildering	Posit	Counter	Heartening
Scores of	Scandalous	Insist	Oppose	Pleasing

Text types	
Article	Headline Strapline
Letter	Dear Mr Young, Yours sincerely, Dear Sir/Madam, Yours faithfully,
Speech	Greet and refer to the audience throughout Rhetorical questions to involve the audience
Essay	Thesis which outlines your argument Conclusion
Leaflet	Title Subheadings

Adding another idea or point to your paragraph	**Equally,** Equally, we mustn't forget that the media is guilty of over manipulating photographs.	**As well as this,** As well as this, celebrities themselves, and the media more generally, are known to manipulate photographs	**Again,** Again, children are left comparing their holiday snaps with the over-edited, unrealistic images many celebrities share.
Developing and extending an idea:	**Above all,** Above all, it is our children who suffer the most from this.	**Most significantly,** Most significantly, it our children who suffer the most from this.	**To be more precise:** To be more precise: children are the real victims here. We cannot lose sight of this.
Looking at the results or consequences of actions:	**As a result,** As a result, we have more and more young people becoming disaffected and struggling with self-esteem.	**If the truth were known,** If the truth were known, more schools would ban phones, and fewer parents would buy them!	**In view of this,** In view of this, headteachers are becoming less and less tolerant of the presence of phones in schools.
Saying the issue represents / is a sign of a larger problem:	**This is emblematic of** This is emblematic of a wider issue within society: our young people's declining self-esteem.	**This is symptomatic of** This is symptomatic of a wider issue within society: our young people's declining self-esteem.	**This is symbolic of** This is symbolic of a wider issue within society: our young people's declining self-esteem.
Being metaphorical and using imagery:	**Imagery of disease - if something is negative and getting worse** • plague on our society • blight on our society • plagues us • spreading / outbreak	**Imagery of weight / imprisonment - if something is burdening us** • sinking under the weight of • crushed by • burdened by • we are encumbered by	**Horticultural imagery – if something bad needs to be replaced by something good** • We need to weed out… and tend to… • …is like a weed: unwanted and stubborn. • An overgrowth of…is choking the… • We must nurture… to allow… to blossom.

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English Literature

Macbeth

Historical Context	
King James I and the Jacobean era	King of Scotland and became King of England in 1603. Two big interests: kingship and witchcraft. Many questioned the legitimacy of James I. He lived in fear of assassination and there were numerous attempts on his life, such as the religiously fuelled Gunpowder Plot (1605).
Kingship	The state of being a king and the behaviours exhibited.
Witches and the supernatural	Jacobeans were superstitious. Believed that witches gained their power by selling their souls to the devil. There was an anti-witchcraft law.
Gunpowder Plot	In 1605, a group of rebels, including Guy Fawkes, attempted regicide (killing a king) by plotting to blow up Parliament.
Divine Right of Kings	The belief that kings were chosen by God.
The Great Chain of Being	Belief that everything on earth was part of a strict hierarchy (order) with God at the top.
The Role of Women	Society was 'patriarchal' (led by men). Women were expected to marry, bear children and be subservient to (serve) their husbands.
The Tragic Hero	Macbeth's downfall is caused by his hamartia (fatal flaw) of ambition.
Machiavellian	Someone seen as cunning, scheming, and unscrupulous.

Key Themes
Ambition: Macbeth and Lady Macbeth's ambition is a driving force in the play, leading them to commit heinous acts and ultimately to their downfall. The play explores how ambition can consume individuals and corrupt them, ultimately destroying their lives.
Guilt: Guilt is a central and destructive force in the play, significantly impacting both Macbeth and Lady Macbeth. It manifests in paranoia, hallucinations, and ultimately, madness and despair, highlighting the psychological consequences of their actions and the corrupting nature of unchecked ambition.
Gender: Masculinity is seen as the desired trait. Lady Macbeth rejects her gender role as she craves power and challenges the masculinity of Macbeth.
The Supernatural: The witches and their prophecies play a significant role in Macbeth's choices and actions, highlighting the power of the supernatural and its influence on human decisions. The supernatural elements also contribute to the play's atmosphere of unease and foreboding.
The Corrupting Influence of Power: Macbeth's pursuit of power leads to violence, tyranny, and ultimately, his own destruction. The play examines how power can corrupt even the most noble individuals and how easily it can be abused.

Key Characters	
Macbeth	Thane of Glamis, Thane of Cawdor, king. Begins as a loyal warrior and ends a tyrannical king.
Lady Macbeth	Macbeth's wife. She persuades Macbeth to murder King Duncan.
Macduff	Macduff is Macbeth's antagonist (enemy). Macduff is a dramatic foil (contrast) to Macbeth. He kills Macbeth at the end of the play.
Banquo	Macbeth's closest friend and ally. He is also a foil to the character of Macbeth.
Fleance	Banquo's son.
King Duncan	King of Scotland at the start of the play. Murdered by Macbeth.
Malcolm	Duncan's eldest son and the rightful heir to the throne. At the end of the play, he becomes king.
The Witches	The Witches are supernatural. The witches state prophecies that never give the full truth (they 'equivocate').

Key Methods
Shakespeare uses blood as a metaphor for guilt through the play. As the guilt increases, the volume of blood increases
Shakespeare uses apparitions to present the consequences of ungodly behaviour and is ambiguous about whether they are real or imagined.
Shakespeare's characterisation of Macbeth and Lady Macbeth establishes the idea that ungodly deeds do not go unpunished.

Shakespeare's Purpose
Shakespeare warns that breaking the natural order will cause disorder and chaos.
Shakespeare exposes the dangers of being influenced by the supernatural.
Shakespeare uses Macbeth's role as a tragic hero to highlight our vulnerability to the destructive temptation of power.
Shakespeare reveals the dire consequences of unchecked ambition.

Macbeth

Key Quotations	
Macbeth as a tragic hero	• Captain: “For brave Macbeth – well he deserves that name” (Act 1, Scene 2) • Captain: “Disdaining fortune, with his brandished steel, which smoked with bloody execution” (Act 1, Scene 2) • Macbeth: “It is a tale Told by an idiot, full of sound and fury, Signifying nothing” (Act 5, Scene 5) • Malcolm: “This dead butcher and his fiend-like queen” (Act 5, Scene 9)
Lady Macbeth subverting stereotypes	• Lady Macbeth: “Yet do I fear thy nature; It is too full o' the milk of human kindness” (Act 1, Scene 5) • Lady Macbeth: “That I may pour my spirits in thine ear and chastise with the valor of my tongue” (Act 1, Scene 5) • Lady Macbeth: “Come you spirits… unsex me here” (Act 1, Scene 5) • Lady Macbeth: “fill me from the crown to the toe top full of direst cruelty” (Act 1, Scene 5) • Lady Macbeth: “stop up the access and passage to remorse” (Act 1, Scene 5 • Lady Macbeth: “Take my milk for gall” (Act 1, Scene 5) • Lady Macbeth: “But screw your courage to the sticking place and we’ll not fail” (Act 1, Scene 7) • Lady Macbeth: “dashed the brains out, had I so sworn” (Act 1, Scene 7)
Supernatural	• The Witches: “When shall we three meet again in thunder, lightning, or in rain?” (Act 1, Scene 1) • The Witches: “Fair is foul and foul is fair / hover through the fog and filthy air” (Act 1, Scene 1) • Macbeth: “So foul and fair a day I have not seen” (Act 1, Scene 3) • Banquo: “he seems rapt withal” (Act 1, Scene 3) • Banquo: “And oftentimes, to win us to our harm, the instruments of darkness tell us truths” (Act 1, Scene 3) • Hecate: “security Is mortals’ chiefest enemy” (Act 3, Scene 5)
Guilt	• Macbeth: “Is this a dagger which I see before me?” (Act 2, Scene 1) • Macbeth: “Amen stuck in my throat” (Act 2, Scene 2) • Macbeth: “Will all great Neptune’s ocean wash this blood clean from my hand?” (Act 2, Scene 2) • Lady Macbeth: “A little water clears us of this deed” (Act 2, Scene 2) Voice (quoted by Macbeth): “Macbeth does murder sleep!” (Act 2, Scene 2) • Macbeth: “O full of scorpions is my mind.” (Act 3, Scene 2) • Macbeth: “Never shake thy gory locks at me” (Act 3, Scene 4) • Macbeth: “I am cabined, cribbed, confined, bound in To saucy doubts and fears” (Act 3, Scene 4) • Lady Macbeth: “Out, damned spot! Out, I say!” (Act 5, Scene 1) • Lady Macbeth: “All the perfumes of Arabia cannot sweeten this little hand” (Act 5, Scene 1)

Key Quotations	
Ambition	• Macbeth: “Whose horrid image doth unfix my hair And make my seated heart knock at my ribs” (Act 1, Scene 3) • Macbeth: “stars hide your fires, let not light see my black and deep desires” (Act 1, Scene 4) • Duncan: “I have begun to plant thee and will labor to make thee full of growing” (Act 1, Scene 4) • Lady Macbeth: “Look like the innocent flower but be the serpent under it” (Act 1, Scene 5) • Macbeth: “False face must hide what the false heart doth know” (Act 1, Scene 7) • Macbeth: “vaulting ambition which overleaps itself” (Act 1, Scene 7) • Macbeth: “fruitless crown” (Act 3, Scene 1)
Subversion of the natural order	• Macduff: “O horror, horror, horror… most sacrilegious murder” (Act 2, Scene 3) • Lennox: “The night has been unruly” (Act 2, Scene 3) • Lennox: “Some say the earth was feverous and did shake” (Act 2, Scene 3) • Old Man: “A falcon, towering in her pride of place, was by a mousing owl hawk’d at and kill’d” (Act 2, Scene 4)
Macbeth as a tyrant	• Lennox: “Our suffering country Under a hand accursed!” (Act 3, Scene 6) • Macbeth: “From this moment The very firstlings of my heart shall be The firstlings of my hand” (Act 4, Scene 1) • Macduff: “Bleed, bleed, poor country… Great Tyranny” (Act 4, Scene 3) • Malcolm: “Devilish Macbeth” (Act 4, Scene 3) • Macduff: “Turn, hell-hound, turn” (Act 5, Scene 8)
Macbeth as nihilistic	• Macbeth: “I am in blood Stepped in so far that, should I wade no more, Returning were as tedious as go o'er” (Act 3, Scene 4) • Macbeth: “I’ll fight till from my bones my flesh be hacked. Give me my armor” (Act 5, Scene 3) • Macbeth: “Out, out, brief candle! Life’s but a walking shadow” (Act 5, Scene 5)
Light and dark	• Macbeth: “stars hide your fires, let not light see my black and deep desires” (Act 1, Scene 4) • Lady Macbeth: “Come, thick night, And pall thee in the dunnest smoke of hell” (Act 1, Scene 5) • Banquo: “There’s husbandry in heaven; Their candles are all out” (Act 2, Scene 1) • Ross: “And yet dark night strangles the travelling lamp” (Act 2, Scene 4) • Macbeth: “Come, seeling night, Scarf up the tender eye of pitiful day” (Act 3, Scene 2) • Gentlewoman: “She has light by her continually. ‘Tis her command” (Act 5, Scene 1)

A Christmas Carol

Historical Context	
A Christmas Carol	**Published**: December, 1843—Victorian era **Genre**: Allegorical; a ghost story **Set**: Victorian London **Structure**: Five stave novella
The Industrial Revolution and Capitalism	Increased poverty levels and crime in the cities. Growth in Capitalism - the belief in making the greatest possible profits for the owners of production.
The 'hungry forties'	The novella is set in the 1840s, a period known as the 'hungry forties'. Characters like Ignorance and Want are symbolic of the plight of the poor and their starvation.
The New Poor Law, 1834	In order to deter poor people from claiming financial help, the government made claimants live in workhouses: essentially, prisons for the poor. Dickens hated this law. He spent 1843 touring factories and mines in England and wished to highlight the situation facing poor people.
Malthusianism	Malthus warned that the Industrial Revolution would lead to population growth, which would ultimately cause starvation and disease due to a shortage of resources for everyone.
Christmas values	Dickens contributed to a more secular (non-religious) Christmas, based on the values of goodwill, benevolence and forgiveness. This imagery (food, decorations, music) is used throughout the novella.
Victorian childhoods	Education was not compulsory. Children born into poverty would be expected to work from young. Dickens believed that how a society treated its children was the true test of that society's moral worth. As a result, childhood innocence is central to Dickens' works.

Dickens' Purpose
Dickens conveys the message that everybody is capable of redemption.
Dickens emphasises the need for social responsibility and charity.
Dickens highlights the importance of family and friendship.

Key Themes
Redemption: The story centres on Scrooge's transformation from a miserly, isolated man to a kind, generous, and loving individual. This transformation is a central message about the possibility of change and the importance of learning from past mistakes.
The spirit of Christmas: The story celebrates the festive season as a time of goodwill, generosity, and family gatherings. Christmas is presented as an opportunity to reflect on one's actions, forgive past wrongs, and spread joy and compassion.
Social injustice: Dickens uses the novella to critique the stark disparity between the rich and the poor in Victorian England. He exposes the plight of the working class and the indifference of the wealthy, particularly through the portrayal of the Cratchit family and the Ghost of Christmas Future's chilling vision of
The consequences of actions: Scrooge's experiences with the ghosts serve as a stark reminder of the consequences of his selfish and uncaring behaviour. His encounters with the past, present, and future highlight the lasting impact of one's choices and actions.
Family: Through his portrayal of family, Dickens embodies the Christian values of charity, forgiveness, caring for one another and kindness. Dickens emphasises the value of family through even the most minor of characters. This implies that family is so essential that it should be interwoven into everyone's lives.

Key Characters	
Ebenezer Scrooge	The miserly (not generous) protagonist who undergoes a transformation throughout the novella.
Bob Cratchit	Scrooge's clerk, a kind and humble man living in poverty with his family.
Fred	Scrooge's nephew, who represents joy and good spirit, despite being rejected by his uncle.
Jacob Marley	Scrooge's dead business partner, who appears as a chain-bound ghost, warning Scrooge about the consequences of his life.
The Ghost of Christmas Past	A spirit that shows Scrooge visions of his past, including his happy memories of childhood and lost love.
Belle	Scrooge's former fiancée, whose memory haunts him.
Fezziwig	Scrooge's kind and generous former employer, a symbol of a time where society was not riddled with greed.
The Ghost of Christmas Present	A spirit that shows Scrooge the joy of Christmas and the poverty and suffering experienced by others.
The Ghost of Christmas Yet to Come	A spirit that shows Scrooge a bleak vision of his future if he continues on his current path.

A Christmas Carol

Key Quotations	
Scrooge as miserly, Malthusian and selfish	• Narrator: “Oh! But he was a tight-fisted hand at the grindstone” (Stave 1) • Narrator: “A squeezing, wrenching, grasping, scraping, clutching, covetous, old sinner!” (Stave 1) • Scrooge: “Are there no prisons?...the Treadmill and the Poor Law are in full vigour, then?” (Stave 1) • Narrator: “Darkness is cheap, and Scrooge liked it” (Stave 1) • Scrooge: “If they would rather die…they had better do it, and decrease the surplus population” (Stave 1)
Scrooge as misanthropic and isolated	• Narrator: “Hard and sharp as flint” (Stave 1) • Narrator: “Solitary as an oyster” (Stave 1) • Scrooge: “I wish to be left alone…I don’t make merry myself at Christmas and I can’t afford to make idle people merry” (Stave 1) • Narrator: “A solitary child, neglected by his friends, is left there still” (Stave 2) • Narrator: “Plundered and bereft, unwatched, unwept, uncared for, was the body of this man” (Stave 4)
The weather as a motif for Scrooge’s moral journey	• Narrator: “No warmth could warm, no wintry weather chill him” (Stave 1) • Narrator: “Foggier yet, and colder. Piercing, searching, biting cold” (Stave 1) • Narrator: “Choked up with a dingy mist, half thawed, half frozen” (Stave 1) • Narrator: “No fog, no mist; clear, bright, jovial, stirring cold; cold, piping for the blood to dance to” (Stave 5)
Fire as a motif for human connections	• Narrator: “Scrooge had a very small fire, but his clerk's fire was so very much smaller, that it looked like one coal” (Stave 1) • Narrator: ‘He was all in a glow; his face was ruddy and handsome; his eyes sparkled, and his breath smoked’ (Stave 1) • Narrator: “A lonely boy was reading near a feeble fire” (Stave 2) • Narrator: “They found a cheerful company assembled round a glowing fire” (Stave 3) • Narrator: “Fuel was heaped upon the fire” (Stave 3)

Key methods
Dickens uses the spirits to propel Scrooge’s redemption.
Dickens uses contrasts to highlight social inequality and the redemption of Scrooge.
The intrusive, omniscient narrator provides the reader with social commentary.

Key Quotations	
Poverty and social injustice	• Charity Collector: "Many thousands are in want of common necessaries; hundreds of thousands are in want of common comforts, sir" (Stave 1) • Narrator: "Dressed out but poorly in a twice-turned gown, but brave in ribbons" (Stave 3) • Bob Cratchit: "A small pudding for a large family" (Stave 3) • Narrator: "Yellow, meagre, ragged, scowling, wolfish" (Stave 3) • Narrator: "A stale and shrivelled hand, like that of age, had pinched and twisted them" (Stave 3) • Narrator: "The whole quarter reeked with crime, with filth, and misery" (Stave 4)
Redemption and transformation	• Jacob Marley: "I wear the chain I forged in life…of my own free will I wore it" (Stave 1) • Scrooge: "I should like to be able to say a word or two to my clerk just now. That’s all." (Stave 2) • Scrooge: "Leave me! Take me back. Haunt me no longer!" (Stave 2) • Scrooge: "Have they no refuge or resource?" (Stave 3) • Scrooge: "Hear me! I am not the man I was. I will not be the man I must have been" (Stave 4) • Scrooge: "I will live in the Past, the Present, and the Future!" (Stave 4) • Scrooge: "I am as light as a feather, I am as happy as an angel, I am as merry as a schoolboy" (Stave 5)
Social responsibility	• Jacob Marley: "Mankind was my business. The common welfare was my business; charity, mercy, forbearance, and benevolence, were, all, my business" (Stave 1) • Scrooge: "Not a farthing less. A great many back-payments are included in it, I assure you" (Stave 5)
Benevolence and generosity	• Spirit of Christmas Past: "A small matter…to make these silly folks so full of gratitude" (Stave 2) • Scrooge: "He has the power to render us happy or unhappy…the happiness he gives is quite as much as if it cost a fortune." (Stave 2)*(Scrooge is speaking about Fezziwig here.)* • Scrooge: "Not the little prize Turkey: the big one" (Stave 5)
Christmas Spirit	• Narrator: “Every man among them hummed a Christmas tune, or had a Christmas thought” (Stave 3)
Family	• Belle: “Another idol has displaced me…a golden one” (Stave 2) • Bob Cratchit: “My little, little child!”, “My little child!” (Stave 4) • Scrooge: “It’s I. Your uncle Scrooge. I have come to dinner. Will you let me in, Fred?” (Stave 5) • Narrator: “Scrooge was better than his word…to Tiny Tim, who did not die, he was a second father” (Stave 5)

An Inspector Calls

Historical Context	
An Inspector Calls	Written by J.B Priestley in 1945 (Edwardian Era). Set in the fictional town Brumley 'an industrial city in the north Midlands' in 1912. Three possible forms - Well-Made Play, Morality Play, Crime
Socialism	Approach to economic and social systems characterised by social ownership, democratic control and equality. Priestley was a Socialist.
Social and moral responsibility	Pre-war: 1912 - strong distinctions between upper and lower classes, society was deeply patriarchal. General attitude of those with social status and wealth was towards looking after one's own. Post-war: Labour party under Attlee won a landslide election reflecting a wave of enthusiasm towards communal responsibility
Poverty	Working and living conditions had improved from the 1840s ('Hungry Forties') but many still lived in poverty. Clement Attlee announced he would introduce the welfare state. This included the establishment of a National Health Service (NHS) in 1948 and a national system of benefits to protect from the
The suffrage movement	Two groups of women were campaigning for the right to vote: the suffragists and the suffragettes. Their support encouraging changing attitudes towards women. In 1918, the government finally passed a law giving some women the right to vote for the first time
Priestley's own political views	Priestley criticised the hypocrisy of those with wealth - pompously religious on Sundays, but 'coarsely raffish' on Saturday nights (ill-using young women).

Priestley's Purpose
Priestley promotes a socialist ideology in which he argues for collective social responsibility.
Priestley suggests that change is possible, and that hope lies with the younger generation.
Priestley challenges existing social hierarchies of class and gender.

Key Themes
Social Responsibility: This is a central theme, with the Inspector demanding that the characters take accountability for their actions and the impact they have on others. The play explores whether individuals should be responsible for the welfare of the wider society.
Generational divide: The younger characters, like Sheila and Eric, are depicted as more receptive to the Inspector's message and more willing to acknowledge their mistakes, contrasting with the older generation's resistance to change.
Socialism and capitalism: The play contrasts the capitalist values of the Birlings, who prioritize profit and individual wealth, with the Inspector's socialist message of social equality and responsibility.
Guilt: Characters grapple with the guilt of their actions and the consequences faced by Eva Smith.
Class: The play highlights the social inequalities and divisions between the wealthy Birlings and the working-class characters, particularly Eva Smith.
Gender: The play also explores themes of gender inequality, particularly the way in which women are treated within the context of the play, as seen through the character of Eva Smith and Sheila's experiences.

Key Characters	
Mr Birling	The patriarch of the Birling family. Arthur is a "rather portentous" man "in his fifties"
Mrs Birling	The matriarch of the Birling family. Sybil is described in the play's performance notes as "cold." She protects what she perceives to be the family's good image and standing in the community.
Sheila Birling	Daughter of Arthur and Sybil. Sheila, "in her early twenties," is engaged to Gerald and
Eric Birling	Son of Arthur and Sybil, and older brother of Sheila. Eric works part-time at the family business and has a drinking problem that he hides, with some success, from his parents and sister.
Gerald Croft	Fiancé to Sheila, and son of another prominent manufacturing family. Gerald is from a more socially-elevated family, and Arthur worries that Gerald's parents believe he is making a "poor match" in marrying Sheila.
The Inspector	Investigating the death of Eva Smith. The Inspector asks all the Birlings, and Gerald, questions about Eva/Daisy. It seems that the Inspector knows the answer to everything he asks, but wants the family to admit to various instances of wrongdoing.
Eva Smith	The victim in the play. She represents the plight of young working class women in exploited by the capitalist systemin Edwardian England.

An Inspector Calls

Key Quotations	
Character introductions	• Mr Birling: "Heavy-looking, rather portentous man…provincial in his speech." (Act 1) • Mrs Birling: "A rather cold woman and her husband's social superior." (A1) • Sheila Birling: "Pretty girl…very pleased with life and rather excited." (Act 1) • Gerald Croft: "Very much the easy well-bred young-man-about-town." (A1) • Eric Birling: "Not quite at ease, half shy, half assertive." (Act 1) • Gerald: "I was awfully busy at the works all that time." (Act 1) • Mrs Birling: "You'll have to get used to that, just as I had." (Act 1) • Goole: "Creates at once an impression of massiveness, solidity and purposefulness." (Act 1)
Mr Birling as ignorant and obnoxious	• Mr Birling: "I'm talking as a hard-headed, practical man of business. And I say there isn't a chance of war." (Act 1) • Mr Birling: "Unsinkable, absolutely unsinkable." (Act 1) • Mr Birling: "There'll be peace and prosperity and rapid progress." (Act 1)
Sheila and Eric as cosseted and child-like	• Sheila: "Mummy." (Act 1) • Mrs Birling: "You seem to have made a great impression on this child" (A2) • Mrs Birling: "My son, Eric, who seems to be in an excitable silly mood." (A2)
Capitalism	• Stage Directions: "Good solid furniture of the period." (Act 1) • Mr Birling: "Crofts and Birlings…working together – for lower costs and higher prices." (Act 1) • Mr Birling: "As if we were all mixed up together like bees in a hive - community and all that nonsense." (Act 1)
The Inspector as an advocate for social responsibility	• Stage Directions: "Pink and intimate" to "brighter and harder." (Act 1) • Inspector: "Public men, Mr Birling, have responsibilities as well as privileges." (Act 2) • Inspector: "Each of you helped to kill her. Remember that." (Act 3) • Inspector: "There are millions and millions and millions of Eva Smiths and John Smiths still left with us." (Act 3) • Inspector: "We don't live alone. We are members of one body. We are responsible for each other." (Act 3) • Inspector: "They will be taught it in fire and blood and anguish." (Act 3)
The older generation refusing to take responsibility	• Mr Birling: "I can't accept any responsibility." (Act 1) • Mrs Birling: "She had only herself to blame." (Act 2) • Mrs Birling: "I did nothing I'm ashamed of." (Act 2) • Mrs Birling: "I used my influence to have it refused." (Act 2) • Mrs Birling: "look for the father of the child. It's his responsibility." (Act 2) • Gerald: "Everything's all right now, Sheila. What about this ring?" (Act 3) • Mr Birling: "The famous younger generation who know it all. And they can't even take a joke." (Act 3)

Key Quotations	
Social class and status	• Inspector: "So you used the power you had...to punish the girl just because she made you feel like that?" (Act 2) • Mrs Birling: "Girls of that class –" (Act 2) • Sheila: "You were the wonderful Fairy Prince. You must have adored it, Gerald." (Act 2) • Gerald: "I became at once the most important person in her life." (Act 2) • Mrs Birling: "As if a girl of that sort would ever refuse money." (Act 2) • Mr Birling: "Look, Inspector – I'd give thousands – yes, thousands." (Act 3)
Eric and Gerald as misogynistic	• Gerald: "I hate those hard-eyed dough-faced women." (Act 2) • Gerald: "Young and fresh and charming." (Act 2) • Eric: "I wasn't in love with her or anything – but I liked her – she was pretty and a good sport." (Act 3) • Eric: "I was in that state when a chap easily turns nasty." (Act 3)
Sheila's transformation	• Sheila: "Fire and blood and anguish. And it frightens me the way you talk." (Act 3) • Stage Directions: "Sheila moves towards the door." (Act 3)
The younger generation as advocates for the poor	• Sheila: "But these girls aren't cheap labour – they're people." (Act 1) • Eric: "Why shouldn't they try for higher wages? We try for the highest possible prices." (Act 1) • Sheila: "It's you two who are being childish – trying not to face the facts." (Act 3)
The younger generation feeling guilt for their actions	• Sheila: "So I'm really responsible?" (Act 1) • Sheila: "If she'd been some miserable plain little creature, I don't suppose I'd have done it." (Act 1) • Sheila: "It's the only time I've ever done anything like that, and I'll never, never do it again." (Act 1) • Eric: "And I didn't even remember – that's the hellish thing. Oh – my God! – how stupid it all is!" (Act 3) • Eric: (shouting) "And I say the girl's dead and we all helped to kill her – and that's what matters –" (Act 3)

Key methods
Priestley's use of contrasts in character, setting and language to emphasise the different conflicts
Priestley's characterisation of the Inspector and the family as a means of highlighting his view of different groups in society.
Priestley's use entrances, exits, beginnings and endings as a means of building and maintaining

Power and Conflict Poetry

Poem	Big Ideas	Example Moment 1	Example Moment 2	Example Moment 3	Example Moment 4	Example Moment 5	Form/structure
'Ozymandias' Shelley	Control and oppression Corruption (of powerful leaders) Nature versus human power Destructive power of nature Transience of human power	**'Half sunk, a shattered visage lies'**	**'sneer of cold command'**	**'Nothing beside remains. Round the decay of that colossal wreck'**	**'Two vast and trunkless legs of stone'**	**'The hand that mocked them, and the heart that fed;'**	**Enjambment:** infinite flow – of time, nature's power, continual erosion **Breaks conventions of traditional sonnet form:** breaking of statue and power it represents
'London' Blake (Industrial Revolution)	Loss of personal identity Control and oppression Corruption (of institutions) Power can be abused Powerlessness (of the poor)	**'Marks of weakness, marks of woe'**	**'mind-forged manacles I hear'**	**'Every black'ning church appalls'**	**'I wander thro' each charter'd street, near where the charter'd Thames does flow'**	**'the hapless Soldiers sigh runs in blood down Palace walls'**	**Uniformed quatrains, iambic tetrameter, regular rhyme scheme:** reflective of control **Cyclical structure:** cycle of suffering
'The Prelude' Wordsworth (autobiographical)	Nature versus human power Nature as a predator/combatant Vulnerability in the face of nature Destructive power of nature Transience of human power	**'one summer evening (led by her)'**	**'o'er my thoughts there hung a darkness… No familiar shapes remained, no pleasant images'**	**'a huge peak, black and huge... Upreared its head'**	**'small circles glittering idly in the moon'**	**'sparkling light' to 'hung a darkness'**	**Enjambment:** infinite flow – of nature's power; speaker's stream of consciousness **Volta:** shift in the poem mirrors shift in nature
'My Last Duchess' Browning (Victorian, but set in 16th Century Italy)	Control and oppression Corruption (of powerful leaders) Power can be abused Powerlessness (of women) Patriarchal power and dominance	**'My Last Duchess'**	**'gift of a nine-hundred-years-old name'**	**'I gave commands; then all smiles stopped together'**	**'none puts by the curtain I have drawn for you, but I'**	**'Notice Neptune, though, taming a sea -horse'**	**Dramatic monologue:** only the voice of the Duke – control – Duchess is voiceless **Rhyming couplets:** reflective of control; almost rehearsed
'The Charge of the Light Brigade' Tennyson (Crimean War)	Physical impact of war Psychological impact of war Futility of blind obedience Power of authority	**'Rode the six hundred'**	**'Theirs not to make reply, theirs not to reason why, theirs but to do and die'**	**'Volley'd and thunder'd; storm'd at with shot and shell'**	**'jaws of Death'**	**'Honour the charge they made!'**	**Dactylic dimeter:** mimics the galloping of horses – relentless charging despite circumstances **Refrain:** 'rode the six hundred' – emphasises' determination
'Exposure' Owen (WW1 poet)	Nature versus human power Nature as a predator/combatant Brutal reality of warfare Physical impact of war Psychological impact of war Loss of personal identity	**'Our brains ache in the merciless iced east winds that knive us'**	**'Dawn massing in the east her melancholy army'**	**'For love of God seems dying'**	**'But nothing happens'**	**'All their eyes are ice'**	**Refrain:** 'But nothing happens' – emphasise hopelessness, monotony, lack of progress **Cyclical structure:** cycle of suffering; no end in sight
'Storm on the Island' Heaney	Nature versus human power Nature as a predator/combatant Vulnerability in the face of nature Destructive power of nature Transience of human power	**'We are prepared' to 'We just sit tight'**	**'Strange, it is a huge nothing that we fear.'**	**'leaves and branches can raise a tragic chorus in a storm'**	**'spits like a tame cat turned savage'**	**'blast', 'dives and strafes', 'bombarded', 'exploding' (etc.)**	**Blank verse** (unrhymed iambic pentameter): chaos and unpredictability of nature **Single stanza:** isolation of the island – vulnerable to attack

Power and Conflict Poetry

Poem	Big Ideas	Example Moment 1	Example Moment 2	Example Moment 3	Example Moment 4	Example Moment 5	Form/structure
'Bayonet Charge' Hughes (Set WW1; written 1957)	Brutal reality of warfare Physical impact of war Psychological impact of war Breakdown of ideologies in war Loss of personal identity	**'Suddenly he awoke and was running – raw'**	**'His terror's touchy dynamite'**	**'In what *cold clockwork* of the *stars* and the nations / Was he the hand pointing that second?'**	**'Patriotic tear that had brimmed in his eye'**	**'King, honour, human dignity, etcetera / Dropped'**	**In medias res opening:** chaos and unpredictability of trench life **Free verse** (no consistent rhyme or metre): chaos of trench life; soldier's lack of control
'Remains' Armitage (Iraq War)	Brutal reality of warfare Physical impact of war Psychological impact of war Widespread impact of war Internal conflict and guilt Memories can be painful	**'Remains'**	**'tosses his guts back into his body.'**	**'His blood-shadow stays on the street'**	**'probably armed, possibly not'**	**'drink and the drugs won't flush him out'**	**In medias res opening:** chaos and unpredictability of life at war **Dramatic monologue:** speaker's voice is colloquial, conversational **Enjambment:** infinite flow – of events in the speaker's mind
'Poppies' Weir	Psychological impact of war Widespread impact of war Memories can be comforting Enduring power of memory	**'Sellotape bandaged around my hand'**	**'you were away, intoxicated'**	**'hoping to hear your playground voice'**	**'I resisted the impulse to run my fingers through the gelled blackthorns of your hair'**	**'without reinforcements of scarf, gloves'**	**Dramatic monologue:** son's voice is absent – reflects the loss the mother feels **Enjambment:** outpouring of grief
'War Photographer' Duffy	Brutal reality of warfare Physical impact of war Psychological impact of war Widespread impact of war Memories can be painful	**'explode beneath the feet of running children'**	**'spools of suffering set out in ordered rows'**	**'The only light is red and softly glows'**	**'hands, which did not tremble then though seem to now'**	**'A hundred agonies in black and white'**	**Enjambment:** infinite flow – of events relived in speaker's mind **Consistent stanza and rhyme scheme:** *attempts* to impose order and calm on his mind
'Tissue' Dharker	Nature versus human power Fragility of human constructs Transience of human power Humanity's reliance on physical representations of power	**'Paper that lets the light shine through, this is what could alter things'**	**'might fly our lives like paper kites'**	**'raise a structure never meant to last'**	**'Maps too. The sun shines through their borderlines'**	**'of paper smoothed and stroked and thinned to be transparent'**	**Free verse** (no consistent rhyme or metre): reflects the freedom that nature has **Enjambment:** infinite flow – of nature, time
'The Emigree' Rumens	Widespread impact of war Power of identity Enduring power of memory Memories can be comforting	**'branded by an impression of sunlight'**	**'it may be sick with tyrants'**	**'My city takes me dancing'**	**'my city comes to me in its own white plane.'**	**'I comb its hair and love its shining eyes.'**	**Enjambment:** infinite flow – of the speaker's thoughts wandering between past and present **Each stands ends:** 'sunlight'
'Kamikaze' Garland (Japan WW2)	Individual vs societal expectations Psychological impact of war Widespread impact of war Loss of personal identity Power of nature	**'head full of powerful incantations'**	**'swivelled towards the sun'**	**'he must have wondered which had been the better way to die'**	**'enough fuel for a one way journey into history'**	**'strung out like bunting on a green-blue translucent sea'**	**Third person narrative:** the pilot is voiceless **Free verse:** (no consistent rhyme or metre): reflects the freedom the pilot chooses; defies government control
'Checking Out Me History' Agard	Loss of personal identity Importance of reclaiming identity Control and oppression Power of authority Corruption (of institutions)	**'dem tell me'**	**'bandage up me eye'**	**'I carving out me identity'**	**'beacon', 'fire-woman', 'healing star among the wounded, a yellow sunrise to the dying'**	**'Dem tell me bout de dish run away with de spoon'**	**Caribbean dialect:** pride, sense of self, act of personal rebellion **Rhyme:** in stanzas about figures from British colonial education – makes them sound trivial, childish

Unseen Poetry

Key Terms: Language	
Alliteration	Recurrence of initial consonant sounds *e.g. tragedy travelled through our trivial tale.*
Assonance	Repeated vowel sounds.
Colloquial language	Casual, informal language.
Extended metaphor	A series of linked metaphors.
Hyperbole	Deliberate exaggeration.
Imagery	Visually descriptive or figurative language.
Internal rhyme	Rhyme on the same line.
Metaphor	Comparing one thing to another, *e.g. The sky was a blanket of darkness.*
Motif	Recurring theme or symbol.
Onomatopoeia	The formation of a word from a sound associated with what is named (e.g. *cuckoo*, *sizzle*).
Pathetic fallacy	Giving human emotion and conduct to things found in nature including the weather.
Personification	An object is given human qualities, *e.g. the moon was suffocated by the cloud.*
Plosive	Sounds which are created through a burst of air e.g. p, t, k, d,
Semantic field	A group of words which link to the same theme or concept.
Sibilance	Repeated s, sh, ch, z sounds.
Simile	Making a comparison using like or as, *e.g. The sky was like a blanket of darkness.*

Key Terms: Structure	
Anaphora	Repeated first words at the start of a line.
Caesura	A break in the middle of a line using punctuation.
End-stopped	A pause at the end of a line of poetry signalled with punctuation.
Enjambment	When a sentence runs over into a new line, couplet or stanza.
Iambic pentameter	5 sets of stressed/unstressed beats on a line.
Juxtaposition	Placing contrasting ideas close together in a text.
Oxymoron	Combines contradictory terms.
Quatrain	A stanza of four lines.
Refrain	Repeated lines like in a chorus of a song.
Repetition	A pattern of repeated words/ideas/sounds.
Rhyme scheme	The organisation of the rhyme throughout the poem.
Rhyming couplet	Two lines that rhyme next to each other.
Rhythm	A recurring beat in the poem.
Stanza	A group of lines forming the basic recurring metrical unit in a poem; a verse.
Volta	The turning point of the poem.

Key Terms: Form	
Ballad	A dramatic poem with 4 line stanzas.
Blank verse	Verse with no rhyme—usually 10 syllables per line.
Dramatic monologue	Where a single character speaks at length to an implied or explicit audience, revealing their thoughts, feelings, and motivations.
Elegy	A poem written to mourn the death of a person (elegiac).
Epic	A tragic/heroic story-telling poem.
First person	Using the pronouns I/me/my.
Free verse	No regular rhyme scheme or rhythm.
Ode	A lyrical poem addressed to one person.
Persona	The voice/speaker of the poem, different from the writer.
Sonnet	A 14 line poem, often using iambic pentameter. traditionally associated with romantic love
Third person	Using the pronouns he/she/they.

When generating big ideas, ask yourself: ***What does the poem do? Does it...***	
Capture an emotion?	What is the emotion?
Capture a significant moment or memory?	What is the moment or memory?
Capture a change (often in the speaker's perspective)?	Identify the change.
Focus on minutiae (to comment on the universal)?	Generalise outwards.
Explore an idea through a metaphor?	Identify and exploit the symbolism/metaphor.
Explore a social issue?	Grasp and critique the social message.

Comparison Vocabulary	
Similarly,	**Contrastingly,**
Likewise,	**On the other hand,**
Corresponding to this,	**Whereas,**
Comparably,	**Unlike in..,**
Parallel to this,	**On the contrary,**
	In antithesis to this,
	In stark contrast to this,
	Juxtaposing this,
	However,

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Mathematics

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Mathematics - Number

Key Term	Definition
Ascending	Increasing in size (or numerical value)
Compare	To look at two or more numbers and say what is similar or different.
Composite Numbers	A positive integer with more than two factors.
Consecutive	Describing things which follow each other in a particular order.
Cube Numbers	The result of multiplying a number by itself twice. 1, 8, 27, 64, 125, 216, 343, 512, 729, 1000
Decimal Places	The number of digits to the right of a decimal point in a decimal number.
Degree of Accuracy	Describing how precise or accurate a value is, in terms of number of decimal places or significant figures.
Denominator	The bottom number of a fraction. **Must be an integer.**
Descending	Decreasing in size (or numerical value)
Difference	The result of a subtraction.
Divisible	One number is divisible by another if it is capable of being divided exactly, without a remainder.
Equivalent	Of equal value.
Estimate	To find an approximate answer to a calculation by rounding the numbers involved, commonly to 1 significant figure.
Evaluate	To find the numerical value of.
Factor	An integer that divides another integer exactly, without a remainder.
Factor Pair	A set of two factors that have a particular product.
Fraction	A number which represents part (or parts of) a whole.
Highest Common Factor	The largest number that divides exactly into two or more numbers.
Improper Fraction	A fraction where the numerator is larger than the denominator.

Key Equivalents		
FDP Conversion	$1 = \frac{1}{1} = 100\%$ $0.5 = \frac{1}{2} = 50\%$ $0.1 = \frac{1}{10} = 10\%$ $0.25 = \frac{1}{4} = 25\%$	$0.75 = \frac{3}{4} = 75\%$ $0.2 = \frac{1}{5} = 20\%$ $0.\dot{3} = \frac{1}{3} = 33.\dot{3}\%$

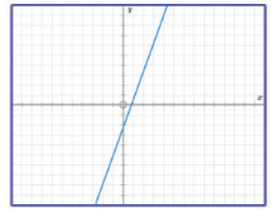
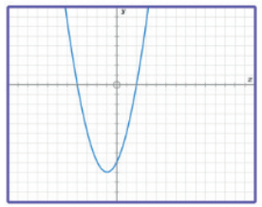
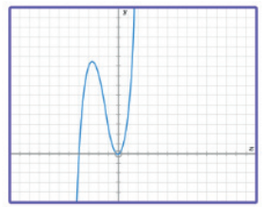
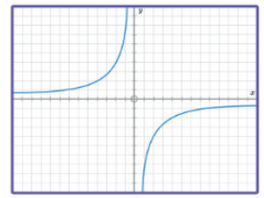
Key Term	Definition
Indices	The power of a number which shows how many times the number is multiplied by itself.
Inequality	The relationship between two numbers that are not equal to each other, shown using the symbols <, > , ≤, ≥ or ≠.
Integer	A whole number including positive and negative numbers and zero.
Lowest Common Multiple	The smallest number which appears in the list of multiples for two or more numbers.
Mixed Number	A number formed of both an integer (whole number) and a fraction.
Multiple	The result of multiplying a number by an integer, i.e. the times tables of a number.
Numerator	The top number of a fraction. Must be an integer.
Order of Operations	BIDMAS—Brackets, Indices, Division & Multiplication and Addition & Subtraction.
Power of 10	The product of multiplying 10 by itself, a number of times.
Prime Number	A positive integer with only two factors, 1 and itself. 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
Product	The result of a multiplication.
Proper Fraction	A fraction in which the numerator is less than the denominator.
Remainder	In division, the amount leftover when a number does not divide exactly.
Square Numbers	The result of multiplying a number by itself. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225
Square Root	The particular factor of a number which can be multiplied by itself to produce that number.
Sum	The result of an addition.
Unit Fraction	A proper fraction with a numerator of 1.
Significant figures	The significant figures of a number are the digits which **carry meaning** (ie. are significant) to the size of the number. The **first significant figure** of a number **cannot be zero**.

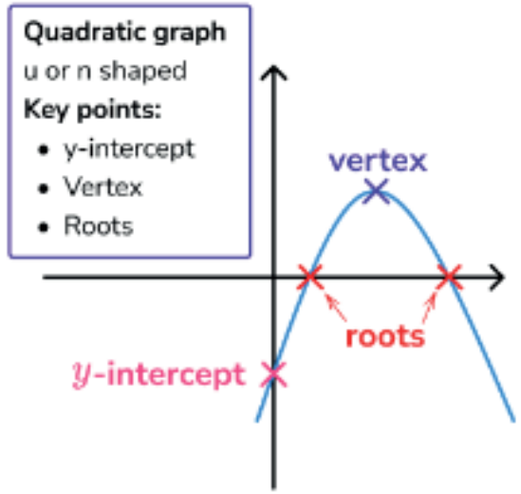
Mathematics - Number

Key Term	Definition
Equivalent Fractions	Fractions which have different numerators and denominators but represent the same value.
Dividing Fractions	Multiply by the reciprocal of the second fraction.
Percentage Increase/ Decrease	Calculating a percentage of an amount and either adding this onto (increasing) or subtracting this from (decreasing) the original amount.
Percentage Change	To calculate the percentage change, use the following: $\frac{difference}{original} \times 100$
Percentage Multiplier	The number you multiply a quantity by to increase or decrease it by a percentage. E.g. to increase by 10% the multiplier is 1.1.
Significant figure	The significant figures of a number are the digits which **carry meaning** (ie. are significant) to the size of the number. The **first significant figure** of a number **cannot be zero**.
Write number in standard form	A way of writing large or small numbers.
Product of prime factors / Prime factorisation	Finding which prime numbers multiply together to make the original number. Should be written as primes multiplied together. e.g. 20 = 5x2x2 or as index form :20 = $5x2^2$
Simple Interest	Interest calculated as a percentage of the original amount.
Compound Interest	Interest calculated as a percentage of what you currently have.
Cube Root	The particular factor of a number which can be multiplied by itself twice to produce that number.

Key Term	Definition
Write number in standard form	$a \times 10^n$ where $1 \leq a < 10$ 1 500 000 in standard form is 1.5×10^6
Base	The number that will be multiplied by itself (eg 5^3 the base is 5).
Power	The small number in 10^3, tells you how many times you multiply the base by itself. 10^3 means 10x10x10.
Index Number	Another word for power, plural is indices.
10^4	Ten to the power four, means 10 x 10 x 10 x 10 because the power is 4.
10^3	Ten Cubed, means 10 x 10 x 10 because the power is 3.
10^2	Ten squared, means 10 x 10 because the power is 2.
10^1	Ten to the power one, just means 10 because the power is 1.
10^0	Ten to the power zero. Anything to the power zero always equals 1.
10^{-1}	Ten to the power negative 1 = 0.1
10^{-2}	Ten to the power negative 2 = 0.01
Growth & Decay / Compound Interest	Original amount x multiplier^{time} For example: To calculate interest on £45,000 over 3 years at 3.2%. £45000 x 1.032^3 = £49459.71
Simple Interest	Interest is paid out each period instead of being added to the balance Total Interest earnt = original amount x multiplier x time For example: To calculate simple interest on £45,000 over 3 years at 3.2%. Total interest earnt = £45,000 x 0.032 x 3 = £4320.00
Key units of measurement	**Time** 1 hour = 60 minutes 1 minutes = 60 seconds 1 hour = 3600 seconds **Length** 1 cm = 10mm 1m = 100cm 1km = 1000m **Mass** 1kg = 1000g 1 tonne = 1000kg **Area** $1cm^2 = 100mm^2$ $1m^2 = 10000cm^2$

Mathematics - Algebra

Key Term	Definition
Straight line graphs	Are written in the form y = mx + c Where **m** is the gradient (steepness) of the line and **c** is the y intercept (where it crosses the y axis) Parallel lines have equal gradients. 
Linear Graphs	The graph of y = 3 is a horizontal line crossing the y axis at (0,3) The graph of x = 3 is a vertical line crossing the x axis at (3,0) The **mid-point** of a line is exactly half way. You find the mid-point by finding half way between both the x and y coordinates.
Quadratic graph	For example $y = x^2 + 2x—8$ 
Cubic graph	For example $y = x^3 + 4x^2$ 
Reciprocal	Reciprocal. For example y = $\frac{4}{x}$ 

Key Term	Definition
Sketching a quadratic curve	The graph of a quadratic function is always u-shaped (positive x^2 coefficient) or n-shaped (negative x^2 coefficient).
Parabola	The shape made by the graph of a quadratic function.
Quadratic curve key features	
Roots	The solutions of a quadratic equation, given as values not co-ordinates.
Satisfy	To fulfil the requirements or conditions of
Simultaneous equations	Two or more algebraic equations with the same unknown variables that can be solved to find solutions that satisfy both equations.
Point of intersection	Where two lines cross over one another.
Solving simultaneous equations graphically	Using the graphs of two or more equations to find the solutions for the variables. The solutions can be determined by finding the point of intersection of the graphs and reading the *x* and *y* values.

Mathematics - Algebra

Key Term	Definition
Algebra	A branch of mathematics in which letters are used to represent numbers.
Coefficient	A constant value which multiplies a variable. Always written before the variable.
Constant	A fixed number on its own.
Equation	A mathematical statement in which two expressions with equal values are connected by an equals sign.
Expand	To remove the brackets from an expression by multiplying terms and simplifying as necessary.
Expression	An algebraic expression is made up of two or more terms combined by operators.
Factorise	To rewrite an expression in brackets. Completed by finding the highest common factor, placing this outside the bracket and dividing by this to get an expression for inside the bracket.
Formula	An equation that shows the relationship between two or more variables.
Identity	An equation that is true for all values.
Linear	Contain only variables with a power of one, such as *x*
Simplify	To write an expression or fraction in a more concise form using the rules of algebra.
Solution	The value or values that can be substituted for the unknown in an equation to make it true.
Solve	To find the solution(s) to an equation by isolating the unknown.
Subject	The dependant variable in a formula or equation, identifiable by being on its own on one side of the equals sign.
Substitution	The process by which symbols are replaced by numbers in order to evaluate an expression or formula.
Term	A constant, variable or coefficient and one or more variables.
Unknown	A value that is not known in an equation.
Variable	A symbol, often a letter, whose value can vary.

Key Term	Definition
Inverse operation	The opposite operation that is being performed on a variable.
Term	A constant, variable or coefficient and one or more variables.
Inequality	

Inequality Symbols	
$\neq$	not equal
$<$	less than
$\leq$	less than or equal to
$>$	greater than
$\geq$	greater than or equal to

Inequalities		Examples
Inequalities on a Number Line	Inequalities can be shown on a number line. Open circles are used for numbers that are less than or greater than $(< \text{ or } >)$ Closed circles are used for numbers that are less than or equal or greater than or equal $(\leq \text{ or } \geq)$	 $x \geq 0$  $x < 2$  $-5 \leq x < 4$

Key Term	Definition
Direct Proportion	If two quantities are in direct proportion, as one increases, the other increases by the same percentage.
Inverse Proportion	If two quantities are inversely proportional, as one increases, the other decreases by the same percentage.
Scale Factor	A number by which a shape is enlarged
Ratio	Comparing the size of one part to another. The ratio of a to b is written as a:b.
Equivalent ratio	Equivalent ratios are found by multiplying/dividing all parts of the ratio by the same value.

Mathematics - Algebra

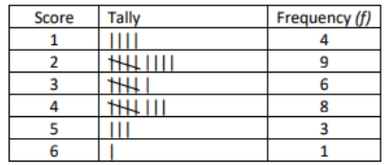
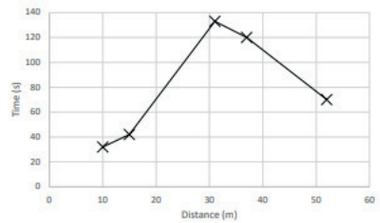
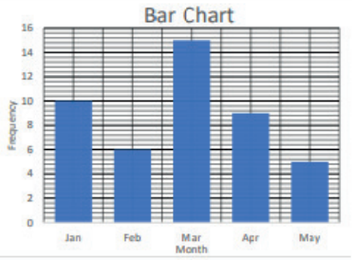
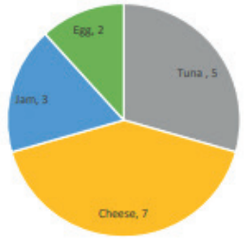
Key term	Definition
Laws of indices	The rules for simplifying expressions involving powers of the same base number.
Multiplication Law:	$a^n \times a^m = a^{n+m}$
Division Law:	$a^n \div a^m = a^{n-m}$
Bracket Law:	$(a^n)^m = a^{nm}$
Power of 0:	$a^0 = 1$

Key term	Definition
Linear Sequence	A number pattern with a common difference.
Term	Each value in a sequence is called a term.
Term-to-term rule	A rule which allows you to find the next term in a sequence if you know the previous term.
nth term	A rule which allows you to calculate the term that is in the nth position of the sequence. Also known as the 'position-to-term' rule. n refers to the position of a term in a sequence.

Key term	Definition
Quadratic expression	A quadratic expression is of the form $\boldsymbol{ax^2 + bx + c}$, where a, b and c are numbers and $\boldsymbol{a \neq 0}$.
Factorising with double brackets	Quadratic expressions of the form $\boldsymbol{ax^2 + bx + c}$ are factorised using double brackets. E.g. $x^2 + 6x + 8 = (x + 4)(x + 2)$
Difference of two squares	The factorisation of an algebraic expression including two square terms, with one being subtracted from the other. E.g. $x^2 - 9 = (x + 3)(x - 3)$

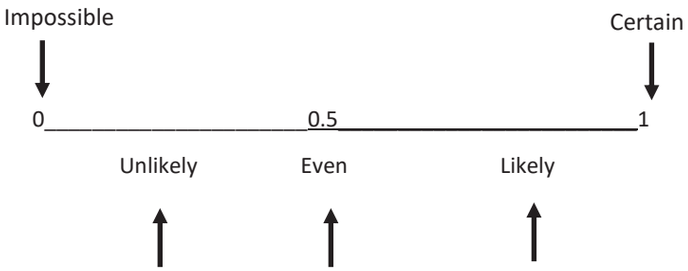
Mathematics - Probability & Statistics

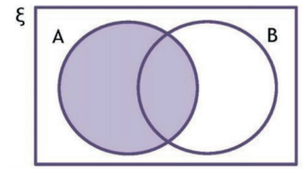
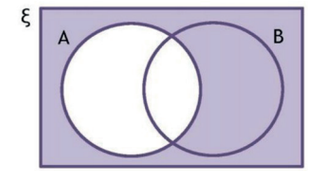
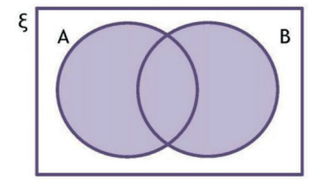
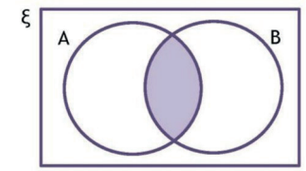
Key term	Definition
Average	A single number or value that is used to represent a set of data. There are three main averages we focus on: mode, median and mean.
Data	Information in the form of facts and numbers.
Data point	A single item from a data set.
Data Set	A collection of data which all refers to the same category or topic.
Intersection	The numbers of elements that belong to both/all sets. In a Venn Diagram, this is where the circles overlap.
Mean	The sum of all the values in a data set, divided by the number of values in the data set.
Median	The middle value in an ordered list.
Mode	The most common value. It is possible to have more than one mode, or no mode.
Qualitative Data	A type of data that can be grouped under named categories, often described as data that can be described.
Quantitative Data	Types of data that can be represented numerically, often described as data that can be counted.
Range	The difference between the smallest and largest value.
Two-way Table	A diagram in which frequencies for two categories may be organised; one variable in rows and the other in columns.
Venn Diagram	A diagram in which circles are used to illustrate the relationships between different sets. Must have a box around it.

Key Term	Definition	Examples
Frequency Table	A table showing how often something occurs. Can include tally charts.	 Score | Tally | Frequency *(f)* 1 | |||| | 4 2 | 𝍸 |||| | 9 3 | 𝍸 | | 6 4 | 𝍸 ||| | 8 5 | ||| | 3 6 | | | 1
Line Graph	Uses lines to join points on a graph to represent a data set.	
Bar Chart	A way of displaying data using horizontal or vertical bars which are the same width and have gaps between them.	
Pie Chart	A method of displaying proportional information by dividing a circle up into different-sized sectors.	

Key Term	Definition
Frequency	How many times something occurs.
Continuous data	Data that can take any value. E.g. height, weight, length.
Discrete data	Data that can only take certain values. E.g. shoe size.

Mathematics - Probability & Statistics

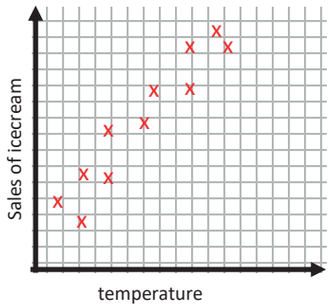
Key term	Definition
Frequency polygon	A graph in which the frequency of a group is plotted against the midpoint of the group, with the points connected using straight line segments.
Probability	The likelihood of an event or outcome happening, a maximum probability is 1 (100%).
Probability Scale	
Independent Events	Events where the outcome of the first event **does not** affect the probability of the second event.
Expected Outcome	Expected outcome = probability x number of trials
Tree diagram	A diagram which represents a sequence of events. The diagram has probabilities on the branches which can be used to calculate the probabilities of outcomes. The probability of a single outcome can be found by multiplying the probabilities along the branches. The probability of more than one outcome can be found by adding the probabilities of single outcomes together.

Key term	Definition
Venn diagram	A diagram that uses overlapping circles to illustrate the relationships between two or more sets of data.
Intersection	The intersection of a Venn diagram is where two or more circles overlap.
Universal set	A set that contains all of the objects or elements being represented.
Set notation	Set notation is used to list numbers, objects, outcomes or probabilities from Venn diagrams. A – all elements **in A**  A' - all elements **not in A**  A ∪ B – all the elements **in A or B or both**  A ∩ B – all the elements **in both A and B** 

Mathematics - Probability & Statistics

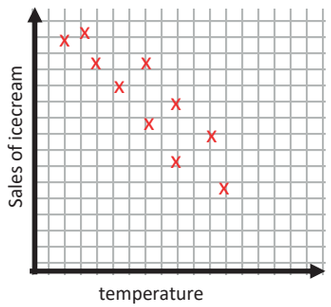
Key Term	Definition
Primary Data	Data that you have collected.
Secondary Data	Data that someone else has collected.
Bar Chart	Shows discrete data, there are gaps between the bars.
Pictogram	Shows discrete data, pictures are used to show frequencies, must have a key.
Time Series Graphs	Frequencies plotted over time. Points are joined with straight lines.
The Product Rule	Used to find the intersection of 2 or more probabilities, found by multiplying probabilities together.
Scatter Graphs	A graph of plotted points that compares two sets of information.
Describe relationship (scatter graphs)	Being specific about the trend seen with the variables involved e.g. as the temperature increases the sales of ice-cream also increases.

Key Term	Definition
Line of Best Fit	A line on your scatter graph that best describes the relationship between the two sets of data. • A straight line. • Goes roughly through the middle of the points on your scatter graph. • There should be an equal number of points above and below your line.
Correlation	Describes how two variables are linked.
Positive Correlation	As one variable increases so does the other variable.
Negative Correlation	As one variable increases the other decreases.
No Correlation	No relationship between the two variables.
Trend	A pattern in a set of results.
Outliers	A point that is far from the line of best fit.



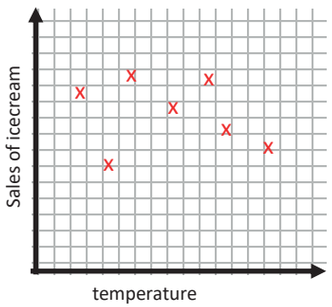
Upward trend in the position of the points

Positive Correlation



Downward trend in the position of the points

Negative Correlation



No particular trend in the position of the points

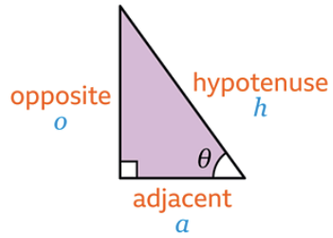
No Correlation

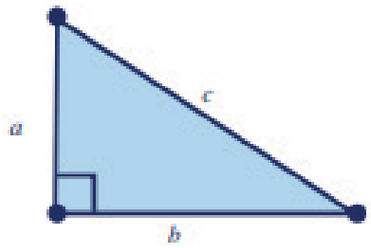
Mathematics - Geometry & Measure

Key term	Definition
Right-angled triangle	A triangle that contains a 90^0 angle.
Hypotenuse	The longest side – opposite the right angle.
Opposite (length)	The length found opposite to the identified angle in a right-angled triangle.
Adjacent	The length found next to the identified angle in a right-angled triangle.
Trigonometry (right-angled triangles)	The relationship between side lengths and angles in right-angled triangles.
SOHCAHTOA	Method used to find missing lengths and angles in right-angled triangles.
SOHCAHTOA rules (Missing lengths)	SOH $\text{Sin}\,\theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$ CAH $\text{Cos}\,\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$ TOA $\text{Tan}\,\theta = \frac{\text{Opposite}}{\text{Adjacent}}$
SOHCAHTOA rules (Missing angles)	$\theta = sin^{-1}\left(\frac{O}{H}\right)$ $\theta = cos^{-1}\left(\frac{A}{H}\right)$ $\theta = tan^{-1}\left(\frac{O}{A}\right)$

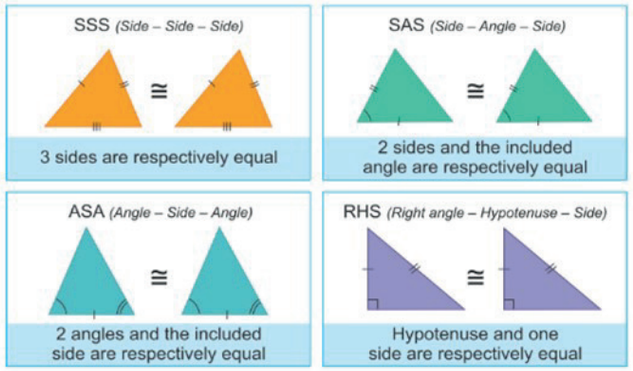
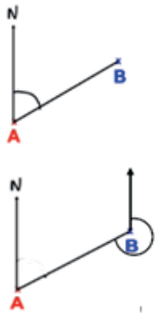
Key term	Definition
Exact trigonometry values	Values for specific angles that are expected to be known for a non-calculator exam.

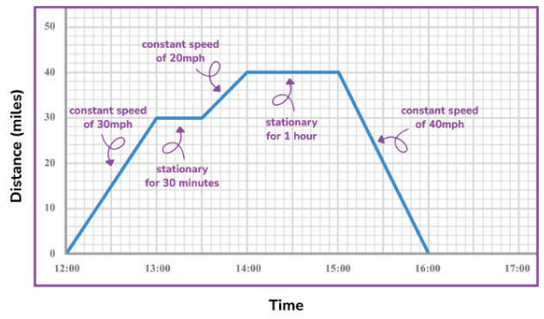
	0°	30°	45°	60°	90°
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	–

Labelled right-angled triangle	

Key term	Definition
Right angled triangle	A triangle that contains a 90^0 angle.
Hypotenuse	The longest side – opposite the right angle.
Pythagoras' theorem	For any right-angled triangle, the area of the square of the longer length (the hypotenuse) is equal to the area of the squares of the shorter lengths added together. $c^2 = a^2 + b^2$ $a^2 = c^2 - b^2$ $b^2 = c^2 - a^2$ 

Mathematics - Geometry & Measure

Key term	Definition
Congruency	To have the exact same shape and size i.e. be identical
Congruent triangles	Two or more triangles are congruent if all three corresponding sides are equal in length and all three corresponding angles are equal in measure.
Conditions of congruency (triangles)	
Similar shapes	Shapes that are enlargements of one another using a scale factor.
Bearings	• Measure from the North • Measured in a clockwise direction • Written using 3 digits Bearing of B **from A** (start at A) Bearing of A **from B** (start at B) 

Key term	Definition
Compound measures	Types of measure that involve two or more different units e.g. speed, density, pressure.
Speed, Distance, Time	$Speed = \frac{Distance}{Time}$ $Distance = Speed\ X\ Time$ $Time = \frac{Distance}{Speed}$
Density, Mass, Volume	$Density = \frac{Mass}{Volume}$ $Mass = Density\ X\ Volume$ $Volume = \frac{Mass}{Density}$
Pressure, Force, Area	$Pressure = \frac{Force}{Area}$ $Force = Pressure\ X\ Area$ $Area = \frac{Force}{Pressure}$
Distance-Time graphs	Graphs that depict a journey taken over time against the distance travelled. 

Mathematics - Geometry & Measure

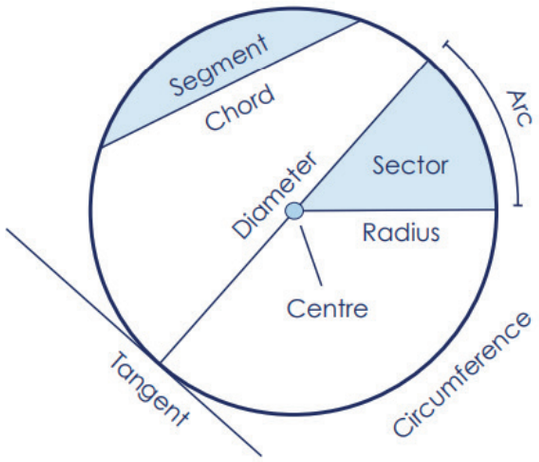
Key Term	Definition
Acute Angle	An angle less than 90°.
Adjacent	Next to, or near.
Area	A measure of the space inside a closed two-dimensional shape.
Axes	The straight lines on a graph used to define the position of a point. The x-axis goes across (horizontal). The y-axis goes up (vertical).
Centimetre (cm)	A metric unit of length equal to one hundredth of a metre. 100cm = 1m
Compound Shape	A shape made up of two or more geometric shapes.
Coordinate	An ordered pair of points that show an exact position on a set of axes. Written (x, y).
Exterior Angle	An angle between one side of a shape and a line extending from an adjacent side.
Irregular Polygon	A polygon with unequal length sides and angles.
Kilometre (km)	A metric unit of length equal to one thousand metres. 1km = 1000m
Line of Symmetry	A line that can divide a shape into identical halves, which are mirror images of each other.
Metre (m)	The base unit of length in the international system of units.
Midpoint	The point exactly halfway between two points.
Millimetre (mm)	A metric unit of length equal to one thousandth of a metre. 10mm = 1cm
Obtuse Angle	An angle measuring between 90° and 180°.
Order of Rotation	The number of times that a shape appears identical during a turn of 360°.
Origin	The point with coordinate (0, 0).
Parallel	Two lines that will never cross and that will remain the same distance apart.
Perpendicular	Two lines that meet at an angle of 90°.

Key term	Definition
Perimeter	The total distance around the outside of a closed two-dimensional shape.
Polygon	A closed two-dimensional shape made up of all straight edges.
Protractor	An instrument used to measure angles.
Quadrilateral	A two-dimensional shape with four sides.
Reflex Angle	An angle measuring between 180° and 360°.
Regular Polygon	A polygon with sides of equal length and angles of equal size.
Right-angle	A 90° angle.
Rotational Symmetry	A symmetry in which a shape may be rotated about a central point and appears identical after a turn of less than 360°.
Square Units	Units used to measure area.
Triangle	A two-dimensional shape with three sides.
Vertex	A point on a polygon at which two lines meet to form an angle.

Key term	Definition
Angles around a point	Angles around a point sum to 360°.
Angles on a straight line	Angles on a point on a straight line sum to 180°.
Angles in a triangle	Angles in a triangle sum to 180°.
Angles in a quadrilateral	Angles in a quadrilateral sum to 360°.

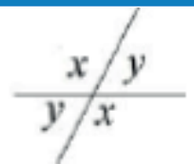
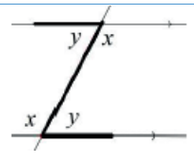
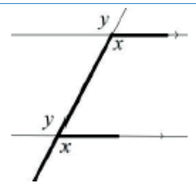
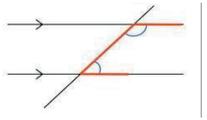
Key terms	Definition
Area of a rectangle or square	Length x width
Area of a parallelogram	Length x perpendicular height
Area of a triangle	$\frac{\text{Base x perpendicular height}}{2}$
Area of a trapezium	$\frac{a + b}{2}$ x h, where a and b are parallel sides.

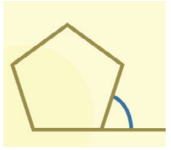
Mathematics - Geometry & Measure

Key Term	Definition
Parts of a circle	
Arc	A section of the circumference.
Sector	The area bounded by two radii and an arc.
Chord	A straight line joining any two parts of the circumference.
Circumference	The distance around the outside of the circle.
Diameter	A straight line going from one end of the circle to another passing through the centre.
Segment	The area bound by the circumference and a chord.
Tangent	A straight line that touches the circumference at a single point.
Pi (π)	The ratio of a circle's circumference to its diameter.

Key Term	Definition
Circumference	The perimeter of the circle. C = πd
Radius	$diameter \div 2$
Diameter	$2 \times radius$
Perimeter of semi-circle	$p = \frac{\pi d}{2} + d$
Perimeter of quarter circle	$p = \frac{\pi d}{4} 2r$
Perimeter of three-quarter circle	$p = \frac{3}{4}\pi d + 2r$
Area of a circle	$A = \pi r^2$
Area of a semi-circle	$A = \frac{\pi r^2}{2}$
Area of a quarter-circle	$A = \frac{\pi r^2}{4}$
Area of three-quarter circle	$A = \frac{3\pi r^2}{4}$
Sector	**Sectors** are sections of a circle that are created by two radii and an arc.
Arc	A portion of the circumference.
Area of sector	$Area\ of\ a\ sector = \frac{\theta}{360}\pi r^2$
Length of arc	$length\ of\ arc = \frac{\theta}{360}\pi d$

Mathematics - Geometry & Measure

Key Term	Definition
Vertically Opposite Angles	Vertically opposite angles are equal. 
Alternate Angles	Alternate angles are equal. 
Corresponding Angles	Corresponding angles are equal. 
Co-Interior Angles	Co-Interior angles add up to 180°. 

Key Term	Definition
Sum of all angles in Polygons	n is the number of sides. $(n-2)\times 180$
Internal angle in regular polygon	$\frac{(n-2)\times 180}{n}$
External angle	The angle between a side of a polygon and an extended adjacent side.
Exterior angle regular polygon	 $\frac{360}{n}$

Key term	Definition
Translation	Translate means to move a shape. The shape does not change size or orientation.
Rotation	The size does not change, but the shape is turned around a point.
Reflection	The size does not change, but the shape is 'flipped' like in a mirror. Line $x=?$ is a vertical mirror line. Line $y=?$ is a horizontal mirror line. Line $y=x$ is a diagonal mirror line.
Enlargement	The shape will get bigger or smaller in relation to a centre of enlargement. Multiply each side by the scale factor.
Centre	Used in rotations and enlargements as the centre for the transformation.

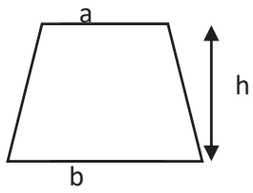
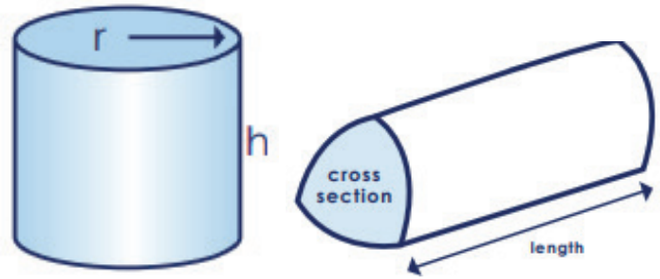
Key term	Definition
Column vector	A vector whose components are listed vertically in a single column. The top number describes a movement to the right (positive value) or left (negative value) The bottom number describes a movement up (positive value) or down (negative value)

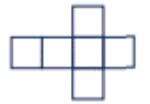
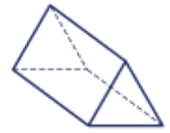
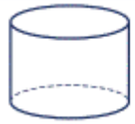
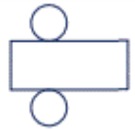
Mathematics - Geometry & Measure

Key term	Definition
Properties of Solids	Faces = flat surfaces Edges = sides/lengths where faces meet Vertices = corners where edges meet
Plan	The view from directly above a 3D shape. You will see a 2D shape.
Side	The view directly to the side of a 3D shape. You will see a 2D shape.
Elevation	The view from the front and side of a 3D shape. You will see a 2D shape.
Sketch	To roughly draw a shape. Always label the sides and write any measurements on.

Key term	Definition
Volume	The amount of 'space' a solid object occupies. Units: mm^3, cm^3, m^3 etc.
Volume of a Cube/Cuboid	$\boldsymbol{V = Length \times Width \times Height}$ You can also use the Volume of a Prism formula for a cube/cuboid. $\boldsymbol{V = L \times W \times H}$
Surface Area	The total area of all the faces of a 3D shape.
Surface area of a cylinder	$A = 2\pi rh + 2\pi r^2$
Volume of a Prism	$\boldsymbol{V = Area\ of\ Cross\ Section \times Length}$

Mathematics - Geometry & Measure

Key Term	Definition	
Area of a trapezium	$\frac{a+b}{2} \times h$	
Face	A face is a single flat surface.	
Edge	An edge is a line segment between two faces.	
Volume	The amount of 'space' a solid object occupies. Units: ***mm^3, cm^3, m^3***, etc. The volume of a prism ***V = Area of Cross Section x Length*** The volume of a *cylinder* = ***$\pi r^2 h$*** 	
Volume of a cube / cuboid	Length x width x height	
Prism	A 3D shape with a constant cross-section.	
Cross-section	The 2D shape that is consistent throughout the prism.	

Key Term	Definition	Shape	Net
Cube	6 square faces 12 edges 8 vertices		
Cuboid	6 rectangular faces 12 edges 8 vertices		
Triangular Prism	5 faces 9 edges 6 vertices		
Cylinder	3 faces 2 edges 0 vertices		
Square-based Pyramid	5 faces 8 edges 5 vertices		
Triangular-based Pyramid	4 faces 6 edges 4 vertices		
Cone	2 faces 1 edge 1 vertex		
Sphere	1 face 0 edges 0 vertices Half a sphere is known as a hemisphere.		

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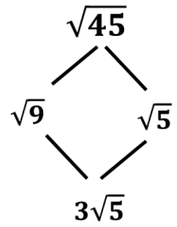
Mathematics

GCSE Higher

Number Ratio & Proportion - Higher

Key term	Definition
Direct proportion	Two quantities are in direct proportion if they increase or decrease at the same rate, causing the ratio of the two values to be equal to a constant value.
Inverse/indirect proportion	Two quantities are in indirect proportion if one decreases as the other increases, for example speed and time.
Constant of proportionality	The constant value, often written **k**, relating quantities that are either directly or indirectly proportional.
Direct Proportion Formula	$y \propto x$ $y = kx$ for a constant k
Inverse Proportion Formula	$y \propto 1/x$ $y = k/x$ for a constant k

Key term	Definition
Surd	An irrational number, depicted by the root of an integer.
Simplify surd	To simplify a surd, find the highest square number that divides into that number. 
Manipulating surds	Calculations with surds can be carried out using the following: $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$ $\sqrt{a} \times \sqrt{a} = a$ $a\sqrt{b} \times c\sqrt{d} = ac\sqrt{bd}$
Rationalising surds	Converting the denominator of a fraction from an irrational number to a rational number using equivalent fractions. E.g. $\frac{8}{\sqrt{2}} = \frac{8 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2}$ $\frac{4}{(2+\sqrt{3})} = \frac{4(2-\sqrt{3})}{(2+\sqrt{3})(2-\sqrt{3})} = 8 - \sqrt{3}$

Number Ratio & Proportion - Higher

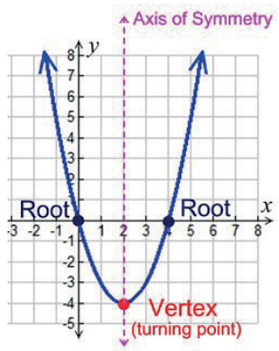
Key term	Definition
Recurring decimal	A decimal number in which a figure or group of figures is repeated indefinitely. E.g. 0.666... or 1.858585… Represented by dots over the recurring numbers e.g. 0.111111111…. $0.\dot{1}$ 0.4343434343 …. $0.\dot{4}\dot{3}$ 0.765765765 …. $0.\dot{7}6\dot{5}$ 0.237823782378237… $0.\dot{2}378\dot{2}$

Key term	Definition
Upper and lower bounds (Limits of accuracy)	Upper and lower bounds are the maximum and minimum values a number could have been before it was rounded, often written using error intervals. E.g A length (l) of 6.4cm, rounded to one decimal place would have an error interval of 6.35 cm ≤ *l* < *6.45 cm*
Calculations with bounds	Calculations involving bounds use these values within calculations. Which values to use in which calculation is summarised in the table below:

Calculation with *x* and *y*	Upper bound	Lower bound
Addition ($x + y$)	$x_{upper} + y_{upper}$	$x_{lower} + y_{lower}$
Subtraction ($x - y$)	$x_{upper} - y_{lower}$	$x_{lower} - y_{upper}$
Multiplication ($x \times y$)	$x_{upper} \times y_{upper}$	$x_{upper} \times y_{upper}$
Division ($\frac{x}{y}$)	$\frac{x_{upper}}{y_{lower}}$	$\frac{x_{lower}}{y_{upper}}$

Suitable degree of accuracy	Finding a value to a **suitable degree of accuracy** involves finding the **upper** and **lower** bound of your calculation and finding what they **both** round to, this needs to be as accurate of a number as possible.

Algebra - Higher

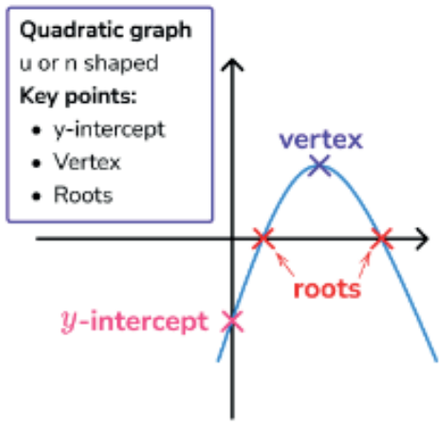
Key term	Definition
General quadratic equation	$ax^2 + bx + c = 0$
Quadratic formula	A formula that gives solutions of the general quadratic equation: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Completing the square	Quadratic expression factorised by completing the square and writing in the form: $(x + a)^2 + b$ E.g. $x^2 + 4x + 7 = (x + 2)^2 + 3$
Turning point	The point where the gradient of a function changes from positive to negative or negative to positive. The turning point can be found from completed square form using: **(- a, b).** 

Key term	Definition
Iteration	Finding approximate solutions to equations using iterative methods.
Iterative formula	Tells us how to find the next solution, labelled as $x_n + 1$, given the current solution, which is labelled as x_n .
Change of sign	If there is **a change of 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.

Key term	Definition
Algebraic proof	Even numbers: 2n, 2n+2, 2n+4,… Odd numbers: 2n+1, 2n+3, 2n+5,… **Sum:** add **Product:** multiply **Difference:** subtract **Show it's a multiple:** factorise **Show it's even:** show it's a multiple of 2
Even numbers	2n, 2n+2, 2n+4 …
Odd numbers	2n –1, 2n + 1, 2n + 3 …
Consecutive	Describing things which follow each other in a particular order.
Sum	The result of an addition.
Product	The result of a multiplication.
Difference	The result of a subtraction.
Show it's a multiple	Factorise
Show it's even	Show it's a multiple of 2 by factorising

Key term	Definition
Laws of indices	The rules for simplifying expressions involving powers of the same base number.
Multiplication Law:	$a^n \times a^m = a^{n+m}$
Division Law:	$a^n \div a^m = a^{n-m}$
Bracket Law:	$(a^n)m = a^{nm}$
Power of 0:	$a^0 = 1$
Negative Indices:	$a^{-n} = \frac{1}{a^n}$
Fractional Indices:	$a^{\frac{n}{m}} = \sqrt[m]{a^n}$

Algebra - Higher

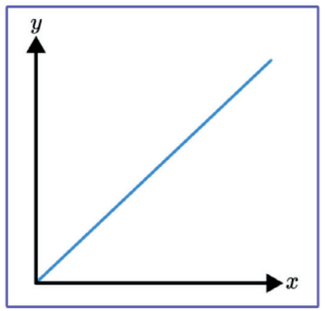
Key term	Definition
Equation of a circle	Equations of circles are given in the form $x^2 + y^2 = r^2$
Centre for a circle	The centre of the circle for equations in this form is always (0,0).
Gradient of the radius	The gradient of the radius is the negative reciprocal of the gradient of a tangent to a point on the circumference i.e. they are perpendicular.
Gradient of a curve	A tangent is drawn to the curve at a given point, the gradient of the tangent will be an estimation of the gradient of the curve at this point.
Coefficient	A constant value which multiplies a variable. Always written before the variable.
Sketching a quadratic curve	The graph of a quadratic function is always u-shaped (positive x^2 coefficient) or n-shaped (negative x^2 coefficient).
Parabola	The shape made by the graph of a quadratic function.
Quadratic curve key features	
Roots	The solutions of a quadratic equation, given as values not co-ordinates.

Key term	Definition
Algebraic functions	Functions in algebra are described using function notation. The ***f*** in ***f(x)*** is known as the function being applied to a variable ***x.*** Other letters such as ***g*** and ***h*** are also commonly used.
Substituting into algebraic functions	Substitution of values into a variable to find an output or using an output to solve an equation to find an initial value.
Composite functions	Two or more functions that are combined together. To substitute into a compositive function, the value given is first substituted into the function closest to the value and the result of this is the substituted into the next function back until all functions have been used. E.g. If $f(x) = 3x$ and $g(x) = x^2 + 1$, find $fg(2)$. $g(2) = (2)^2 + 1$ $g(2) = 5$ $f(5) = 3(5)$ $f(5) = 15$, so $fg(2) = 15$.
Inverse functions	**Inverse functions** are the 'reverse' of the original function. Inverse functions use the notation $f^{-1}(x)$. E.g. If $f(x) = 3x + 7$, find $f^{-1}(x)$. $y = 3x + 7$ $y - 7 = 3x$ $\frac{y-7}{3} = x$ $f^{-1}(x) = \frac{x-7}{3}$

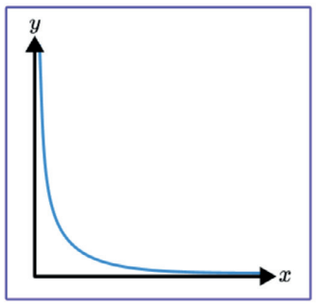
Algebra - Higher

Key Term	Definition
Cubic	An equation with the highest power of x is x^3
Reciprocal	An equation where x is in the denominator.
Numerator	The top number in a fraction.
Denominator	The bottom number in a fraction.
Direct Proportion	Two quantities are in direct proportion if they increase or decrease at the same rate, causing the ratio of the two values to be equal to a constant value.
Inverse/Indirect Proportion	Two quantities are in indirect proportion if one decreases as the other increases, for example speed and time.

Direct proportion: Graphs which indicate a directly proportional relationship between *x* and *y*. Always intersect at the origin.
For example, $y = x$

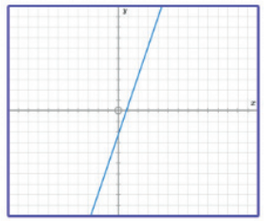


Indirect proportion: A reciprocal graph which is found in the first quadrant. Does not touch any axis.

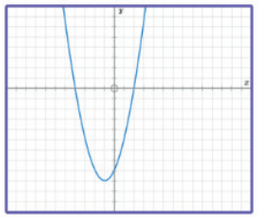


Graphs that need to be recognised

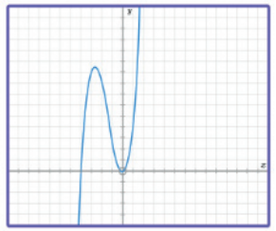
Linear: For example y = 3x—2



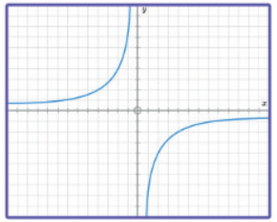
Quadratic: For example $y = x^2 + 2x—8$



Cubic: For example $y = x^3 + 4x^2$

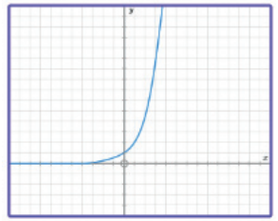


Reciprocal: For example $y = \frac{4}{x}$

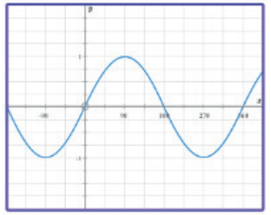


Graphs that need to be recognised

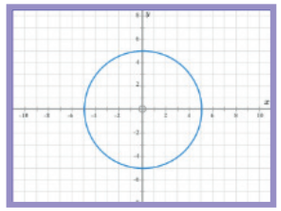
Exponential: For example $y = 2^x$



Trigonometric: For example y = sin(x)

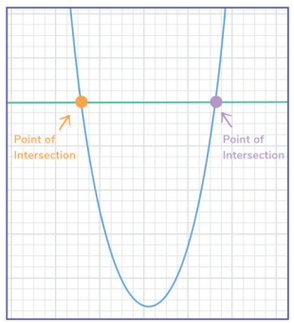


Circle: For example, $x^2 + y^2 = 25$



Algebra - Higher

Key term	Definition
Quadratic sequences	Ordered sets of numbers that follow a rule based on the sequence: n^2 = 1, 4, 9, 16, 25, 36…
Quadratic sequence nth term	The *n*th term of a quadratic sequence will always contain an n^2 term. $an^2 + bn + c$
Finding the nth term of a quadratic sequence	n 1 2 3 Nth term rule: $= a + b + c$ $= 4a + 2b + c$ $= 9a + 3b + c$ 1st difference: $3a + b$ $5a + b$ 2nd difference: $2a$

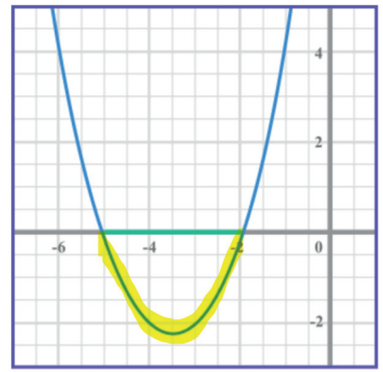
Key term	Definition
Quadratic simultaneous equations	Quadratic simultaneous equations are two or more equations that share variables that are raised to powers up to a maximum of 2 e.g. x^2 and y^2.
Quadratic simultaneous equations solutions	Quadratic simultaneous equations will have multiple solutions for *x* and *y*, due to the way the graphs intersect when drawn. A visual representation of this is below:  The points of intersection show a visual representation of the solutions. Due to the multiple points of intersection, there will be 2 solutions for *x* and 2 solutions for *y*.

Key term	Definition
Quadratic inequalities	Can be solved to give a range of solutions that work for the inequality.
Range of solutions	We determine the range of solutions by sketching the graph of the quadratic equation that can be seen in the equation. The range of solutions is determined by the inequality symbol used in the question, determining whether the range we are interested in is above or below the *x* axis.

E.g.1

Solve $x^2 + 7x + 10 < 0.$

$-5 < x < -2.$

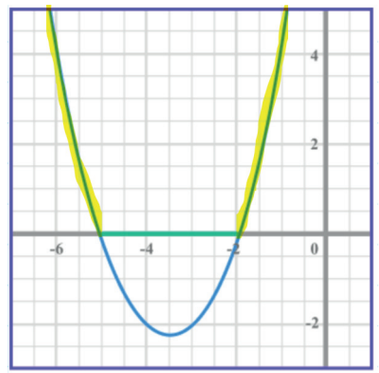


E.g. 2

Solve $x^2 + 7x + 10 \geq 0$

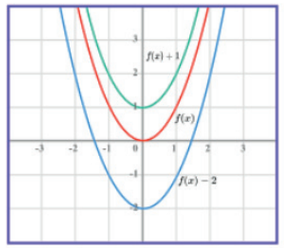
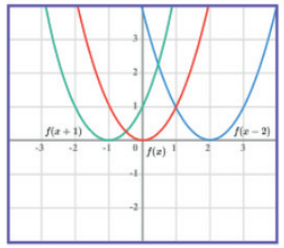
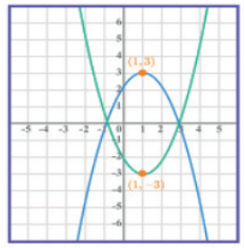
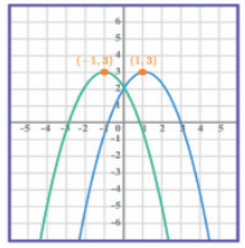
$x \leq -5$

$x \geq -2$



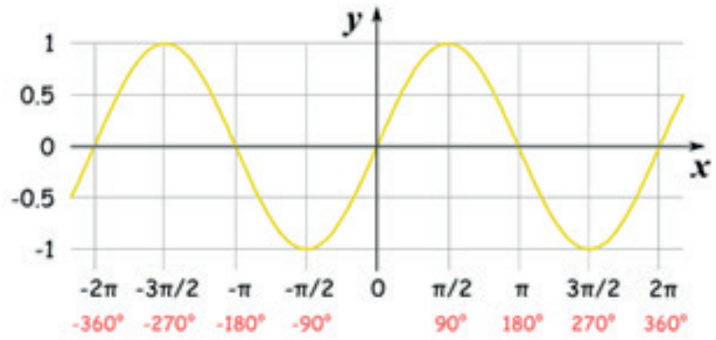
Key term	Definition
Polynomial expression	A **polynomial** expression consists of two or more algebraic terms.
Expanding triple brackets	Expanding triple brackets starts with the expansion and simplification of two of the brackets. The resulting expression is then multiplied by the two terms found in the third bracket separately, and all terms simplified to a final expression.

Geometry & Measures - Higher

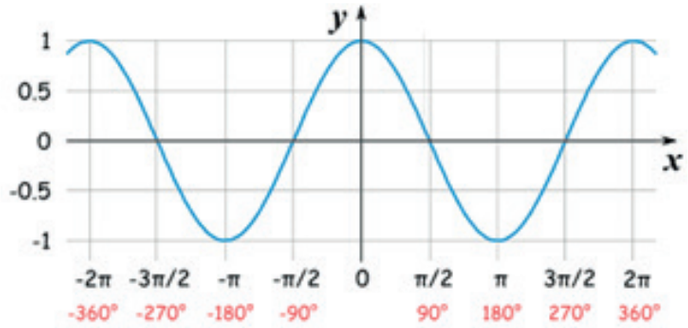
Key term	Definition
Graph transformations	Involve performing transformations, such as translations and reflections, on the graph of a function.
Translations	 $f(x)+a$ Translation by vector $\begin{pmatrix}0\\a\end{pmatrix}$ ↑ Add a to the y coordinate  $f(x-a)$ Translation by vector $\begin{pmatrix}a\\0\end{pmatrix}$ → Add a to the x coordinate
Reflections	 $-f(x)$ Reflection in the x-axis ↕ Multiply the y coordinates by -1  $f(-x)$ Reflection in the y-axis ↔ Multiply the x coordinates by -1

Trigonometric graphs

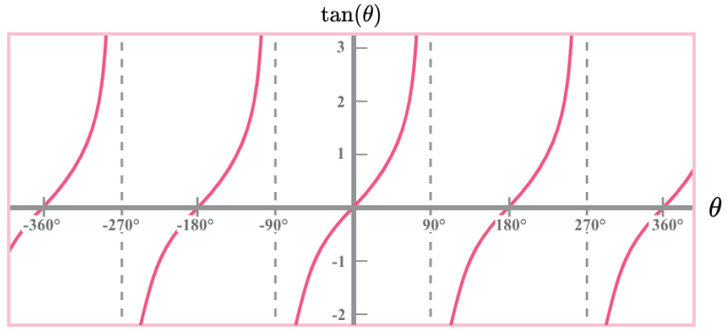
Sine Curve



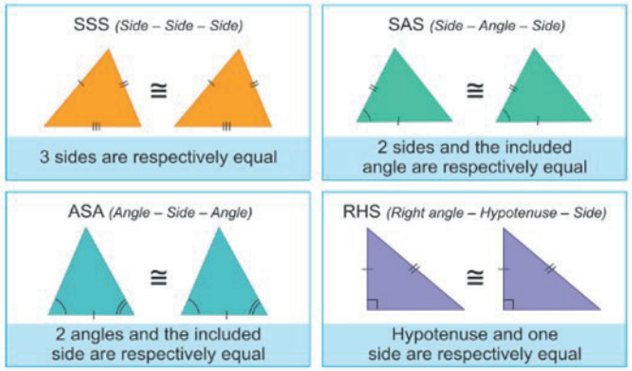
Cosine Curve



Tangent curve

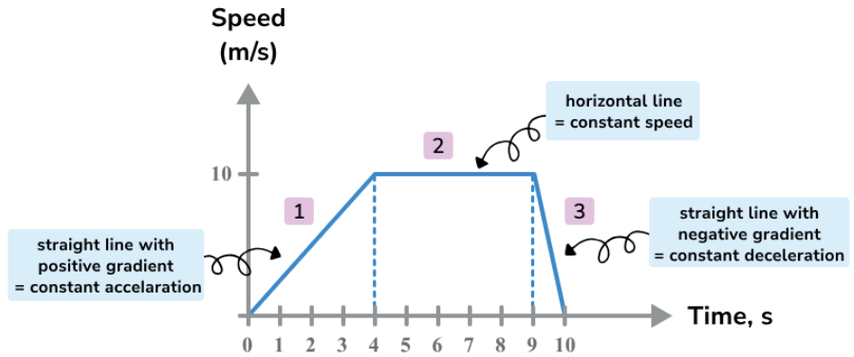


Geometry & Measures - Higher

Key term	Definition
Congruent	Exactly equal in shape and size.
Congruent triangles	Two or more triangles that are identical to one another in relation to side lengths and angle sizes.
Conditions of congruency	
Vectors	$\begin{pmatrix} a \\ b \end{pmatrix}$ Operations with vectors $\begin{pmatrix} 2 \\ 6 \end{pmatrix} + \begin{pmatrix} 7 \\ -3 \end{pmatrix} = \begin{pmatrix} 9 \\ 3 \end{pmatrix}$ If $b = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$, then $3b = \begin{pmatrix} 12 \\ -6 \end{pmatrix}$

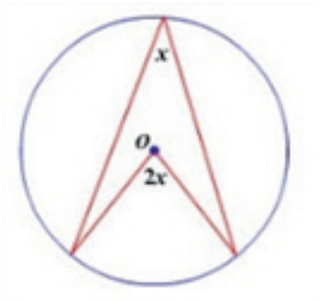
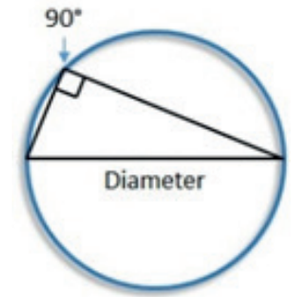
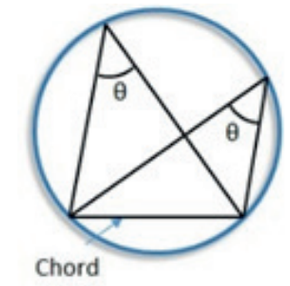
Key Term	Definition
Surface area of a cylinder	Curved surface area =2πrh Area of circle =πr^2
Surface area of a cone	$curved\ surface\ area = \pi rl$
Surface area if a sphere	$Surface\ area = 4\pi r^2$
Surface area of a prism (including cube and cuboid)	Calculate the area of all faces and add them together.

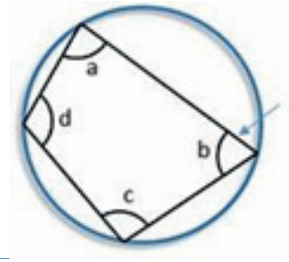
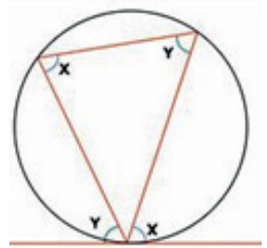
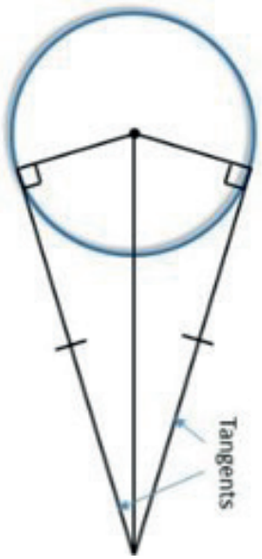
Key term	Definition
Speed-time graph	A graph that shows the motion of an object against time. They may also be referred to as velocity-time graphs. Speed is shown on the *y*-axis and time on the *x* axis.
Acceleration	the rate of change in speed over time, this is the **gradient** over a given time period on the graph. Acceleration units have the time unit squared e.g $\frac{m}{s^2}$.
Distance	Total distance is found by calculating the area under the speed-time graph.



Key Term	Definition
Volume of a cylinder	$Volume = \pi r^2 h$
Volume of a cone	$Volume = \frac{1}{3}\pi r^2 h$
Volume of a sphere	$Volume = \frac{4}{3}\pi r^3$
Volume of a pyramid	$Volume = \frac{1}{3} \times area\ of\ base \times height$
Volume of a prism	Area of cross section x length

Geometry & Measures - Higher

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.

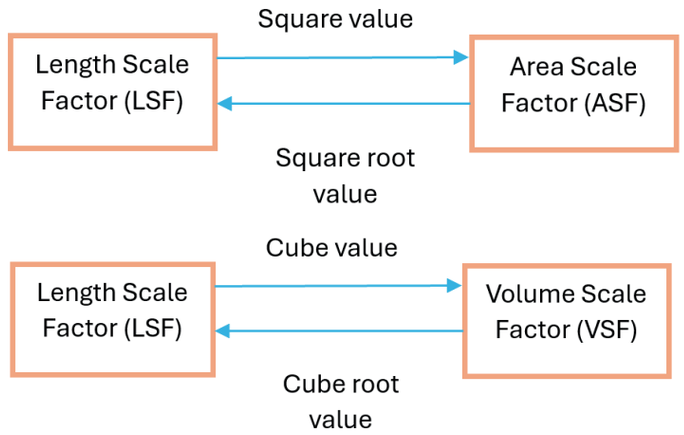
Circle Theorems	
	Opposite angles of a cyclic quadrilateral add up to 180).
	Alternate segment theorem: angles in alternate segments formed by a chord are equal.
	Tangents from an external point are equal in length. The tangent to a circle is perpendicular (90°) to the radius.

Geometry & Measures - Higher

Key term	Definition
Sine rule	Demonstrates the relationship between the size of an angle in a triangle and its opposite side. The rule involves the use of 2 of the "pairs" of angles and their opposite sides.
Sine rule (Missing length)	$\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$
Sine rule (Missing angle)	$\frac{sinA}{a} = \frac{sinB}{b} = \frac{sinC}{c}$
Cosine rule	Used to calculate a missing length or angle in a triangle if the sine rule is not possible to use.
Cosine rule (Missing length)	$a^2 = b^2 + c^2 - 2bc\ cosA$
Cosine rule (Missing angle)	$A = \cos^{-1}\left(\frac{b^2 + c^2 - a^2}{2bc}\right)$
Area of a non-right angled triangle	Used to find the area of a triangle when we do not know the base and perpendicular height, usually in a non right-angled triangle: $A = \frac{1}{2}ab\ sinC$

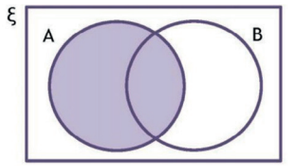
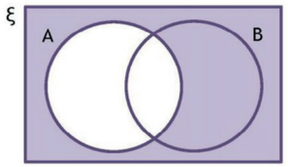
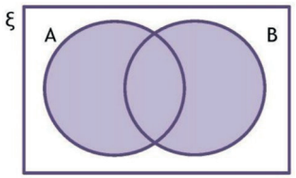
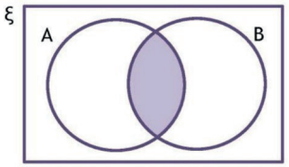
Key term	Definition
Enlargements (negative scale factor)	Enlargements by a negative scale factor produce an enlarged image on the opposite side of the centre as the original shape. The image will appear upside down and will have also changed its size.
Invariant point	A point of invariance or an invariant point is a point or points which have remained in the same place once a transformation has taken place.

Key term	Definition
Similar shapes	Shapes that are enlargements of one another using a scale factor.
Linear scale factor (LSF)	Used to convert lengths in similar shapes.
Area scale factor (ASF)	Used to convert areas in similar shapes.
Volume scale factor (VSF)	Used to convert volumes in similar shapes.
Converting scale factors	Conversions between the scale factors follow the pattern below:

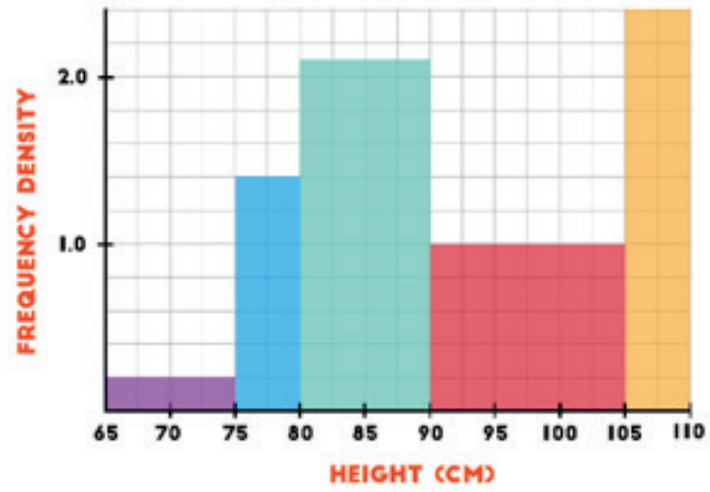


When using the correct scale factor, multiplication is used to find a missing value in the larger similar shape and division used to find a missing value in the smaller similar shape.

Probability & Statistics - Higher

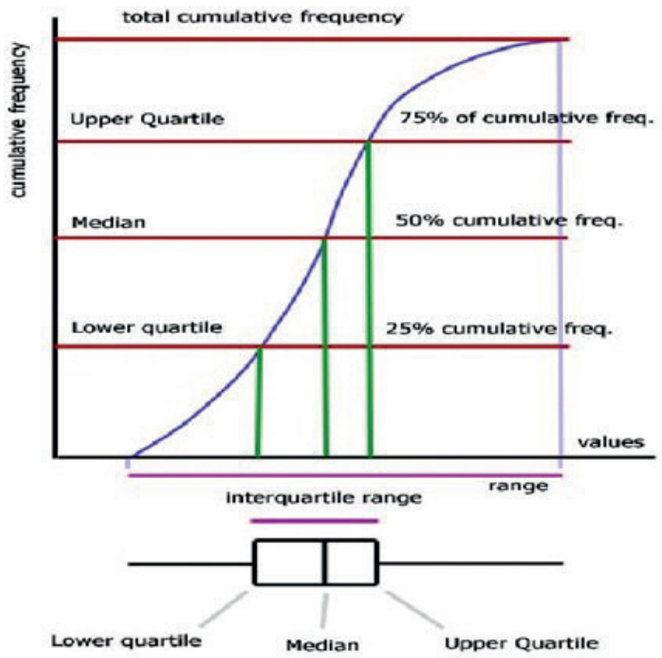
Key term	Definition
Venn diagram	A diagram that uses overlapping circles to illustrate the relationships between two or more sets of data.
Intersection	The intersection of a Venn diagram is where two or more circles overlap.
Universal set	A set that contains all of the objects or elements being represented.
Set notation	Set notation is used to list numbers, objects, outcomes or probabilities from Venn diagrams. A – all elements **in A**  A' - all elements **not in A**  A ∪ B – all the elements **in A or B or both**  A ∩ B – all the elements **in both A and B** 

Key term	Definition
Histogram	A visual representation of grouped, continuous data where bars are used whose area represent the frequencies of the groups.
Frequency density	The frequency per unit for the data in each class, found using the formula: $$Frequency\ density = \frac{frequency}{class\ width}$$ Frequency density is always found on the *y*-axis of a histogram.
Class width	The difference between the upper class limit and the lower class limit of a grouped data class.

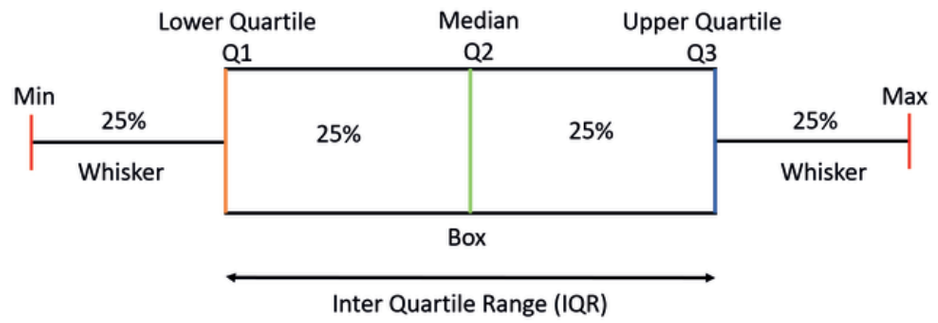


Probability & Statistics - Higher

Key term	Definition
Cumulative frequency graph	Used to represent and analyse the distribution of large grouped data sets. Data points are plotted using the upper class boundary of the data sets against cumulative frequency.
Cumulative frequency	A running total of the frequencies across a frequency distribution. Cumulative frequency is always labelled on the *y*-axis.
Median	Read off 50% through the cumulative frequency.
Upper quartile (UQ)	Read off 75% through the cumulative frequency.
Lower quartile (LQ)	Read off 25% through the cumulative frequency.



Key term	Definition
Box plot	Used to compare datasets using key averages and data pieces.
Median	The middle value in an ordered set of data.
Upper quartile (UQ)	Found 75% of the way through an ordered data set.
Lower quartile (LQ)	Found 25% of the way through an ordered data set.
Inter-quartile range (IQR)	The difference between the upper quartile and lower quartile.
Comparing box plots	Box plots can be compared using the median values and a measure of spread (the range or the IQR). Values must be compared using more than or less than terminology and must be applied to the context of the question.



Key term	Definition
Tree diagram	• A diagram which represents a sequence of events. The diagram has probabilities on the branches which can be used to calculate the probabilities of outcomes. • The probability of a single outcome can be found by multiplying the probabilities along the branches. • The probability of more than one outcome can be found by adding the probabilities of single outcomes together.
Dependent events	Events where the outcome of the first event affects the probability of the second event.
Independent events	Events where the outcome of the first event **does not** affect the probability of the second event.
Expected outcomes	How often an outcome is expected in an experiment. Can be calculated using: *Expected outcome = probability x number of trials*

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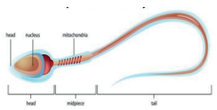
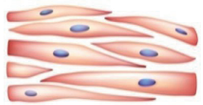
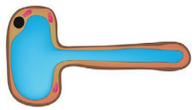
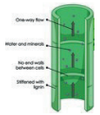
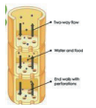
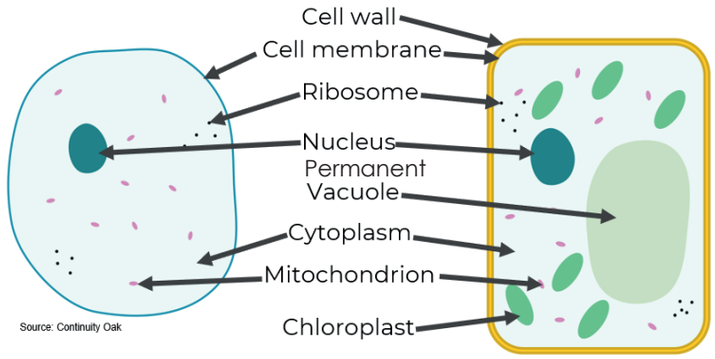
Science

Science - B1 - Cell Biology

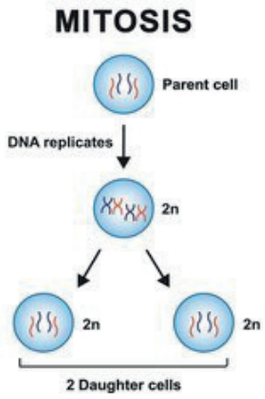
Key words	
DNA	The molecule that holds the genetic information in a cell
Plasmid	A small loop of DNA, only found in prokaryotic cells (bacteria)
Eukaryotic cell	DNA contained within nucleus (plant and animal)
Prokaryotic cell	DNA not contained in nucleus (bacteria)
Cell differentiation	Cells become specialised by developing different sub-cellular structures to help them function
Chromosomes	Found in nucleus of a cell, made of DNA. Usually found in pairs. Humans have 46 chromosomes (23 pairs) in a body cell

Specialised cells		
Specialised cell	**Image**	**How the structure relates to the function**
Nerve cell		Elongated axon to transmit electrical impulses over a distance; large dendrites; fatty sheath covering the axon for insulation, to speed up transmission
Sperm cell		Has a long tail to allow it to swim; contains many mitochondria to release lots of energy; streamlined head containing enzymes
Muscle cell		Lots of mitochondria to release energy for muscle contraction; elastic fibres to allow the muscle to contract and relax
Root hair cell		Has a large surface area and thin cell wall for water and mineral absorption
Xylem cell		Strengthened walls by lignin for the transport of water and dissolved ions
Phloem cell		Sieve plates to allow the transport of dissolved sugars

Sub-cellular structures	Function
Nucleus	Controls the cell's activities and contains genetic material
Cell membrane	Controls the movement of substances into and out of the cell
Cytoplasm	Jelly-like substance where chemical reactions take place
Mitochondria	The site of aerobic respiration
Ribosome	Site of protein synthesis (proteins are made)
Cell wall	Strengthens the cell, made of cellulose
Chloroplast	Site of photosynthesis (contains chlorophyll, a green pigment which absorbs light)
Permanent Vacuole	Filled with cell sap to help keep the cell turgid (stiff) to provide support



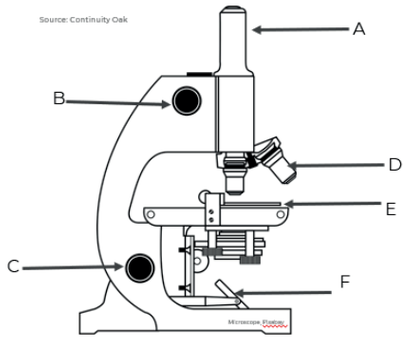
Mitosis – cell division	
Stage	**Description**
1	Cell grows, number of sub-cellular structures (e.g. ribosomes and mitochondria) increases and DNA replicates to form two copies of each chromosome
2	Nucleus divides and one set of chromosomes is pulled to each end of the cell
3	Cytoplasm and cell membranes divide to form two identical cells

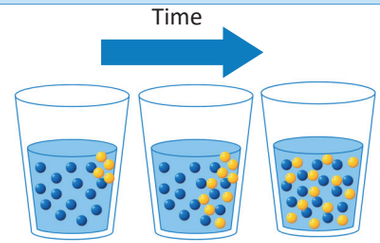
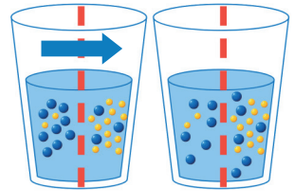
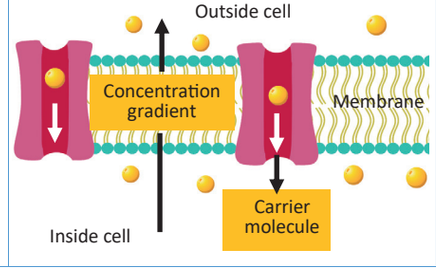


Science - B1 - Cell Biology

Microscopy	
Term	**Definition**
Magnification	Magnification = size of image ÷ size of actual object
Focus	Start with lowest magnification to focus image
Resolution	This is the measure of the level of detail you can see in the image using a microscope
Light microscope	Device that uses visible light and a series of lenses to produce an enlarged image of an object, maximum magnification of 1500x and low resolution
Electron microscope	Microscope with a much higher magnification and resolution than a light microscope so can be used to study cells in much finer detail and see sub-cellular structures.

Microscopes		
A	**Eyepiece lens**	Where the viewer looks through to see the specimen
	Clips	Keep the specimen secure on the stage
B	**Coarse focus**	Moves the stage up and down
C	**Fine focus**	Used to make the image clearer
D	**Objective lens**	Changes the magnification of the image
E	**Stage**	Where the specimen is placed
F	**Light**	Produces light to see the specimen



Transport across membranes			
Process	**Definition**	**Image**	**Uses**
Diffusion	The net movement of particles from an area of higher concentration to an area of lower concentration. Occurs in solutions and gases.		Movement of oxygen and carbon dioxide in gas exchange (lungs - alveoli; leaves – spongy mesophyll and stomata), and of the waste product urea from cells into the blood plasma for excretion in the kidney.
Osmosis	The diffusion of water from a dilute to concentrated solution, across a partially permeable membrane (shown in red)		Movement of water across cell membranes into and out of cells.
Active Transport	The movement of particles from a low concentration to a high concentration, using energy from respiration.		Absorption of mineral ions into plant root hairs from very dilute solutions in the soil. Absorption of sugar molecules from lower concentrations in the gut into the blood which has a higher sugar concentration.

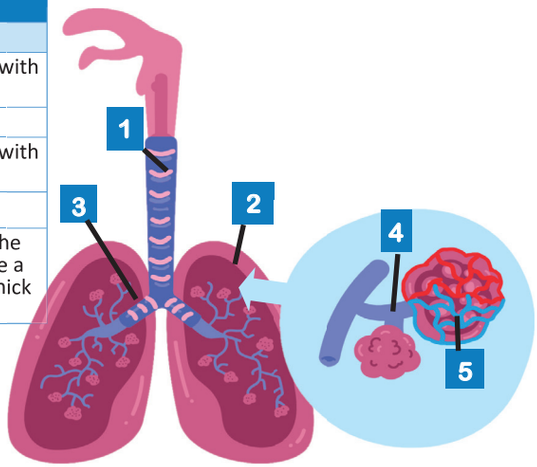
Stem cells		
A stem cell is an undifferentiated cell of an organism which is capable of giving rise to many more cells of the same type, and from which certain other cells can arise from differentiation. Stem cells may be able to help conditions such as diabetes and paralysis.		
Embryo	**Adult**	**Meristem**
Can be cloned and made to differentiate into most different types of human cells	Adult bone marrow can form many types of cells including blood cells	Can differentiate into any type of plant cell, throughout the life of the plant
In therapeutic cloning an embryo is produced with the same genes as the patient		

Science - B1 - Organisation

Levels of organisation: Cell → Tissue → Organ → Organ System → Organism	
Cell	The smallest unit for building all organisms e.g., muscle cell
Tissue	A group of cells with a similar structure and function, which work together to do a particular job e.g., muscle tissue
Organ	A group of different tissues, which all work together to do a particular job e.g., heart
Organ system	A group of different organs, which all work together to do a particular job e.g., circulatory system
Organism	A living thing (capable of the 7 life processes)

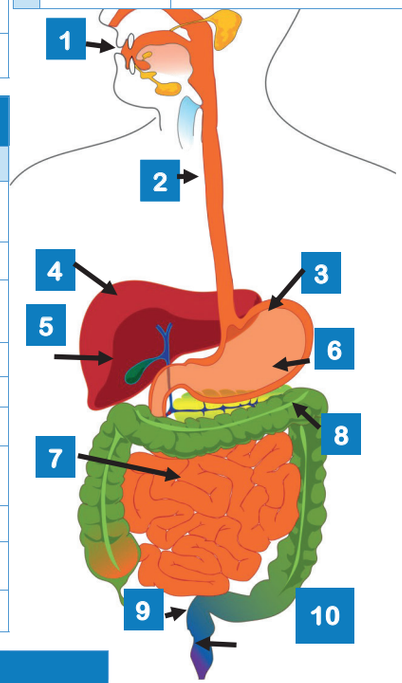
Structure of the lungs

#	Name	Adaptations
1	**Trachea**	Tubes through which gases move. Lined with cartilage so they do not collapse
2	**Lung**	Organ where gas exchange occurs
3	**Bronchus**	Tubes through which gases move. Lined with cartilage so they do not collapse
4	**Bronchiole**	Tubes not lined with cartilage
5	**Alveoli**	Small sacs where gas exchange occurs. The alveoli are surrounded by capillaries, have a large surface area and are only one cell thick



Parts of the digestive system

#	Organ	Function
1	**Mouth**	Mechanical digestion by chewing. Saliva from salivary glands, contains the enzyme amylase
2	**Oesophagus**	Muscular tubing where peristalsis takes place
3	**Stomach**	Mechanical digestion by churning. Cells in the lining of the stomach release acid to kill bacteria and produce the enzyme protease
4	**Liver**	Produces bile
5	**Gall bladder**	Stores bile
6	**Pancreas**	Produces digestive enzymes
7	**Small intestine**	Chemical digestion: larger molecules are broken down into small soluble molecules which are absorbed into the blood
8	**Large intestine**	Absorbs water from waste back into the bloodstream
9	**Rectum**	Stores faeces
10	**Anus**	Ring of muscle allowing faeces to exit the body



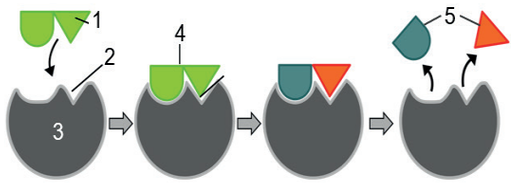
Components of the blood

Component	Function
Red blood cells	Transports oxygen in the blood.
White blood cells	Cells in the blood that fight infection caused by pathogens.
Platelets	Fragments of cells that cause clotting of blood at a wound.
Plasma	The liquid part of the blood, with dissolved substances like glucose, proteins, ions and carbon dioxide

Digestive enzymes

Enzyme	Site of production	Site of action	Substrate	Product
Carbohydrase - e.g., amylase	Salivary glands, pancreas and small intestine wall	Mouth, small intestine	carbohydrates - e.g., starch	Simple sugars - e.g., glucose
Protease	Stomach, pancreas, small intestine wall	Stomach, small intestine	Proteins	Amino acids
Lipase	Pancreas, small intestine wall	Small intestine	Lipids	Glycerol and fatty acids

Source: Continuity Oak

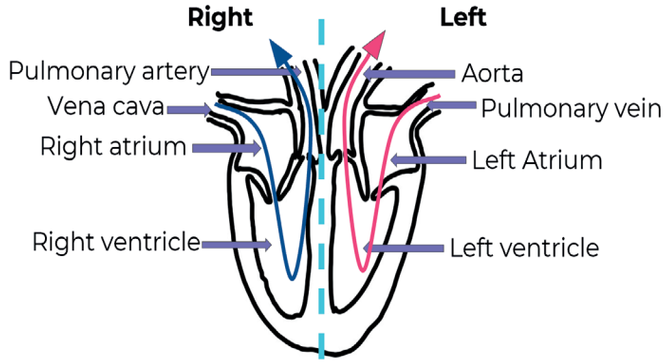


Lock and Key model

#	Organ
1	Substrate
2	Active site
3	Enzyme
4	Enzyme-substrate complex
5	Products

Science - B1 - Organisation

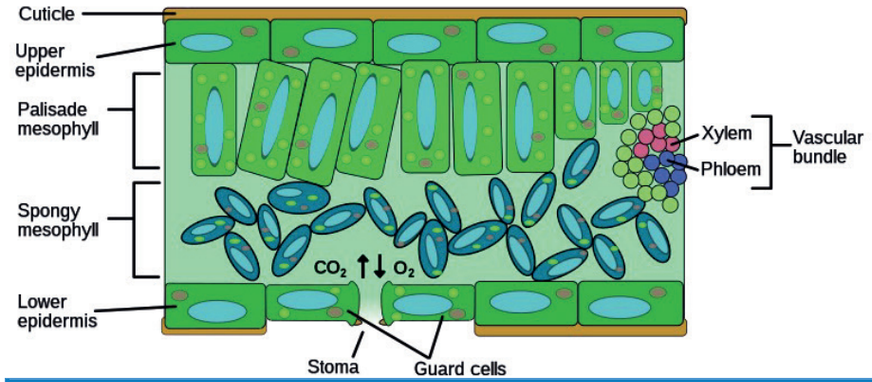
The heart	
Structure	**Function**
Vena cava	Major vein carrying blood back to the heart from the body
Right atrium	Smaller chamber of the heart which fills with blood from the vena cava.
Right ventricle	Large chamber pumps blood to the lungs.
Pulmonary artery	Artery carrying blood from the heart to the lungs.
Left atrium	Small chamber that fills with blood from the lungs.
Left ventricle	Large chamber that pumps blood around the body.
Aorta	Major artery carrying blood away from the heart to the body



Blood vessels	
Artery	Transports blood away from the heart, thick and elastic walls.
Vein	Carries blood to the heart, valves prevent backflow.
Capillary	One cell thick for quick diffusion between blood and cells.

Helping the heart			
Treatment	**How it works**	**Advantage**	**Disadvantage**
Stent	Wire mesh opens a blocked artery.	Keeps artery open. Low -risk surgery.	Fatty material can rebuild.
Statin (drug)	Reduces cholesterol.	Reduces fat being deposited in arteries.	Side effects e.g., liver damage.
Heart transplant	Replacement heart from a donor.	Long-term.	Major surgery. Could be rejected.
Artificial heart	Man-made heart used while waiting for a transplant.	Not rejected. Keeps patient alive.	Short lifetime. Limited activity.

Organisation in plants		
#	**Term**	**Function**
1	**Waxy cuticle**	Physical barrier to infection that prevents water loss.
2	**Epidermis**	Type of plant tissue that covers the surface of a plant allowing light through.
3	**Palisade mesophyll**	Tightly packed cells in leaf where photosynthesis takes place. Contains many chloroplasts.
4	**Spongy mesophyll**	Tissue in the leaf with air spaces between cells – specialised for gas exchange.
5	**Stomata**	Opening that allows CO_2 water vapour and O_2 to diffuse in and out of the leaf.
6	**Guard cells**	Cells that open and close stomata to allow gas exchange to enter the leaf for photosynthesis.



Transport in plants	
Transpiration	The loss of water vapour from the leaves by evaporation from cells and then out through the stomata.
Translocation	The movement of dissolved sugar around the plant.

Factors Affecting Transpiration	
Factor	**Effect on the rate of transpiration**
Temperature	Increasing temperature increases the rate as water evaporates quickly.
Humidity	Increasing humidity decreases the rate as water evaporates slowly.
Wind speed	Increasing wind speed increases the rate as water evaporates quickly.
Light	Increasing light increases the rate as stomata open.

Science - B1 - Infection and response

Key terms	
Communicable	A disease spread from person to person caused by a pathogen
Pathogen	Micro-organism that causes disease. The four types of pathogen are bacteria, virus, fungus and protist.
Bacteria	Causes disease by reproducing rapidly inside the body, and releasing toxins which damage tissues and make us feel ill
Virus	Causes disease by living and reproducing inside cells, causing cell damage
Vector	An organism which carries something e.g. a disease but isn't affected by it such as a mosquito

Diseases				
Disease	**Pathogen**	**Symptoms**	**Transmission**	**Method of reducing transmission**
Measles	Virus	Fever, red skin rash	Inhalation of infected droplets from sneezes and coughs	Vaccination
HIV	Virus	Flu-like symptoms. Develops into AIDS over time which damages the body's immune system.	Sexual contact, exchange of bodily fluids, sharing needles	Condoms, do not share needles
Tobacco mosaic virus (TMV) - plant only	Virus	Distinctive mosaic pattern of discolouration on leaves, affects growth of plant by reducing photosynthesis	Spread through the use of infected tools on healthy plants (direct contact)	Removing infected areas of the plant, sterilising gardening tools
Salmonella	Bacteria	Fever, abdominal cramps, vomiting, diarrhoea	Bacteria ingested in food prepared in unhygienic conditions, undercooked food	Vaccination of poultry, ensure food cooked thoroughly, especially poultry
Gonorrhoea	Bacteria	Thick yellow or green discharge from the penis or vagina, pain when urinating	Sexual contact	Treatment with antibiotics, use of a barrier method of contraception e.g. condom
Rose black spot—plant only	Fungus	Purple or black spots on leaves. Effects growth of plant due to reduction of photosynthesis	Air, water or direct contact	Use of fungicides and/or removing and destroying the affected leaves
Malaria	Protist	Recurrent episodes of fever	Mosquito (vector)	Preventing mosquitoes breeding: mosquito nets and insect repellent

Treatment	
Antibiotic	Drug which cures bacterial disease by killing pathogenic bacteria
Painkiller	Drug which reduces pain, does not cure a disease but relieves symptoms

Non-specific defence systems	
Skin	Acts as a barrier
Nose	Hairs and mucus trap pathogens before entering lungs
Trachea and bronchi	Cilia cells (small projections from cells) and mucus (produced by goblet cells) trap pathogens
Stomach	Contains hydrochloric acid to kill pathogens that have been eaten

Vaccination key terms	
Vaccines	Dead or weakened form of a pathogen injected into the body
Antigen	Protein on the surface of a pathogen which the body recognises as a foreign body
Antibody	Protein produced by white blood cells which binds to the antigens on pathogen and helps them be destroyed
Herd immunity	The protection given to a population against an outbreak of a specific disease when a very high percentage of the population have been vaccinated against it

Stages of vaccination	
Stage	**Effect**
1	Dead or weakened pathogen injected into the body
2	Antigens in the vaccine stimulate white blood cells to make antibodies
3	Memory cells (type of white blood cell) can be used to make the correct antibody for that pathogen
4	If the pathogen re-enters the body the while blood cells will respond quickly to produce the correct antibodies, preventing infection. The person is immune

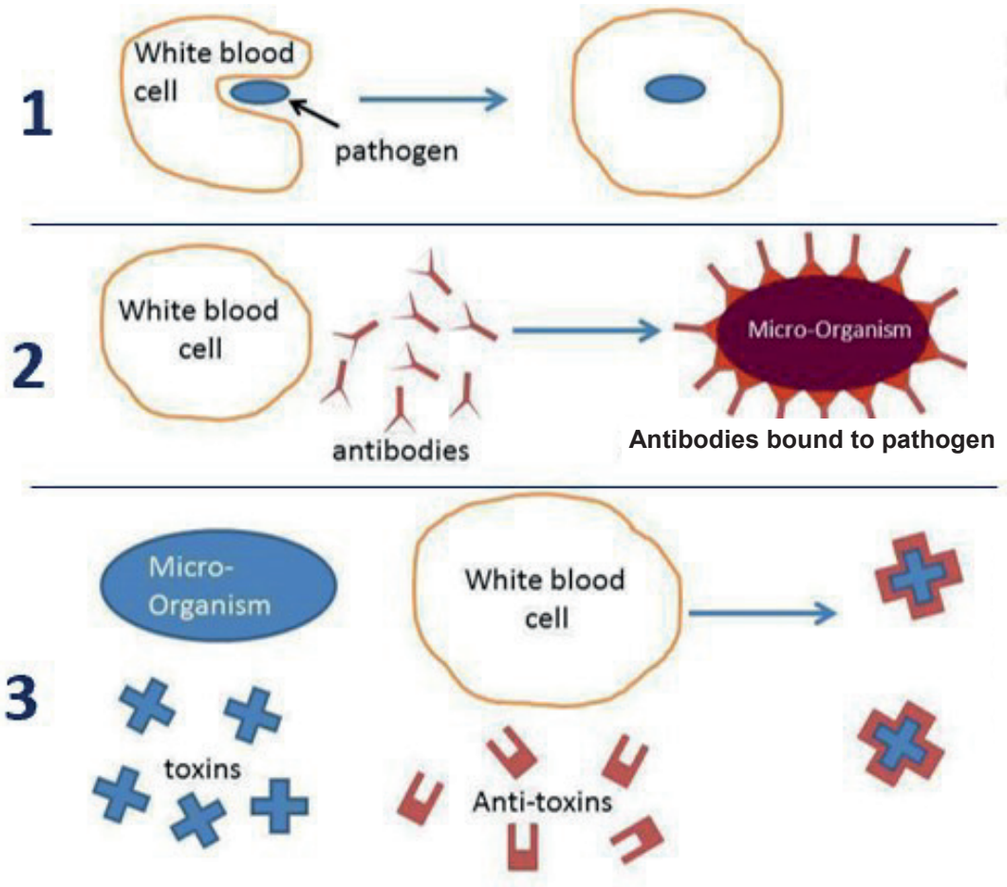
Science - B1 - Infection and response

Drugs	
Drug	**Origin**
Digitalis	Heart drug from foxgloves originally
Aspirin	Painkiller from willow trees
Penicillin	Antibiotic originally from fungus. Discovered by Alexander Fleming

Drug trials key terms	
Key term	**Definition**
Efficacy	Whether the drug works
Dose	How much of the drug to use
Toxicity	If the drug has harmful side effects
Placebo	A fake drug
Double blind trial	Neither the doctor nor the patient know if they have the placebo or the real drug, to avoid bias

Stages in drug trials	
Pre-clinical trials	1. Tested on cells and tissues for toxicity and side effects 2. Tested on animals for toxicity and side effects
Clinical trials	3. Low dose tested on healthy volunteers to check for side effects and toxicity 4. Test on small group of patients with the illness to find optimum dose (best dose with fewest side effects). Patients will go through double blind trails, to avoid bias 5. Large scale testing 6. Peer review, to avoid bias

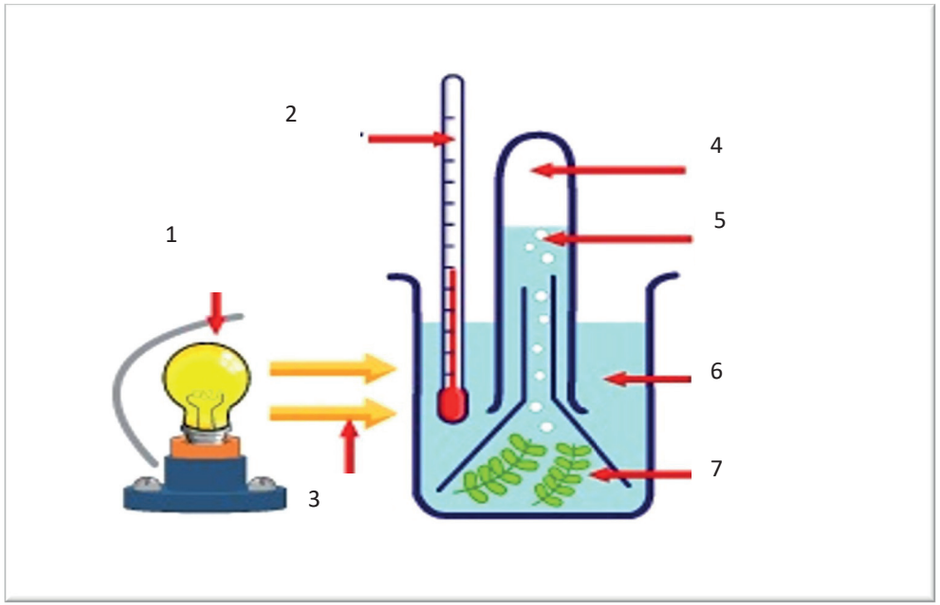
White blood cells		
1	**Phagocytosis**	engulfing and breaking down the pathogen
2	**Produces antibodies**	specific to the antigen
3	**Produces antitoxins**	to neutralise toxins



Science - B1 - Bioenergetics (Photosynthesis)

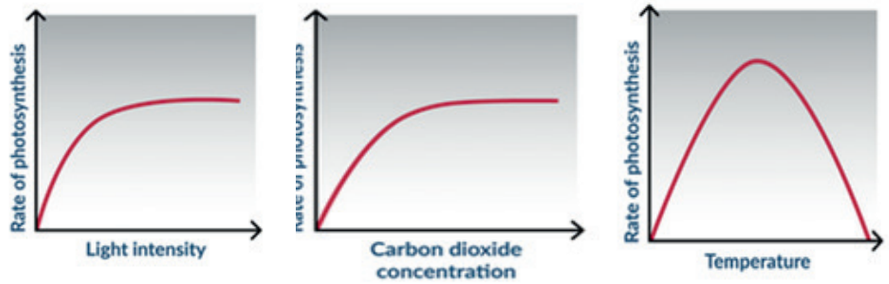
Photosynthesis
Endothermic chemical reaction that takes place in chloroplasts in leaves that produces glucose and oxygen from carbon dioxide and water
Carbon dioxide + water —> glucose + oxygen
$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

Required practical	
Number	**Label**
1	Lamp (LED to control temperature)
2	Thermometer
3	Distance from light
4	Collected oxygen
5	Bubbles of oxygen (count number of bubbles produced per minute)
6	Water with sodium hydrogencarbonate
7	Pond weed



Uses of glucose from photosynthesis
Converted into starch for storage
Used to produce fats and oils for storage
Used to produce cellulose, which strengthens the cell wall
Used to produce amino acids for protein synthesis (to produce proteins, plants also use nitrate ions that are absorbed from the soil)
Used for respiration

Limiting factors:	
1	Concentration of carbon dioxide
2	Light intensity
3	Amount of chlorophyll
4	Temperature



Light intensity (HT only)	
Inverse square law	As distance from the light source increases, the light intensity decreases in a non-linear relationship.

Science - B1 - Bioenergetics (Respiration)

Respiration	
Term	**Definition**
Respiration	A chemical process in all cells that releases energy from glucose.
Aerobic respiration	Respiration that uses oxygen to release large amounts of energy from glucose, occurs in the mitochondria.
Anaerobic respiration	Respiration that does not use oxygen and releases less energy from glucose, occurs in the cytoplasm.
Oxygen debt (HT only)	The amount of extra oxygen the body needs after exercise to react with accumulated lactic acid and remove it from the cells.

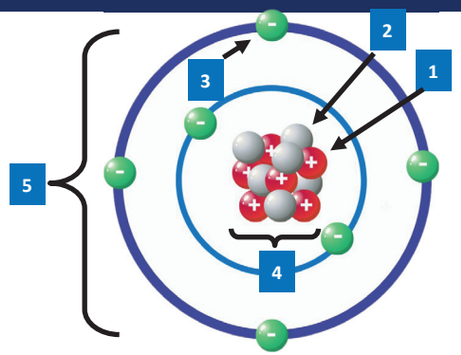
Respiration equations	
Aerobic respiration	Glucose + oxygen —> carbon dioxide + water $C_6H_{12}O_6 + 6O_2$ —> $6CO_2 + 6H_2O$
Anaerobic respiration (muscles – animals)	Glucose —> lactic acid
Anaerobic respiration (plants and yeast)	Glucose —> Carbon dioxide + ethanol

Uses of anaerobic respiration	
Fermentation	Ethanol produced from anaerobic respiration in plants and yeast is used to make alcoholic drinks such as beer, wine, cider and spirits.
Baking	Carbon dioxide produced from anaerobic respiration in yeast is used to make bread rise.

Effect of exercise	
Effect	**Reason**
Increased heart rate	To deliver more oxygen and glucose to muscle cells and remove waste carbon dioxide.
Increased breathing rate	To get more oxygen into the blood quickly
Increased breath volume	Get more oxygen into blood per breath and remove waste carbon dioxide
Heart beats harder	more blood is pumped with every beat

Metabolism is the sum of all the reactions in a cell or body. Including:	
1	Conversion of glucose to starch, glycogen and cellulose
2	Formation of lipids from fatty acids and glycerol.
3	The use of glucose and nitrate ions to form amino acids which are turned into proteins
4	Respiration
5	Breakdown of excess proteins to form urea for excretion.

Science - C1 - Atomic structure and the Periodic table



	Name	Relative Mass	Relative Charge
1	Proton	1	+1
2	Neutron	1	0
3	Electron	very small	-1
4	Nucleus	A	+ Z
5	Atom	A	0

Term	Definition
Element	Substance that contains only one type of atom
Mixture	Two or more elements and/or compounds not chemically combined together
Compound	Contains two or more different elements chemically combined
Group	Columns on the periodic table, informs us of the number of electrons in the outer shell of the atom. Contain 'families' of elements with similar properties
Period	Rows on the periodic table, informs us of the number of electron shells in an atom
Reactants	The substances that take part in a chemical reaction
Products	The substances that are made in a chemical reaction
Electronic structure	Pattern of electrons in shells. Shells fill from the inside; 1st shell max 2, 2nd shell max 8, 3rd shell max 8, 4th shell max 2
Ion	An atom with an overall positive or negative charge due to the loss or gain of electrons

Term	Definition	
Atom	A neutral particle consisting of protons, neutrons and electrons. Number of protons = number of electrons	
Mass number, A	Total of number of protons and neutrons in the nucleus of an atom	23 Na
Atomic number, Z	Number of protons in the nucleus of an atom; determines the identity of the element	11
Atomic radius	Distance from the centre of an atom's nucleus to the electrons (approx. 10^{-10}m or 0.1nm)	
Isotopes	Atoms of the same element (i.e. same number of protons) with different number of neutrons	
Nanometre	$1x10^{-9}$m = 0.001µm = 0.000 001mm = 0.000 000 001m	
Nucleus	The positively charged centre of an atom made of protons and neutrons. Approximately 10 000 times smaller than the atom (approx.10^{-14}m)	
Subatomic	Smaller than the size of an atom	

Method	For separating mixtures of…	Requirements	Example
Filtration	insoluble solids from liquids/solutions	Filter funnel, filter paper	Sand from water
Crystallisation	soluble solids from solvents	Heat energy for evaporation	Copper sulphate crystals from solution
Simple distillation	two liquids of different boiling points	Heat energy, condenser	Ethanol (alcohol) from water
Fractional distillation	many liquids of differing boiling points	Heat energy, condenser or fractionating column	Crude oil fractions
Chromatography	different coloured compounds	Solvent, chromatography paper	Pigments in ink/dye

		Determined by….
a	**Relative atomic mass**	mean mass of nucleus taking into account relative abundance of isotopes
b	**Element symbol**	element name
c	**Element name**	number of protons
d	**Atomic number**	Number of protons

Scientist	Contribution
Rutherford	Disproved 'plum pudding' model. Replaced with 'Nuclear model' Atom mostly empty space, nucleus positive where almost all the mass is concentrated
Bohr	Modified the 'Nuclear' model: central nucleus with orbiting electrons at specific distances.
Chadwick	After the proton was discovered, provided experimental evidence for existence of neutrons.

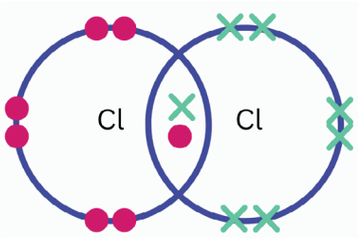
Science - C1 - Bonding, structures and properties of matter

Key Terms	
Term	**Definition**
Ionic bond	Between a metal and non-metal. Involves the transfer of electrons.
Covalent bond	Between non-metals only. Involves the sharing of electrons.
Ion	charged particles formed through the loss or gain of electrons. Metals and hydrogen form positive ions. Non-metals form negative ions.
Metallic bond	Between metal ions. Neat rows of positive metal ions surrounded by a sea of delocalised electrons.
Alloy	Harder than a pure metal. Different sized atoms distort the layers meaning they cannot slide
Simple covalent structures	Small molecules with low melting and boiling points as they have weak intermolecular forces, so it doesn't take much energy to overcome these forces.
Molten	Melted (in the liquid state)
Aqueous	Dissolved in water (aq)

State symbols	
Symbol	**Meaning**
(s)	Solid
(l)	liquid
(g)	Gas
(aq)	Aqueous (dissolved in water)

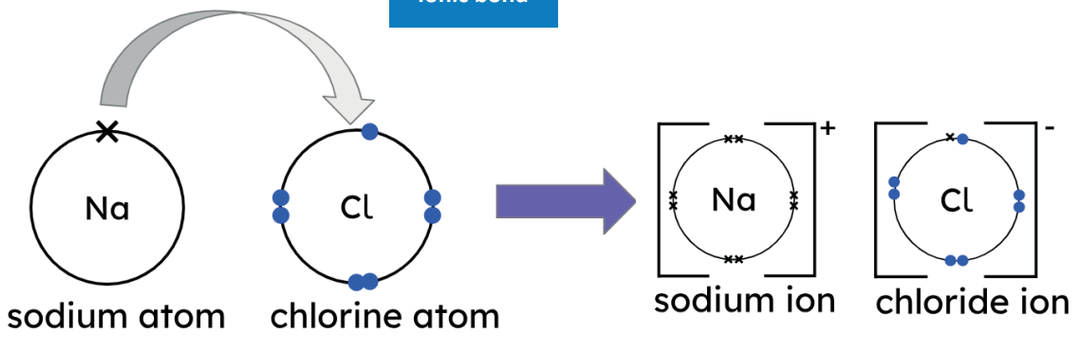
Giant structures	
Key term	**Facts**
Giant covalent structures	High melting and boiling point as has strong covalent bonds between many atoms which take a lot of energy to break e.g. Diamond, graphite and silicon dioxide
Diamond	Four covalent bonds from each carbon atom to neighbouring carbon atoms. Does not conduct electricity as no free electrons. Hard and high melting and boiling point
Graphite	3 bonds between each carbon atom Conducts electricity as has free electrons (delocalised electrons) Soft as layers can slide
Giant ionic lattice	High melting and boiling point as has strong electrostatic forces between many ions, so takes a lot of energy to overcome forces. Does not conduct when solid Conducts electricity when molten or aqueous as ions are free to move
Polymer	Made of many repeating units. Large molecules with strong covalent bonds linking monomers. Strong intermolecular forces so solid at room temperature
Graphene	Single layer of graphite. Useful in electronics and composites
Fullerenes	Molecules of carbon atoms with hollow shapes
Buckminsterfullerene	First fullerene to be discovered. Made of 60 carbons (C_{60}). Spherical shape
Carbon nanotubes	Hollow carbon tubes. very high strength to weight ratio

Covalent bond



Diamond

Ionic bond



Science - C1 - Quantitative Chemistry

Key Terms	
Term	**Definition**
Conservation of mass	Mass cannot be created or destroyed, the mass of the products equals the mass of the reactants
Relative formula mass (Mr)	The sum of the relative atomic masses of the atoms (in the numbers shown) in the formula
Relative atomic mass (Ar)	The relative mass of one atom of a substance, i.e. the big number in periodic table
In excess	More of the reactant is present in the reaction than is needed
Uncertainty	The range of measurements about the mean i.e. for a repeated measurement, equal to (maximum – minimum)/2
Avogadro's constant (HT only)	The number of atoms, molecules or ions in a mole of a given substance. The value of the Avogadro constant is 6.02×10^{23} per mole
Limiting reactants (HT only)	The reactant that is completely used up is called the limiting reactant because it limits the amount of product made , because the other reactant was in excess

Equations	
Quantity	**Calculation**
Mr	Ar + Ar + Ar… Eg CO_2 Mr = 12 + (2x16) = 44
Concentration (g/cm^3)	Mass (g) Volume (cm^3)
Moles of a substance (HT only)	Mass Mr (remember Mr Mole lives under mass)
Concentration (mol/dm^3) (HT only)	Moles Volume (dm)

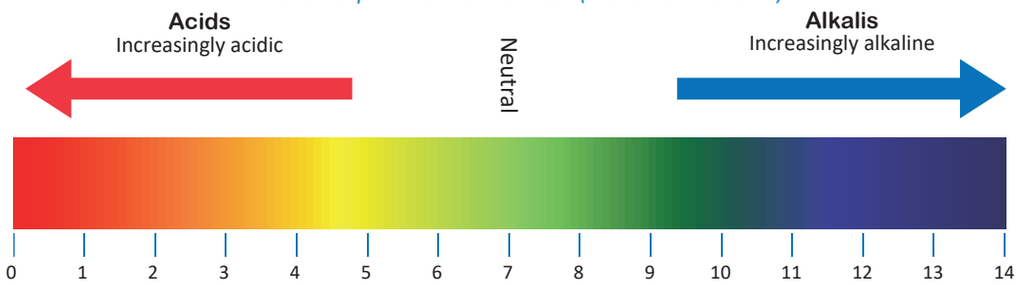
Concentration	
Key terms	**Definition**
Concentration	Mass of dissolved substance in specific volume (eg dm^3)
Mass	The quantity of matter a substance is made up of. Measured in kilograms
Volume	A measure of the amount of space that matter occupies

HT only	
Skills needed	**How to do it**
Big numbers show moles	$2Mg + O_2 \rightarrow 2MgO$ Means 2moles of Mg react with 1 mole of O_2 to form 2 moles of MgO
Balancing equations when given masses	Take the mass of each substance and divide by Mr. Write as a ratio. Simplify the ratio

Science - C1 - Chemical Changes

Acids and alkalis	
Key Term	**Definitions**
Acids	Contain H+ ions, have a pH of less than 7
Alkalis	Contain OH- ions, have a pH of more than 7 (max 14)
Neutral	pH = 7
Neutralisation	Reaction between acid and alkali which produces a salt and water
Half equation	H^+ (aq) + OH^- (aq) —> H_2O (l)
Indicator	Changes colour in acids or alkalis. E.g. universal indicator
Crystallisation	Separation of salt from solution. Evaporate water partially to concentrate solution. Leave to cool to form crystals.
Strong/weak acid (HT only)	Strong Hydrogen ions fully dissociate e.g. nitric, hydrochloric and sulphuric acids / weak hydrogen ions only partially dissociate e.g. ethanoic, citric and carbonic acids
Concentration (HT only)	Amount of solute dissolved in a given volume (dilute/concentrated). Measured in g/dm^3 or mol/dm^3

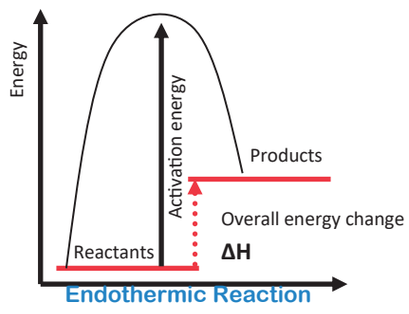
Universal pH value colour scale (universal indicator)

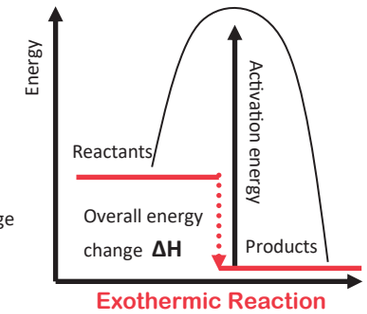


Common salts	
Acid	**Salt**
Hydrochloric acid	_____ chloride
Sulphuric acid	_____ sulphate
Nitric acid	_____ nitrate

Electrolysis	
Key Term	**Definitions**
Electrolysis	The breaking down of a substance using electricity. Used if element is more reactive than carbon
Electrolyte	The solution which is being broken down during electrolysis. Must be molten (melted) or aqueous to allow ions (charged particles) to move.
Aqueous	Dissolved in water (contains H^+ and OH^- ions)
Oxidation	The loss of electrons or gaining of oxygen
Reduction	The gain of electrons or the loss of oxygen
Anode	The positive electrode
Cathode	The negative electrode
Anion	Ion that goes to anode (- ion)
Cation	Ion that goes to cathode (+ ion)
Rules of electrolysis	**Negative electrode:** Least reactive of hydrogen or metal (hydrogen unless copper, silver or gold present) **Positive electrode:** Group 7 halogen if halide present, oxygen from OH^- if not

Reaction profiles	
Key term	**Definition**
Exothermic	Releases energy to the surroundings. Feels hot
Endothermic	Takes in energy from the surroundings. Feels cold
Chemical reaction	Occurs when particles collide with sufficient energy
Activation energy	Minimum amount of energy needed for reaction to occur





Science - P1 - Energy

	Types of Energy Stores	
	Term	**Definition**
Stores	**Kinetic**	Energy stored in a moving object
	Gravitational potential	Energy stored in an object in a gravitational field.
	Internal	Energy stored in all materials; due to the motion of particles (thermal) and forces between particles (chemical).
	Elastic potential	The potential stored in a spring or something stretchy that will spring back after being released
	Nuclear	Energy stored in nuclei of atoms, released through nuclear fission or fusion.
	Magnetic	The potential energy stored in a magnetic field
	Electrostatic	The energy stored when like charges are moved closer together/unlike charges are pulled
Transfers	**Mechanical**	A force moving an object through a distance
	Electrical	When an electric current flows through a device
	Heating	By conduction, convection, or radiation
	Radiation	Energy transferred by electromagnetic radiation (e.g. light)

Energy Resources

Name of Resource	Production	Advantages	Disadvantages
Coal	Burning coal heats water, producing steam which turns turbines to generate electricity	Readily available – reliable	Non-renewable, inefficient, high water use, produces greenhouse gases
Crude oil	Burned to heat water into steam to turn turbines to generate electricity	High energy density, vast quantity of other products also made from oil	Produces greenhouse gases, non-renewable, expensive
Natural Gas	Piped to consumer and burned on site	Energy efficient, less greenhouse gases than coal	Non-renewable, not available everywhere, limited applications
Solar	Energy converted to electricity using photosynthetic cells	Abundant, free, renewable, no greenhouse gas	Not yet available everywhere, expensive to set up – unreliable
Tidal/Wave	Waves power turbines which generate electricity	Readily available, renewable, close to cities	Difficult and expensive to harness wave power effectively – unreliable
Wind	Wind causes turbines to turn, which generate electricity	Free, clean, no greenhouse gas emissions	Expensive to set up, can endanger birds - unreliable
Hydroelectric	Running water turns turbines to generate electricity	Renewable, readily available	Set-up generate greenhouse gases and damages environment
Biofuel	Plant matter burned to power electricity generators	Potentially renewable, recycles agricultural waste – reliable	Cultivation and burning of fuel can yield low level pollutants

Energy Stores and Systems

System	Energy Transfer
An object projected upwards 	**Kinetic** energy decreases. **Gravitational potential** increases
A moving object hitting an obstacle 	**Kinetic** energy **transferred** to the obstacle. (Sound, heat, deformation of the object)
A vehicle slows down 	**Kinetic** energy decreases as it is **transferred** to internal energy (**thermal**) e.g. in brakes.
Water boiling in an electric kettle 	Waters internal energy increases as energy is transferred from electrical energy

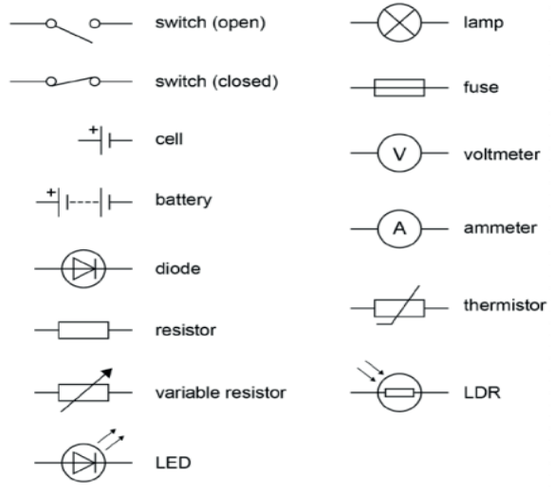
Unwanted energy transfers

Energy transfers can be reduced through lubrication and the use of thermal insulation.

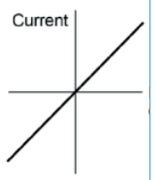
Key Term	Definition
Renewable	A resource which can be replenished as it is being used
Non-renewable	A resource that will run out, as it is being used at a greater rate than it can be replaced

Science - P1 - Electricity

Circuit diagram symbols

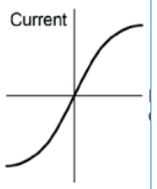


Resistors



Fixed Resistor (Ohmic Conductor)

Current and potential difference are **directly proportional**. **Resistance is constant**.



Filament Lamp

Resistance of a filament lamp is **not constant**. As temperature increases, resistance increases.

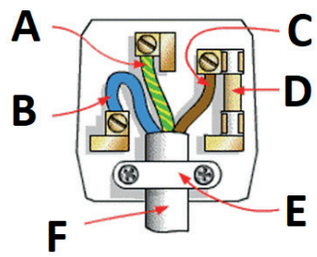
Diode/ LED

The **current** through a diode flows in **one direction only**. The diode has a **very high resistance in the reverse direction**.

V, I and R in Series and Parallel

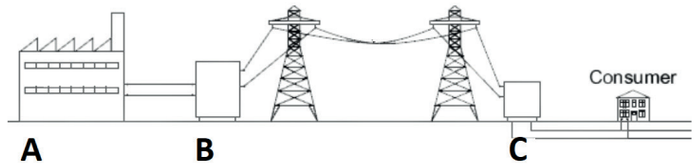
	Current	Potential Difference	Resistance
Series	The current is the same through each component	The total potential difference of the power supply is shared between the components	The **more resistors, the greater the resistance**. The total resistance of two components is the sum of the resistance of each component. $R_{total} = R_1 + R_2$
Parallel	Current through the whole circuit is the sum of the currents through the separate branches	The potential difference across each branch is the same	The **total resistance** of two resistors is **less than the resistance of the smallest individual resistor**.

3 core cable



A	**Earth**	Yellow and green colour. Potential difference of 0V. Carries charge to Earth if live wire touches the metal casing of an appliance (faulty).
B	**Neutral**	Blue colour. Completes the circuit. Potential difference should be 0V.
C	**Live**	Brown colour. Current flows to the appliance. Potential difference between this and other wires should be 230V.
D	**Fuse**	A safety device consisting of a strip of wire that melts and breaks an electric circuit if the current exceeds a safe level.
E	**Cable grip**	**F** **Cable**

National grid



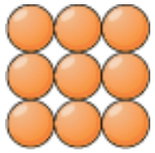
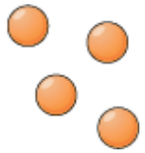
Definition:

A series of **cables** and **transformers** linking power stations to consumers

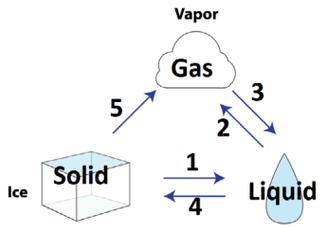
A	**Power station**	Non-renewable power stations burn fossil fuels to boil water, which turns a turbine and generator, transferring chemical energy to electrical.
B	**Step up transformer**	Increases the potential difference for transmission across power cables. This reduces the current and therefore less heat is lost from the cables. This makes the National Grid efficient.
C	**Step down transformer**	Reduces the potential difference from the cables to 230V for use by consumers.

Science - P1 - Particle Model

Particle model

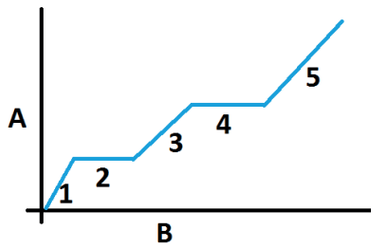
			
Organisation (Pattern)	Regular pattern	No pattern, random arrangement	No pattern, random arrangement
Spacing (Touching?)	All touching, close together	Close together but may still be touching	Wide spaces between, far apart
Motion (Movement of molecules)	Vibrate in a fixed position	Move and slide around each other	Move quickly in all directions

1. Melt
2. Boil
3. Condense
4. Freeze
5. Sublimate



1. Solid
2. Melting
3. Liquid
4.Boiling
5. Gas

A. Temp.
B. Heat absorbed

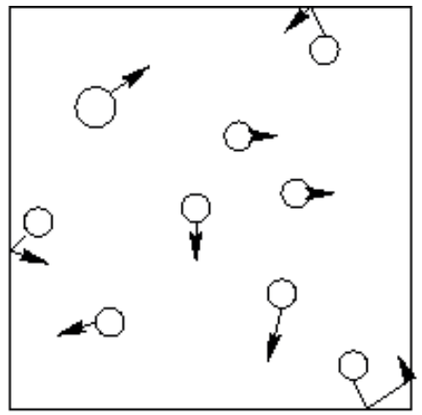


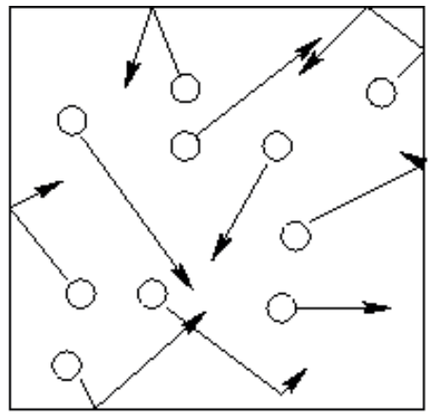
Key Terms

Term	Definition
Internal energy	The total kinetic energy and potential energy of all the particles (atoms and molecules) that make up a system
Changes of state	Physical changes, the material recovers its original properties if the change is reversed
specific heat capacity	The amount of energy required to raise the temperature of one kilogram of the substance by one degree Celsius
specific latent heat	The amount of energy required to change the state of one kilogram of the substance with no change in temperature
Specific latent heat of fusion	Change of state between solid and liquid
Specific latent heat of vaporisation	Change of state between liquid and gas / vapour
Pressure	Pressure is caused by the force exerted by particles in a gas when they collide with the walls of a container
Density	The mass per unit volume
Mass	The amount of matter

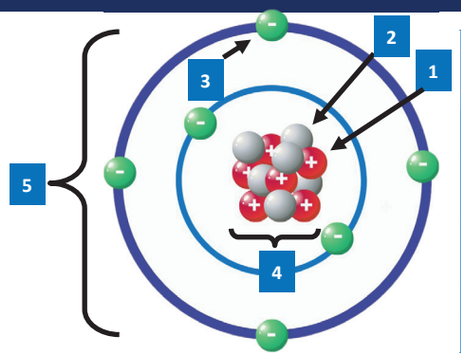
Pressure in gases

Particles in a gas are constantly moving – so they store **kinetic energy**. They collide with the walls of their container, and exert a force when they do. The total force exerted on a certain area of the wall is the **gas pressure**.





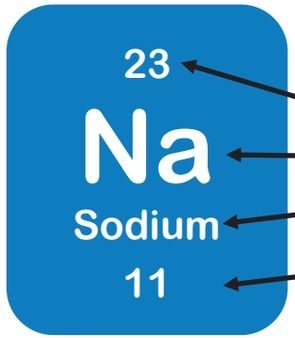
Science - P1 - Atomic structure



	Name	Relative Mass	Relative Charge
1	Proton	1	+1
2	Neutron	1	0
3	Electron	very small	-1
4	Nucleus	A	+ Z
5	Atom	A	0

Term	Definition
Atom	A neutral particle consisting of protons, neutrons and electrons. Number of protons = no. of electrons
Mass number, A	Total of number of protons and neutrons in the nucleus of an atom
Atomic number, Z	Number of protons in the nucleus of an atom; determines the identity of the element
Atomic radius	Distance from the centre of an atom's nucleus to the electrons (approx. 10^{-10}m or 0.1nm)
Nanometre	$1x10^{-9}$m = 0.001µm = 0.000 001mm = 0.000 000 001m
Nucleus	The positively charged centre of an atom made of protons and neutrons. Approximately 10 000 times smaller than the atom (approx.10^{-14}m)
Subatomic	Smaller than the size of an atom

Term	Definition
Isotopes	Atoms of the same element with the same number of protons and a different number of neutrons
Positive ion	Formed when a metal **atom loses electron**
Negative ion	Formed when a non-metal **atom gains electron**
Electron shells	Electrons, in atoms that ***absorb*** electromagnetic radiation, can 'jump' to higher energy levels (electron shells) Electrons in atoms that ***emit*** electromagnetic radiation, can fall to lower energy levels (electron shells)



		Determined by….
a	**Relative atomic mass**	mean mass of nucleus taking into account relative abundance of isotopes
b	**Element symbol**	element name
c	**Element name**	number of protons
d	**Atomic number**	number of protons

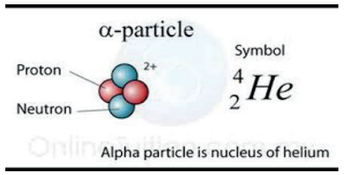
Development of the model of the atom

Model	DETAILS OF THE MODEL	EVIDENCE
Plum Pudding model	Atoms were thought to be spheres of positive charge containing scattered electrons	Discovery of the **negatively charged electron** led to the **Plum Pudding model**
The Nuclear Model	Atoms were then known to have: - a small positively charged nucleus - most of the mass concentrated in the nucleus - negatively charged electrons orbiting the nucleus	**Rutherford's alpha particle scattering** (gold leaf) (gold leaf) experiment showed positively **alpha particles deflected** significantly from **concentrated centres** of **positive charge** in atoms
(Neils Bohr's addition to the Nuclear model)	Niels Bohr predicted that electrons orbit the nucleus in specific energy levels (electron shells). This was later proven by experimental evidence.	Niels Bohr discovered that electrons can: - move **away** from the **nucleus** when they **absorb** electromagnetic radiation - move **closer** to the **nucleus** when they **emit** electromagnetic radiation
Discovery of the neutron	Later we discovered the nucleus is made from small positively charged particles called protons. James Chadwick later discovered the neutron	Experimental evidence revealed the existence of protons in the nucleus. **Chadwick** discovered **neutrons** 20 years after the discovery of the nucleus.

Science - P1 - Atomic structure (radiation)

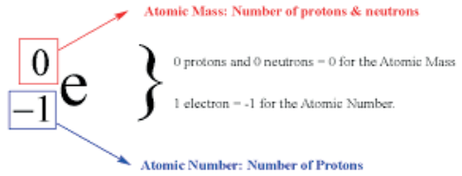
Term	Definition
Radioactive Decay	Unstable nuclei release ionising radiation to become more stable
Activity	This is the rate at which unstable nuclei decay releasing radiation
Becquerel (Bq)	The unit for measuring activity. 1Bq = 1 nucleus decay per sec
Geiger-Muller Tube	A detector used to measure radioactivity

Alpha Particle (α)



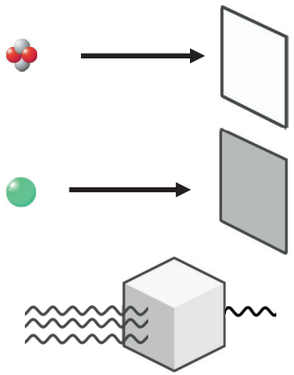
Consists of 2 neutrons and 2 protons, making it the same as a helium nucleus.

Beta Particle (β)



A high speed electron ejected from a nucleus as a neutron turns into a proton

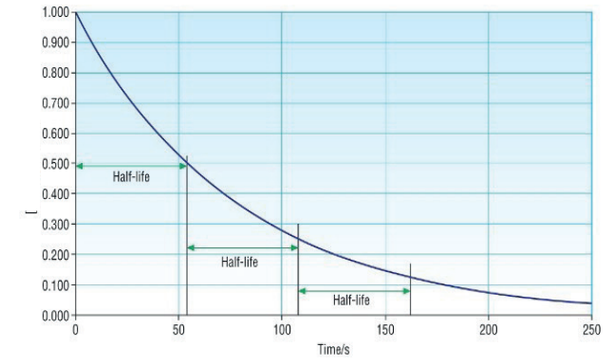
Gamma Ray (γ)	High frequency electromagnetic radiation emitted from a nucleus



α	**Alpha**	Fast moving helium nucleus stopped by skin or paper
β	**Beta**	High energy electron, stopped by aluminium plate
γ	**Gamma high energy**	Photons, stopped by dense material

CHARACTERISTIC	HIGHEST		LOWEST
Weight	**α**	**β**	**γ**
Ionising power	**α**	**β**	**γ**
Range in air	**γ**	**β**	**α**
Penetration	**γ**	**β**	**α**

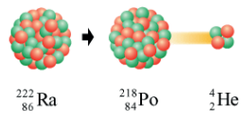
Term	Definition
Half Life (There are 2 definitions)	a) The time taken for the *number of nuclei* in a radioactive isotope to randomly decay *to half* the original number. b) The time taken for the *activity/ count rate* to *halve*.
Calculating Half Life	You need to use a graph like the one below to work out the time it takes for the radioactive count to halve



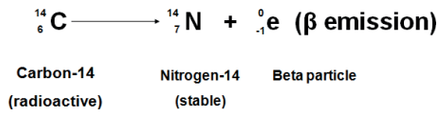
Radioactive Contamination	**a**) Radioactive contamination is the *unwanted presence of radioactive atoms* on other materials. b) The *hazard* is caused by *radioactive decay* of these atoms c) The *hazard* depends on *the type of radiation* emitted d) Suitable *precautions* must be taken against any *hazard* presented by radioactive materials
Peer Review	It is important that scientific studies that have been published into the effects of contamination, are *shared and checked* by other scientific teams.

Nuclear equations

Alpha particle decay: The original element loses '2' off the proton number and '4' off the atomic mass as it becomes a new element:

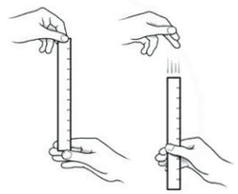


Beta particle decay:
The original element gains 1 x proton number as it decays to form new element:



Science - B2 - Homeostasis and response

Nervous system	
Term	**Definition**
Homeostasis	Regulating the internal conditions of the body (temperature, water levels, blood glucose) to maintain optimum enzyme activity
Central nervous system	Made up of brain and spinal cord
Synapse	Gap between 2 neurons. Signal passes between 2 neurons chemically as a neurotransmitter
Reflex response	Fast response that by passes the brain, to protect us from harm
Receptor	Eyes (light), skin (temperature and pressure), ears (sound), nose (smell), tongue (taste)
Effector	Muscles (contract) or gland (releases chemical)

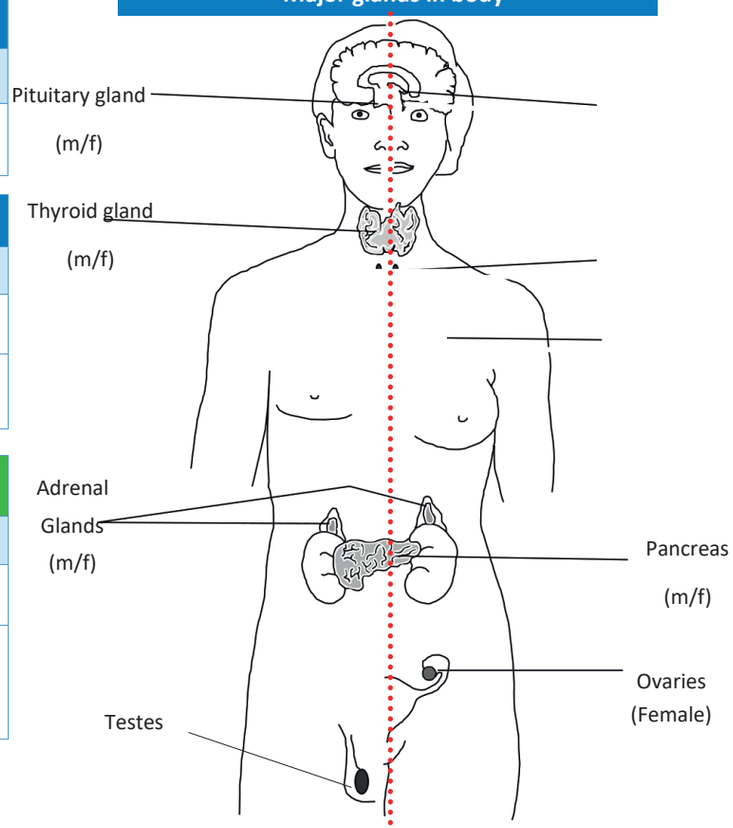
Reaction time required practical	
Term	**Definition**
Reaction time	Typically 0.2-0.9 seconds
Factors affecting reaction time	Caffeine consumption, hours of sleep, alcohol consumption, amount of practice
Ruler drop test method 	1.Person A holds out hand with a gap between thumb and finger 2.Person B holds ruler with the zero at the top of person A's thumb 3.Person B drops ruler randomly and Person A must catch it 4.The distance on the ruler level with the top of person A's thumb is recorded 5.Repeat this three times. 6.Repeat steps 1-5 after a factor has been changed 7.Use conversion table to convert ruler measurements into reaction time.

Reflex arc
Stimulus → receptor → sensory neurone → relay neurone → motor neurone → effector → response
Hot pan → pain receptors → sensory neurone → relay neurone → motor neurone → hand muscles → release pan

Endocrine system	
Term	**Definition**
Endocrine system	Hormonal system - involves glands, hormones and blood vessels
Hormones	Chemical messengers released by glands that travel in bloodstream

Negative feedback (HT only)	
Key term	**Definition**
Thyroxine	Stimulates the basal metabolic rate. Plays an important role in growth and development
Adrenaline	Produced in times of fear or stress. Increases the heart rate (more O_2 and glucose delivery to brain and muscles). Prepares you for 'flight or fight'

Major glands in body



Science - B2 - Homeostasis and response

Blood glucose

Pancreas **monitors** glucose level

If level too high, pancreas releases INSULIN

INSULIN causes uptake of glucose by cells that convert glucose to GLYGOGEN (in liver and muscles)

HT ONLY - If level too low, pancreas releases GLUCAGON

HT ONLY - GLUCAGON causes glycogen to be converted into glucose

Glucose levels return to normal

Diabetes

Type 1	Type 2
Pancreas fails to produce enough insulin	Cells can no longer respond to insulin
	Treated with carbohydrate controlled diet and exercise
Treated with insulin injections	Risk factor - obesity

Menstrual cycle

Key term		Definition
Menstruation		Uterus lining sheds
Ovulation		Egg is released from ovary
Fertilisation		Egg and sperm join
Hormone	**Gland**	**Function**
FSH	Pituitary gland	Matures the egg
Oestrogen	Ovaries	Thickens uterus lining. Inhibits FSH
LH	Pituitary gland	Releases the egg (ovulation)
Progesterone	Ovaries	Maintain uterus lining

Contraceptives

Hormonal	Non-hormonal
Oral contraceptive (the pill) – contains oestrogen to inhibit FSH and stop egg maturing	Barrier methods (condom/ diaphragm) – prevent sperm reaching egg
Skin patch, injection, implant – contains progesterone to inhibit maturation and release of egg for several months/ years	Abstaining from intercourse when egg may be in oviduct
	Surgical methods - sterilisation
	Spermicidal agents – kill/ disable sperm
Intrauterine device – prevents implantation of egg into uterus/releases hormone	

Fertility treatment (HT only)

Key term	Definition
Fertility drug	FSH/LH given to mature and release more eggs
IVF (in vitro fertilisation)	Fertility drug given → eggs collected and fertilised artificially → fertilised eggs develop into embryos → implanted into mother's uterus
Problems with IVF	• Emotionally and physically stressful • Success rates are low • Can lead to multiple births which are a risk to both the babies and the mother

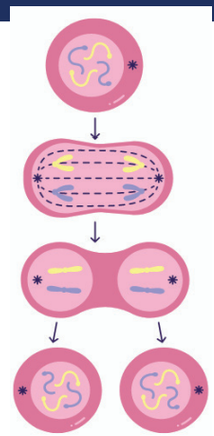
Science - B2 - Inheritance, variation and evolution

Reproduction and genetics	
Term	**Definition**
Sexual reproduction	2 parents, genetic variation in offspring
Asexual reproduction	Only one parent, produces clones (genetically identical offspring)
Gamete	Sex cell e.g. sperm/pollen and egg
DNA	Polymer, made up of two strands forming a double helix
Gene	Small section of DNA on a chromosome, that code for a particular protein
Genome	Entire genetic material of an organism
Chromosomes	Humans have 46 chromosomes in each cell, except gametes have 23 (half)
Sex chromosomes	Females – XX, males - XY

Inheritance	
Term	**Definition**
Allele	A version of a gene
Dominant	Only 1 copy of allele is needed for condition to be expressed (e.g. DD or Dd)
Recessive	2 copies of the allele are needed for condition to be expressed (e.g. ff)
Homozygous	Same alleles present (e.g. FF or ff)
Heterozygous	Different alleles present (e.g. Ff)
Genotype	The combination of alleles
Phenotype	The characteristic expressed
Polydactyly	Condition where individual has extra fingers and toes – caused by a dominant allele
Cystic fibrosis	Disorder of cell membranes – caused by recessive allele
Characteristics controlled by a single gene	Fur colour in mice, red-green colour blindness in humans

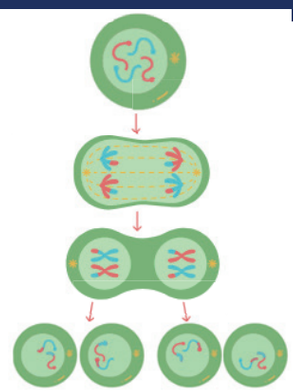
Mitosis	
Produces all body cells (except gametes)	
A	Chromosomes in nucleus are **duplicated**
B	Cell divides into two genetically identical daughter cells. Same number of chromosomes as parent cell

Meiosis	
Produces GAMETES ONLY	
A	Chromosomes are duplicated
B	The cell divides twice to form four daughter cells, each with half chromosomes of parent cell



Mitosis

Each daughter cell is identical to the parent cell



Meiosis

This results in 2N daughter cells (gametes)

Variation and evolution	
Term	**Definition**
Causes of variation	Genetics (inherited e.g. eye colour), environment (developed characteristics e.g. scar), combination (both e.g. weight)
Evolution	Theory of Charles Darwin. Caused by natural selection. All organisms have evolved from simple life forms. Started billions of years ago
Evidence for evolution	Fossil records and antibiotic resistance in bacteria
Fossil formation	• Hard parts being replaced by minerals • Parts of organism not decaying (e.g. preserved in ice) • Traces of organisms preserved (e.g. footprints)
Gaps in fossil record	Many organisms soft bodies so no fossilisation, some fossils have not been discovered yet, and some destroyed by geological activities
Opposition to evolution	Ideas not originally accepted: • Not enough evidence • Didn't know mechanism of inheritance (genes)
Evolutionary tree	Method used to show how scientists believe organisms are related

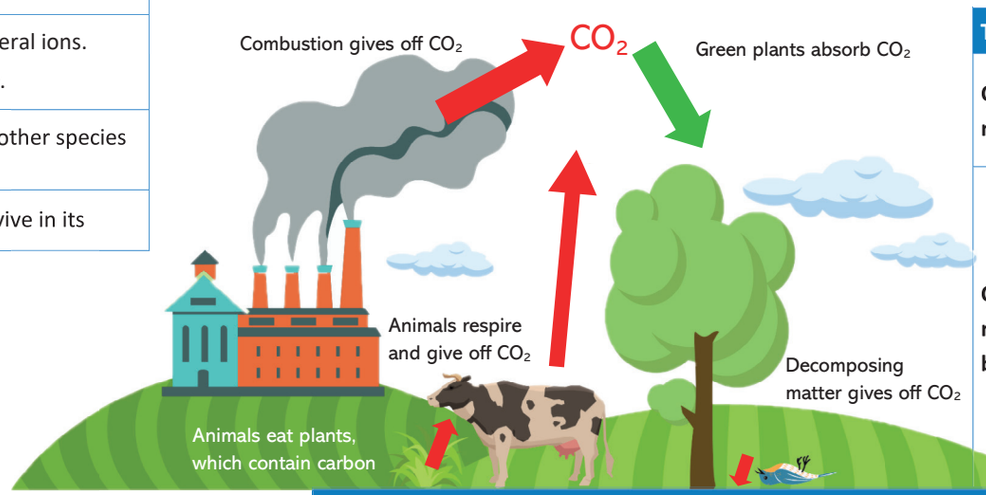
Science - B2 - Ecology

Ecosystems

Term	Definition
Habitat	The area in which an organism lives.
Individual	Single organism
Population	Collection of organisms of the same species in a habitat
Community	Collection of populations in a habitat
Ecosystem	The interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of the environment.
Competition	Plants compete for light, space, water and mineral ions. Animals compete for food, mates and territory.
Interdependence	Within a community each species depends on other species for food, shelter, pollination etc.
Adaptations	A feature an organism has that allows it to survive in its

Biodiversity

Biodiversity	The variety of all the different species of organisms in an ecosystem.
Factors that reduce biodiversity	Destruction of peat bogs, destroying habitats, releasing carbon dioxide into atmosphere (global warming), pollution, deforestation
Maintaining biodiversity	Breeding programmes, protection and regeneration of habitats, keeping hedgerows in farmers' fields, reduction of deforestation and carbon dioxide emissions, recycling rather than using landfill



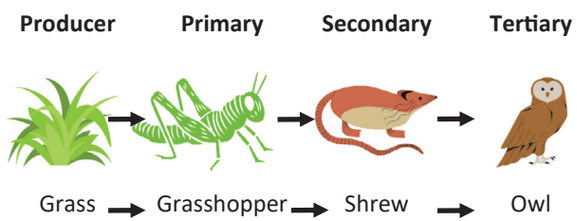
The Carbon Cycle

CO_2 removed	Photosynthesis (plants)
CO_2 released by:	Respiration (plants and animals), combustion (of fossil fuels), Decay and decomposition, destruction of

Biotic and Abiotic Factors

Biotic factors	Availability of food, new predators, new pathogens, other species outcompeting each
Abiotic factors	Light intensity, temperature, moisture levels, oxygen levels, wind intensity, carbon dioxide levels, soil pH.

Food chain



Pollution

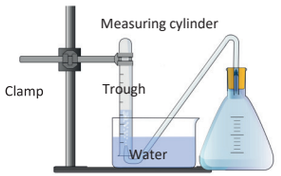
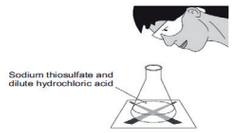
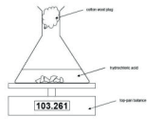
Water	From sewage, fertiliser or toxic chemicals
Air	From smoke and acidic
Land	Landfill and from toxic

Sampling techniques

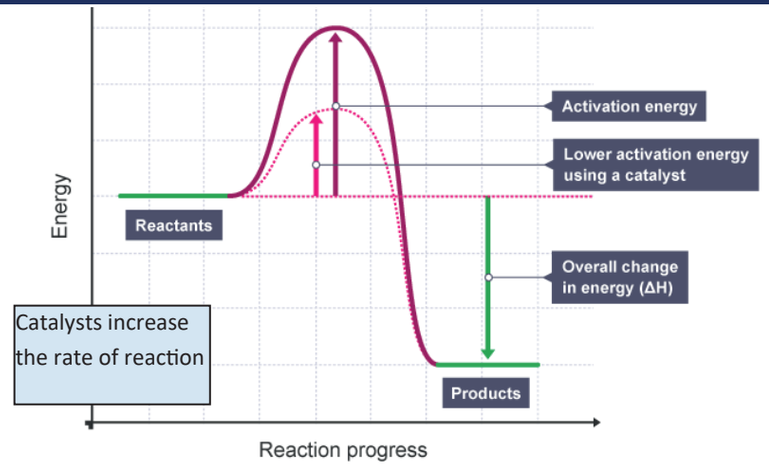
	Random sampling	Transect line
Use	• Used to count total number of organisms in an area	• Used to see pattern of organisms e.g. through a forest/across a river
Method	• Randomly place quadrat (to avoid bias) and count number of organisms. • Repeat 10 times and calculate a mean. • Work out area of field and area of quadrat. • Calculate total organisms by multiplying mean by number of quadrats that could fit in field	• Place a transect line using a 30m tape measure • Place the quadrat at 0m and count organisms. Record distance and organism number in table • Move quadrat to 5m and repeat, moving 5m each time • Plot a graph to see pattern of results

Science - C2 - Rate of Reaction

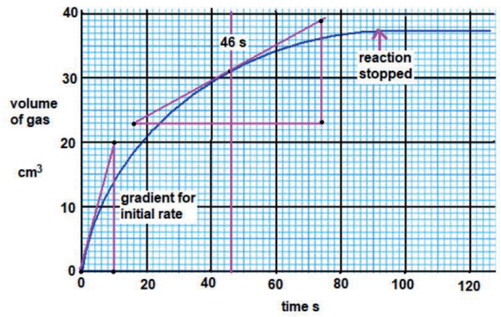
Key concepts	
Key term	**Definition**
Rate of reaction	mass/volume of product formed or used up per unit time
The rate of reaction depends on (collision theory)	1. frequency of collisions between reacting particles 2. energy transferred during successful collisions 3. activation energy – the minimum energy that particles must have to successfully collide and form bonds
Mean rate of reaction	$\frac{\text{quantity of reactant used}}{\text{time taken}}$ OR $\frac{\text{quantity of product formed}}{\text{time taken}}$
Factors affecting rate of reaction	1) concentrations of reactants in solution 2) pressure of reacting gases 3) surface area of solid reactants 4) temperature of the reactants 5) presence of catalysts

Methods		
Measure the volume of gas produced. e.g. magnesium metal & dilute hydrochloric acid produces hydrogen gas	**Timing the formation of product**, e.g. sodium thiosulfate & hydrochloric acid makes a cloudy yellow precipitate, which is turbid (opaque).	**Measure the change in mass** e.g. calcium carbonate in dilute acid will release CO_2 into air
		

The effect of changing conditions on equilibrium—Le Chatelier's principle (HT only)		
CONCENTRATION	**TEMPERATURE**	**PRESSURE**
If the concentration of a reactant is increased, more products will be formed until equilibrium is reached again.	If the temperature is increased the relative amount of products at equilibrium increases for an endothermic reaction and decreases for an exothermic reaction.	An increase in pressure causes the equilibrium position to shift towards the side of the equation with fewer molecules.



Reversible reactions (products of the reaction can react to produce the original reactants)	
$A + B \rightleftharpoons C + D$	Equilibrium is reached when the forward and reverse reactions occur at exactly the same rate in a closed system
If it is exothermic in one direction, it will be endothermic in the other direction	The direction of reversible reactions can be changed by changing the concentration



Calculate the rate of a reaction by dividing the change in quantity of reactant (or product) by time taken.

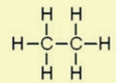
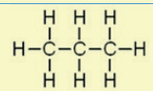
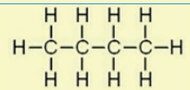
steeper gradient means faster rate of reaction.

Science - C2 - Organic Chemistry

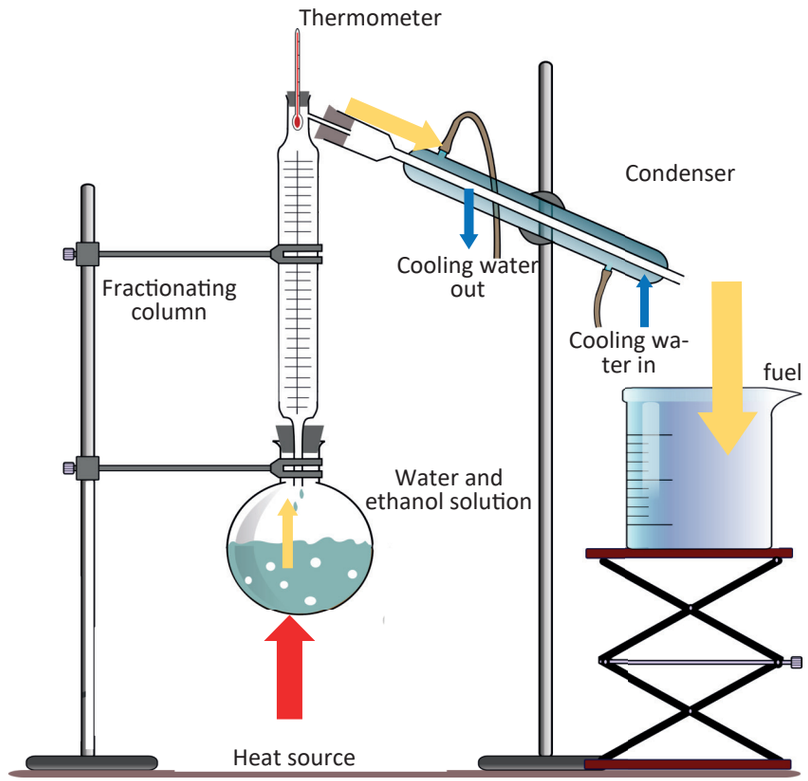
Key words	
Term	**Definition**
Crude oil	Crude oil is a mixture made up of mostly hydrocarbons from the remains of plants and animals from millions of years ago, mostly plankton
Hydrocarbon	A compound made from hydrogen and carbon atoms **only**
Fractional distillation	A process that separates crude oil into different fractions depending on its boiling point by evaporation and allowing to condense at different temperatures
Alkane	A saturated hydrocarbon, single bonds between carbon atoms (used mainly as fuels)
Alkene	An unsaturated hydrocarbon, containing a double bond between two adjacent carbon atoms (used mainly to make polymers, e.g. plastics)
Cracking	The breakdown of a long chain alkene into a shorter chain alkane and a shorter chain alkene, by using steam or a catalyst
General formula for an alkane	C_nH_{2n+2}

Combustion	
Complete combustion	Hydrocarbon + oxygen —> carbon dioxide + water
Incomplete combustion	Hydrocarbon + (lack of) oxygen —> carbon monoxide + carbon + water

The properties of hydrocarbons	
Property	**Definition**
Flammability	The ability of a chemical to burn or ignite
Viscosity	A measure of a fluid's resistance to flow
Boiling point	The temperature at which a liquid changes into a gas

Alkanes			
	Name	**Formula**	**Structure**
1	**Methane**	CH_4	
2	**Ethane**	C_2H_6	
3	**Propane**	C_3H_8	
4	**Butane**	C_4H_{10}	

Testing for alkanes and alkenes	
Alkanes	Bromine water will remain orange
Alkenes	Bromine water changes from orange to colourless

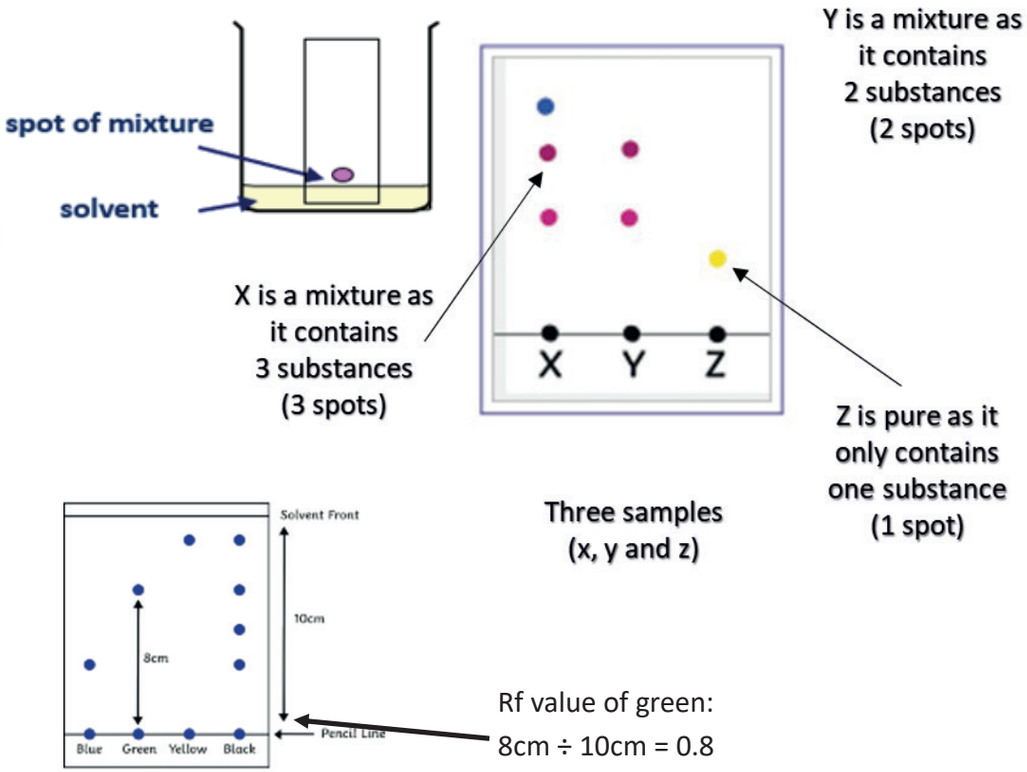


Science - C2 - Chemical Analysis

Key words	
Term	**Definition**
Pure substances	Made up of one compound or element only
Impure substances	Made up of more than one element and/or compound
Formulation	A mixture that has been designed as a useful product
Chromatography	Technique used to separate mixtures of soluble substances
Solvent	Liquid part of a solution
Solute	Solid part of a solution
Solution	A dissolved solute in a solvent
Soluble	Can dissolve in a solvent
Insoluble	Cannot dissolve in a solvent

Chromatography	
Term	**Definition**
Mobile phase	• **Solvent** is the mobile phase**.** The substances dissolve in the Solvent.
Stationary phase	• Does not move • The paper is the stationary phase
Rf Value	This is the ratio of the distance moved by a substance to the distance moved by the compound, and can be calculated using: Rf = distance travelled by the substance ÷ distance moved by the solvent
Solubility	How easy it is for a substance to dissolve. How soluble a substance is determines how far it travels across paper.

5.8.2 Gas tests	
Oxygen, O_2	Place a glowing splint inside a test tube. The splint will relight in the presence of oxygen.
Hydrogen, H_2	Place a burning splint at the opening of a test tube. If hydrogen gas is present, it will burn with a squeaky-pop sound.
Chlorine, Cl_2	Damp litmus paper is held over the of gas. If the tube contains chlorine, the litmus paper becomes bleached and turns white.
Carbon dioxide, CO_2	Bubble the gas through the lime water. If the gas is carbon dioxide, the limewater turns cloudy.



Science - C2 - Chemistry of the atmosphere

Proportions of gases in today's atmosphere (last 200 million years)

1	78% nitrogen
2	21% oxygen
3	1% other gases including carbon dioxide, water vapour and noble

The Earth's early atmosphere (from 4.6 billion years ago)

1	Intense volcanic activity released gases, mainly CO_2, that formed the early atmosphere and water vapour that condensed to form the oceans. (Atmosphere was similar to Mars and Venus today)
2	Volcanoes produced nitrogen and small proportions of methane and ammonia
3	When oceans formed, CO_2 dissolved in the water and carbonates were precipitated as sediments, reducing CO_2 in the atmosphere.

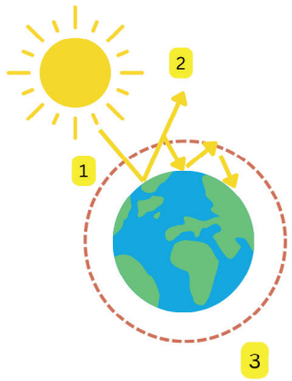
How oxygen increased

1	Algae and plants produced the oxygen that is now in the atmosphere by photosynthesis.
2	$6\ CO_2 + 6\ H_2O \rightarrow C_6H_{12}O_6 + 6\ O_2$ Carbon dioxide + water —> glucose + oxygen
3	Algae first produced oxygen about 2.7 billion years ago; oxygen levels have gradually increased to a level that allowed animals to evolve.

How carbon dioxide decreased

1	Algae and plants decreased the percentage of carbon dioxide in the atmosphere by photosynthesis
2	Carbon dioxide was also decreased by the formation of sedimentary rocks, such as limestone, and fossil fuels, such as coal oil and natural gas, that contain carbon.

Enhanced greenhouse effect



1	Short wave electromagnetic (EM) radiation from the sun, penetrates the atmosphere
2	Earth absorbs energy and re-emits longer wave EM radiation (infra-red)
3	Greenhouse gases in the atmosphere absorb EM radiation
4	Atmosphere maintains more heat; temperature remains higher than it would otherwise be

Global climate change

Increasing global temperature is **causing** climate change.

Effects of climate change include:

Melting ice caps

Rising sea levels

More severe storms

Carbon footprint

Carbon footprint	Total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product service or event
How to reduce carbon footprint	An individual's impact on carbon footprint may be limited to cutting their own use of fossil fuels

Common atmospheric pollutants and their sources

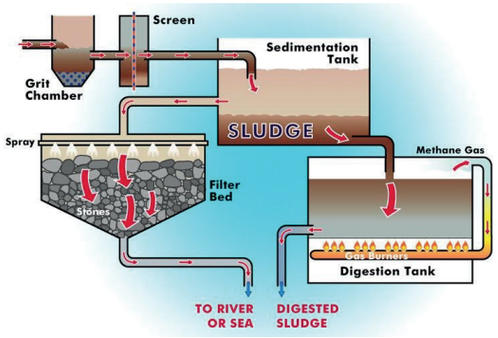
Pollutant	Source	Effect
Carbon monoxide (CO)	Incomplete combustion of fossil fuels (colourless and odourless)	TOXIC: Carried in the blood instead of oxygen
Sulfur dioxide and oxides of nitrogen (SO_2 / NO_x)	Fossil fuels and the internal combustion engine	Acidic gases: respiratory problems and acid rain.
Particulates	Unburned hydrocarbons and other solids (soot)	Global dimming and health problems for humans.

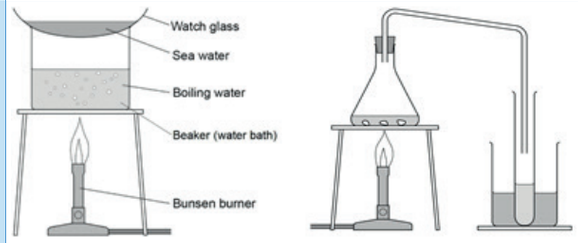
Carbon Dioxide and Methane as Greenhouse Gases

Greenhouse gases	Carbon dioxide (CO_2), methane (CH_4), water vapour (H_2O)
Human activities increasing greenhouse gases	Combustion of fossil fuels, livestock, farming

Science - C2 - Using resources

Earth resources	
Natural resources	Food, building material (timber), clothing and fuel for warmth
Sustainable	Development that meets the needs of current generations without
Finite	Will eventually run out
Potable water	Water that is safe to drink (Sufficiently low levels of dissolved salts
HT only – alternative methods of extracting metals	
Phytomining	Plants to absorb metal compounds. The plants are harvested and
Bioloeaching	Bacteria oxidise metals to produce metal ions; metal compounds now
Displacement	Using waste iron to displace copper from its compounds
Electrolysis	Using an electric current to separate ions from solution

Waste water treatment	
1) **Screening** and **grit removal** 2) **Sedimentation to produce sewage sludge** (solid settles out) and effluent (liquid part at the top) 3) **Anaerobic digestion of sewage sludge** (microbes do not need oxygen) 4) **Aerobic biological treatment of effluent** (microbes breaking down liquid waste)	
Sewage and waste water	Requires treatment before being released into the environment (see 4 stages above)
Sewage and agricultural waste	Requires removal of organic matter and microbes
Industrial waste water	Requires removal of organic matter and harmful chemicals

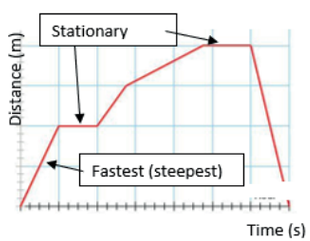
Potable water	
Potable water	Water that is safe to drink (sufficiently low levels of dissolved salts and microbes)
Most potable water is produced by…	1) choosing an appropriate source of fresh water 2) passing the water through filter beds 3) sterilising (killing microbes using; ozone, chlorine, or UV light)
Desalination is used when freshwater is limited, and only salty (e.g. sea) water is available.	Distillation or reverse osmosis; both require large amounts of energy
REQUIRED PRACTICAL: Investigate three water samples from different sources for pH and the presence of dissolved solids; using distillation/evaporation, measuring mass before and after evaporation to detect dissolved solids.	

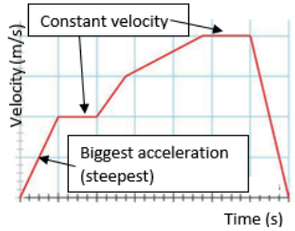
Life Cycle Assessments	
Life cycle assessments (LCA)	Carried out to assess the environmental impact of a product at all stages of its development
Stages of a product's life (all to be assessed for their environmental impact)	• Extracting and processing raw materials • Manufacturing and packaging • Use and operation during its lifetime • Disposal at the end of its useful life • Transportation and distribution at each stage
Limited raw materials produce…	Metals, glass, building materials, clay ceramics and most plastics, and the energy required to make them
Ways of reducing the use of resources	• Recycling, re-using, reducing use, e.g. glass bottles • Scrap iron added to a blast furnace to reduce extraction of iron ore

Science - P2 - Forces and motion

Forces and motion	
Key term	**Definition**
Scalar	A scalar quantity has a magnitude (size) only
Vector	A vector quantity has both a magnitude (size) and a direction
Contact force	A force caused by objects physically touching each other
Non-contact force	Forces where the objects are separated, they do not need to be physically touching.
Resultant force	Result of forces interacting (sum or difference)
Weight	The force acting on an object due to gravity (caused by Earth's gravitational field)
Centre of mass	Point at which an object's weight is considered to act
Newton-metre	Device to measure weight in Newtons (N)
Free fall	Acceleration when free falling = 9.8 ms/^{2}
Terminal velocity	When air resistance and weight are equal, no resultant force acts so object reaches a constant velocity

Momentum	
Conservation of momentum	Momentum before and after a collision/ explosion is the same





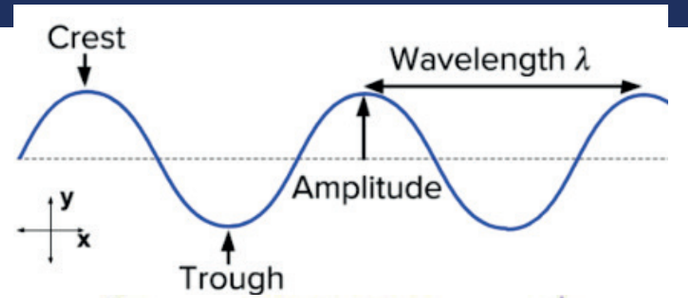
Newton's Laws of Motion	
First Law	If no resultant force is acting on an object, it will continue to move at same speed in same direction
HT ONLY – Inertia	The tendency of objects to continue in their state of rest or of uniform motion
Second law	Force = mass x acceleration
HT ONLY – Inertial mass	A measure of how difficult it is to change the velocity of an object ($interial\ mass = \frac{Force}{acceleration}$)
Third law	For a pair of interacting objects, the forces they exert on each other are equal but opposite
~	Approximately equal symbol

Speed	
Walking	1.5 m/s
Running	3 m/s
Cycling	6 m/s
Speed of sound	330 m/s
Speed of light	300,000,000 m/s (300 million)
Factors affecting speed	Age, terrain, fitness and distance travelled

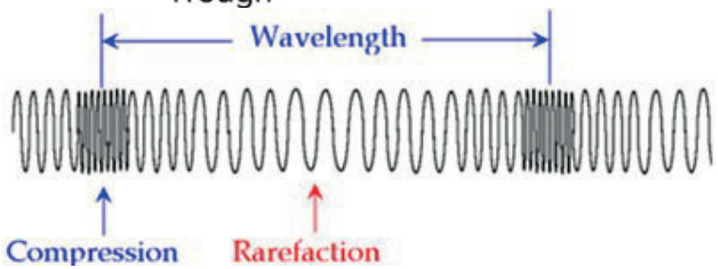
Stopping distance	
Stopping distance	The sum of the distance travelled during the reaction time plus the distance travelled under the braking force (Thinking distance + braking distance)
Reaction time	Typically 0.2 to 0.9s
Factors that affect thinking distance	Speed, tiredness, drugs and alcohol. Distractions may also affect a driver's ability to react
Factors that affect braking distance	Speed, adverse road and weather conditions (wet/ icy) and poor condition of the vehicle (worn brakes/ tyres)
Dangers	Rapid deceleration can lead to overheating of brakes and/or loss of vehicle control

Science - P2 - Waves

Describing waves	
Term	**Definition**
Amplitude	distance from rest position to maximum displacement
Wavelength	The distance from a point to the same point on the next wave
Frequency	The number of waves passing a point per second. Unit: Hz
Period	The time for one wave to pass a given point
Oscillation	Movement back and forth
Wave	Transfer of energy with no transfer of matter
Transverse wave	Oscillations perpendicular to direction of energy transfer (e.g. EM wave, ripples on water)
Longitudinal wave	Oscillations are parallel to direction of energy transfer (e.g. sound). Show areas of compression and rarefaction (spread out)

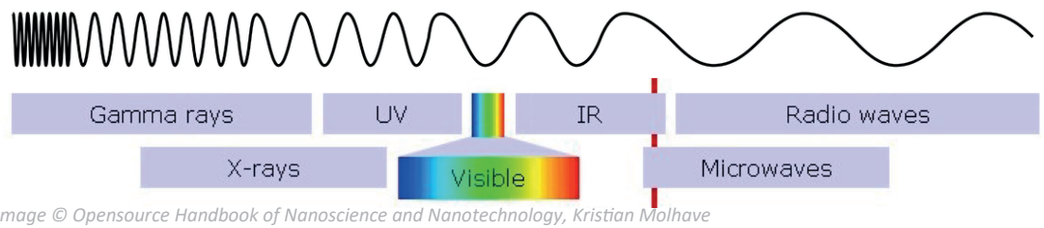


Transverse



Longitudinal

Electromagnetic (EM) spectrum



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Short wavelength
High frequency
High energy

Long wavelength
Low frequency
Low energy

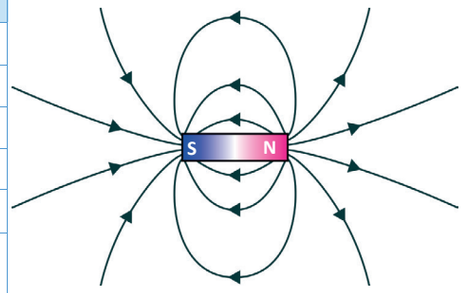
Properties of EM Waves and Sound Waves		
Property	**EM Wave**	**Sound Wave**
Speed	300,000,000 m/s	330 m/s in air
Medium it can travel through	Can travel through anything, even a vacuum (space)	Solids, liquids, gases
Type of wave	Transverse	Longitudinal
Risk	UV, x-rays and gamma rays are ionising (damage cells)	Hearing damage

Uses and Risks of EM Radiation		
EM Wave	**Use**	**Why it's suitable (HT ONLY)**
Radio Waves	Television and radio	Reflected by ionosphere so can broadcast over long distances
Microwaves	Satellite communications, cooking food	Able to pass through the atmosphere to satellites. Has a heating effect
Infrared	Electrical heaters, cooking food, infrared cameras	Has a heating effect. Emitted by objects so can be detected
Visible Light	Fibre optic communications	Able to pass along a cable by total internal reflection
Ultraviolet	Energy efficient lamps, sun tanning	Increases amount of melanin (brown pigment) in skin
X-Rays	Medical imaging and treatments	Absorbed by bone but transmitted through soft tissue
Gamma Rays	Medical imaging and treatments	Able to pass out of body and be detected by gamma cameras. Can kill cancerous cells

Science - P2 - Magnets and Electromagnets

Magnets	
Term	**Definition**
Magnetic field	Where magnetic force is experienced. Always goes N to S
Poles	The ends of a magnet, where magnetic force is strongest
Repulsion	Force between two like poles (N to N or S to S)
Attraction	Force between two unlike poles (N to S)
Permanent magnet	Produces its own magnetic field
Induced magnet	A material that becomes magnetic when placed in a magnetic field. Temporary magnet. Cannot be repelled
Magnetic materials	Iron (steel), cobalt and nickel

Field around bar magnet



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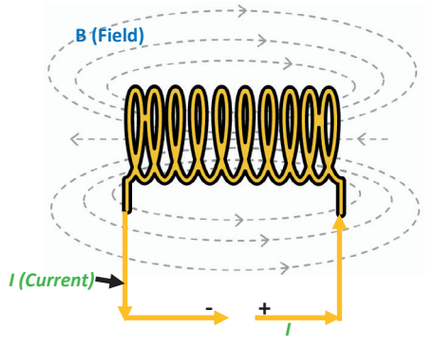
Field around solenoid



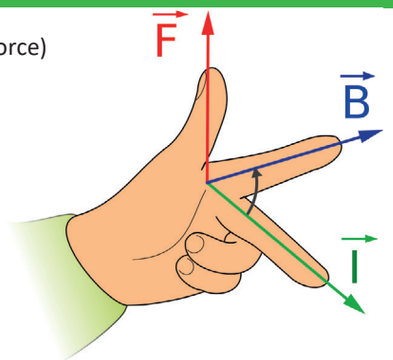
Electromagnets	
Term	**Definition**
Electromagnet	Created by a flow of charge through a wire (current flows + to -)
Solenoid	Coil of wire. Magnetic field similar to bar magnet
Increasing strength	3 C's: Coil the wire, or add more coils Increase the current Add an iron core

HT ONLY - Motors	
Term	**Definition**
Motor effect	When a wire carrying a current is placed in a magnetic field, the field interact causing a force to be exerted
Electric motor	A coil of wire carrying a current in a magnetic field rotating
Fleming's left hand rule	Used to determine direction of rotation of motor

HT ONLY - Fleming's Left Hand Rule

Motion (Force)

(Thu**M**b)



Magnetic **F**ield

(**F**irst finger)

Current

(se**C**ond finger)

Im-

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Geography

Paper 1 Geography - Command Words

Command word	What does it mean?	Marks	Structure	Sentence starters
Assess	Make a judgement	6, 9	**AKUUa x2 + Conc**	AKUUa paragraph: … to a large/small extent. For example… This means… therefore… However, …
Calculate	Work it out	1, 2	Show your working!	Check to see how many decimal places
Compare	Similarities and differences	2, 3	Number of marks = number of state-ments	…whereas…/…however, …/…but…
Contrast	Differences			
Describe (the pattern or trend)	Say what you see in the graph, figure, or map	2, 3	GEO	In general, … For example…and… However,
Discuss	Positives and negatives	6,9	**AKUUa x2 + Conc**	AKUUa paragraph: … to a large/small extent. For example… This means… therefore… However, …
Evaluate	Judge using evidence	6, 9	**AKUUa x2 + Conc**	AKUUa paragraph: … to a large/small extent. For example… This means… therefore… However, …
Explain	Give reasons	2, 4, 6	KUU x2	[Fig X shows…] …This means…Therefore…
Explain the for-mation…	Give reasons	4, 6	POS	Firstly… Over time, … Eventually…
Outline	Briefly explain	2, 3	KUU	…This means…Therefore…
Suggest	Give reasons	2, 4, 6	KUU x2	Fig X shows… This means… Therefore…
To what extent…	Judge the level to which you agree	6, 9	**AKUUa x2 + Conc**	AKUUa paragraph: I agree to a large/small extent. For example… This means… therefore… However, …
Using your own knowledge	Case study details	Any	Check command word	Check the command word above.
Using Figure X…	Refer to the figure using words or numbers	Any	Check command word	Spend 30 seconds annotating the figure. Figure X shows…

Paper 1 Geography - Natural Hazards

1. Natural hazards

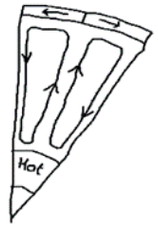
Term	Definition
Natural hazard	A natural event that threatens people or causes damage. *E.g.* earthquakes
Tectonic hazards	Caused by movement of the tectonic plates (volcanoes and earthquakes).
Atmospheric hazards	Created in the atmosphere (tropical storms, drought, tornadoes).
Hazard risk	The chance that a natural hazard may take place.
Earthquake	A sudden movement within the Earth's crust.
Volcano	An opening in the Earth's crust from which lava, ash and gases erupt.
Factors increasing hazard risk Why do more people die in some events than others?	
Vulnerability	More people living are living in dangerous areas.
Capacity to cope	Poverty means people can't afford protection/ planning e.g. can't evacuate.
Nature of the NH	Higher magnitude earthquakes = higher risk.

3. Distribution of tectonic hazards

Plate margin	The boundary between two tectonic plates.
Tectonic plate	A rigid segment of the Earth's crust.
Hazard	**Distribution**
Volcanoes	At destructive + constructive margins.
Earthquakes	Mostly on plate margins. (All margins)

2. Plate tectonic theory

Theory	Explanation
Convection currents	Occur in the mantle. The heating and cooling of magma makes currents which move the plates.



Structure of the earth

Crust	The crust is made up of 7 large tectonic plates.	
	Oceanic crust	Thin. Dense. Can be made and destroyed.
	Continental crust	Thick. Less dense. Older, never destroyed.
Mantle		Semi molten rock. Convection currents occur here.
Outer core		Liquid. Iron and nickel.
Inner core		Solid. 5500°C.

5. Key terms

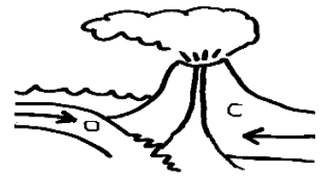
Key term	Definition
Primary effects	The initial impact caused directly by the event. *E.g.* buildings collapse.
Secondary effects	The aftereffects that occur as indirect impacts. *E.g.* People are homeless.
Immediate responses	The reaction of people as the disaster happens and immediately after.
Long term responses	Later reactions that occur in the weeks, months and years after.

4. Plate margins

Include processes and ensure correct sequence.

Destructive margins

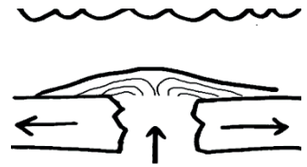
Composite volcanoes.
Earthquakes.



Convection currents move two plates towards each other.
The oceanic plate is denser and so **subducts**
Due to **friction**, the oceanic plate melts.
Pressure builds up. Magma is eventually released in an explosive eruption**.**

Constructive margins

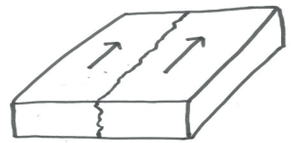
Shield volcanoes.
Earthquakes.



Convection currents move plates apart.
Magma from the mantle rises through the gap.
Runny lava travels a long distance before cooling.
A **shield volcano** is formed.

Conservative margins

Earthquakes.
NO volcanoes.

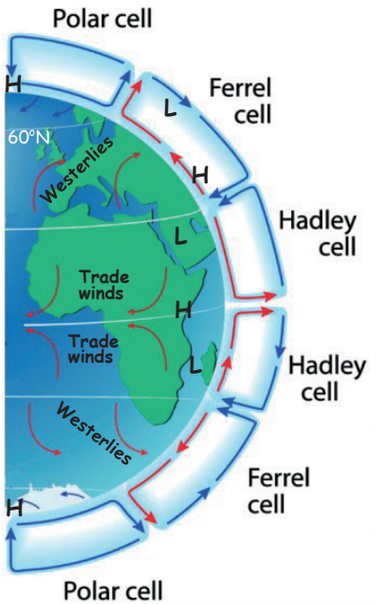


- Convection currents move the plates side by side.
- Friction builds up causing tension.
- Eventually the tension will be released as an earthquake.

6. Tectonic hazards vary between contrasting levels of wealth			
	LIC $1190	HIC $40,000	Explanation
Earthquake	Nepal 2015	New Zealand 2016	
Primary effects	9000 died. 800,000 buildings destroyed. US$5 billion in damages.	2 died. Tens of 1000's of homes damaged. US$8.5 billion in damages.	NZ's buildings are EQ proof. Poor quality in Nepal.
Secondary effects	4 million homeless, no water. Avalanches killed 18 people	100, 000 landslides 60 people needed emergency housing	NZ damage costs ↑ as expensive infrastructure.
Immediate responses	India– search/rescue 15mins Red cross set up emergency shelters for 130,000 families	200 evacuated in 24 hours. Power restored in 24 hrs.	Not adequate in Nepal, relied on aid. NZ had plans.
Long term responses	Took 2 years to repair road to Tibet.	Road/rail repaired in 2yrs.	Slow in Nepal. Very fast in NZ as more money.

7. Why do people continue to live in areas at risk from tectonic hazards?	
Factor	**Explanation**
Always lived there	Don't want to leave family / friends.
Poverty	People can't afford to leave.
Benefits	Volcanoes have fertile soil and geothermal energy. (Economic)
Protection	Earthquake proof buildings make people feel safe.

8. Management can reduce the risks from tectonic hazards				
	Planning	**Prediction**	**Protection**	**Monitoring**
Definition	Actions planned in advance to help communities to respond to disasters.	Attempts to forecast when and where a natural hazard will occur.	Actions taken before a hazard strikes to reduce its impact. Normally built things.	Recording physical changes to help predict.
Earthquake examples	Educate people to know what to do (drills) Plan evacuations. Stockpile emergency supplies i.e. water.	Can't reliably be done for Earthquakes.	Earthquake resistant buildings i.e. reinforced concrete. Bird cage frames, rubber in foundations.	Seismometers. Only gives a SMALL warning time.
Volcanoes examples		Can be done if volcano is well monitored. *E.g.* rising sulphur levels.	Roofs strengthened (heavy ash).	Seismometers, gases released, changes in shape of the volcano.
How does it reduce the risks?	Less people are vulnerable. Often more efficient in HICs.	Allows evacuation, which can reduce deaths and injuries.	Buildings less likely to collapse reducing injury. But expensive.	Allows a warning to be given to put plans in place like evacuation.

9. Global atmospheric circulation	
Factor	**Explanation**
Global atmospheric circulation	Worldwide system of winds, which transport heat from the equator to the poles.
Key information	Wind is air blowing from HIGH to LOW pressure. The circulation occurs as CELLS. Low pressure = Rising air = Rain. High pressure = Sinking air = Clear skies.
	At the poles 90°N an, cool air sinks creating high pressure. (<250mm rainfall). At 60°N air rises creating low pressure. The UK experiences low pressure weather. At 30°N air sinks creating high pressure (deserts <250mm rain). On the equator 0° air rises as the sun's heat is most concentrated. This creates low pressure with high rainfall. (Rainforests >2000mm of rain).

10. Weather hazards in the UK	
Hazard	**Example**
Extreme weather	A weather event that is significantly different from the average pattern and is especially severe or unseasonal.
Strong winds	Damage property / disrupt transport. Storm Ali 2018
Heavy rain	Can cause flooding, costing millions. 2013-14 Somerset Levels
Snow	Injury, death, travel disruption. 2018 Beast from East.
Drought	Crop failure, rules to conserve water. 2022 was drier than average
Heatwaves	Pollution builds up- breathing problems, death. BUT tourism benefits. 2022 was one of the hottest summers recorded

11. Evidence that weather is becoming more extreme…	
Our weather is naturally variable BUT extreme events are becoming more common and severe.	
Hazard	Example
Temperature	10 warmest years all occurred since 2002. Dec 2010 coldest month for 100 years.
Rainfall	More rainfall records broken between 2010 - 2014 than in any other decade.

12. An example of an extreme weather event in the UK	
Name	2013-14 Somerset Levels Flooding
Causes	3x average amount of rainfall Saturated ground coincided with high tides and storm surges Rivers had not ben dredged for 20 years
Impacts	Local companies lost more than £1.2 million in business More than 600 homes were flooded 11,500 hectares flooded, including farmland.
Management strategies	**Immediate responses** Met Office warnings to find emergency accommodation Used sandbags to limit flood damage to homes **Long term responses** Regular dredging of the rivers Parrett and Tone Widening the river channels
Flooding is likely to become more frequent as climate change increases global temperature, leading to more evaporation and rainfall.	

13. Tropical storms

Hurricanes, cyclones, typhoons.
Low pressure, very powerful winds.
Calm central point called the eye of the storm.

Factor	Explanation
Global distribution	5^{o} – 30^{o} north and south of equator (sea temp warm).
Relationship with GACM	Trade winds (from high to low pressure) send tropical storms to west.
Structure	• Circular. • Eye- calm in centre (air ↓, LOW). • Eyewall- strong winds, torrential rain. • Edges- Wind speed falls, rain reduces.

How will climate change affect them?	
Distribution	Increase to higher latitudes (warmer sea temperatures).
Frequency	Number could increase. (Longer season)
Intensity	Stronger as more evaporation.

14. Formation of tropical storms

Include processes and ensure correct sequence.

Conditions	5-30^{o} latitude. > 60m ocean depth. Sea temperature > 27^{o}C. Form summer and autumn.

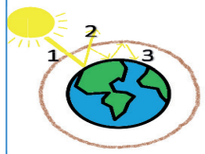
- Sun heats the ocean (27^{o}C) > **rapid evaporation**.
- **Condensation** occurs quickly = large clouds.
- The cloud starts to spin forming an eye.
- Due to rising air, a **low-pressure** area forms.
- Air rushes into this creating high wind speeds. (>74mph = **tropical storm**)
- The low-pressure sucks up the ocean forming a **storm surge**.

15. How can we reduce the impacts?

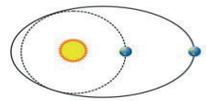
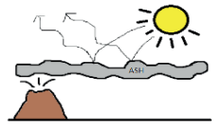
Strategy	Explanation
Prediction / monitoring	• Satellites monitor storms. • Computer models predict the track. • Allows warnings so people can evacuate or protect their home.
Planning	• Emergency services train and prepare. • Plan evacuation routes to reduces death
Protection	• Building design- stilts for flood risk. • Flood defences along the coasts. • Reduces the number of buildings destroyed so fewer injuries and deaths.

16. Tropical storms affect people and environments.

	Generic	Typhoon Haiyan 2013 Philippines
Primary effects	• Direct results of winds and rain. • Flooding, buildings destroyed, death.	• 6,201 deaths. • 1.1 million houses damaged. • 90% of Tacloban city destroyed.
Secondary effects	• Homelessness > lead to poor health. • Lack of sanitation > diseases (cholera) • Food shortages, price increase.	• 4.1 million homeless. • 1.1 million tonnes of crops destroyed (rice).
Immediate responses	• Evacuate before the storm. • Provide food, water, blankets.	• Philippines Red Cross delivered basic food aid. • 800,000 evacuated (warnings given 2 days early).
Long term responses	• Repair homes and infrastructure. • Promote economic recovery.	• More cyclone shelters built. • No build zones.

17. Climate change key terms	
Key term	**Definition**
Climate change	• A change in the global climate from the expected. • Natural or human causes.
Quaternary period	• 2.6 million years ago to today.
Glacial periods	• Colder periods of time.
Interglacials	• Warmer periods of time.
Greenhouse gases (GHGs)	• Water vapour, carbon dioxide, methane, nitrous oxide, ozone, CFCs
Enhanced greenhouse effect 	• Human activities release greenhouse gases (such as CO_2) • Greenhouse gases absorb more of the sun's energy. • Global temperatures increase.

18. Evidence for climate change	
Key term	**Definition**
Photos	• Comparing photos from the 1800's with today show glaciers have shrunk.
Ice cores	• Trapped bubbles of ancient air in ice that show amount of greenhouse gases. ↑ GHGs means a higher temp.
Tree rings	• Thinner rings indicate colder climates. Tell us about climate over 10,000 years.
Temperature records	• Records for the last 200 years using thermometers.

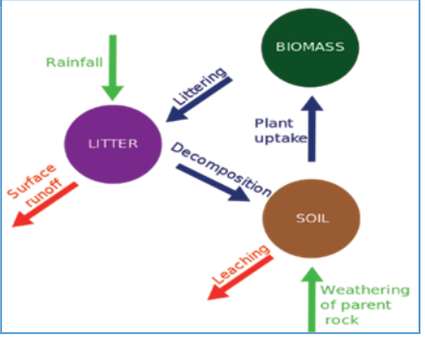
19. Causes of climate change		
Natural factors	**Orbital changes**	• Changes in the Earth's orbit from circular to elliptical. • During the circular rotation the earth is closer to the sun = warmer. 
	Volcanic activity	• Large volcanic eruptions emit ash/gases into the atmosphere. • These block out the sun and reduces temperatures for short periods of time (volcanic winters). 
	Solar output	• The sun's output of energy changes on a 11 year cycle. • When solar output increases the Earth experiences warmer climates.
Human causes	**Use of fossil fuels**	• CO_2 is released into the atmosphere when fossil fuels are burnt. • This occurs with cars, factories and to make electricity.
	Agriculture	• Farming of livestock produces lots of methane and we now eat more meat. • Rice farming also releases methane.
	Deforestation	• Plants remove CO_2 from the atmosphere during photosynthesis. • When we cut down trees we stop them absorbing more CO_2.

20. Effects of climate change	
On people	- Death rate has increased (some due to heat, some due to cold) - Migration needed from low-lying, coastal areas - Less clean water available + Higher temperatures bring more tourists to some areas.
Environment	- Ice caps melt - Sea levels rise: 82cm by 2100. - More extreme weather events (storms, fires)
Poor countries tend to suffer the most as they do not have the money to adapt effectively to climate change. They are also often located in more vulnerable areas.	

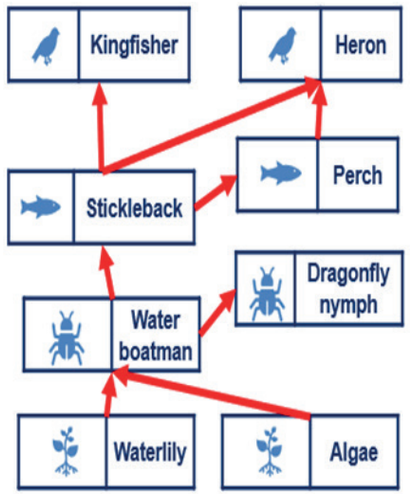
21. Managing climate change			
	Strategy	**Explanation**	**Evaluation**
Mitigation	**Action taken to the causes of climate change.**		
	International agreements e.g. COP 26/ Paris 2015 Agreement	In 2021, nearly 200 countries met for COP26. Countries agree to reduce use of fossil fuels.	+ Global reduction of CO_2 - Because of pressure from India and China, countries only agreed to reduce the use of coal, not ban it completely
	Planting trees e.g. Great Green Wall, northern Africa.	This increases the amount of carbon dioxide that is stored in trees.	+ Also has other environmental benefits (reduce flooding etc). - Takes a long time for trees to grow
	Alternative energy production e.g. Thanet Offshore Wind Farm, Kent.	Replace fossil fuels with renewable energy to reduce greenhouse gas emissions.	+ Reduces CO_2 emissions. - Expensive, needs large investment.
	Carbon capture and storage e.g. by Shell.	New technology which captures CO_2 and stores it safely underground.	+ Reduces CO_2 in the atmosphere - Expensive technology. Cost £1 billion per UK station converted.
Adaptation	**Actions taken to adjust the impacts of climate change.**		
	Drought resistant crops	Rainfall unreliable, temperatures ↑ but food can still be grown i.e. millet in Kenya.	+ People can keep farming. - Drought resistant seeds are more expensive, increasing food prices
	Water Butts	Collect rainwater to use during times of drought, recycle wastewater.	+ Collecting rainfall is cheap. Recycling wastewater requires energy e.g. burning fossil fuels. Depends on rainfall, doesn't work if there is no rainfall to collect.
	Building barriers e.g. Thames Barriers	Sea levels are expected to rise by 82cm by 2100. Physical defences like flood barriers can be built. Cheaper options= earth embankments or building houses on stilts.	+ Important as large areas are being affected. Can be unaffordable for LICs.

Paper 1 Geography - Living World

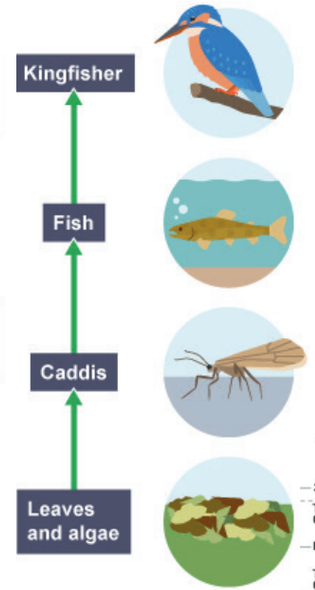
1. What is an ecosystem?	
Term	**Definition**
Ecosystem	A community of plants and animals (**biotic**) and their environment –**abiotic**
Biotic	Living elements e.g. plants, animals.
Abiotic	Non-living elements e.g. soil, climate.
Food web	A complex food chain.
Food chain	Arrows showing the flow of energy from producers to consumers.
Producer	A plant that can absorb energy from the sun through photosynthesis.
Consumer	Organisms that eat other organisms. Primary consumers - grasshoppers. Secondary consumers eat herbivores.
Decomposer	An organism that breaks down organic material and recycles nutrients to the soil. E.g. bacteria and fungi.
Nutrient cycle	A set of processes whereby organisms extract the nutrients necessary for growth from soil or water, before passing them on through the food chain. Decomposers ultimately return these back to the soil.



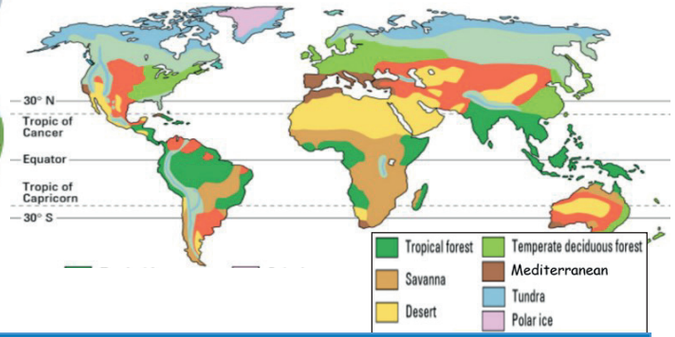
Slapton Ley Reed Bed Food Web



Food Chain



2. EG of a small-scale ecosystem	
Name	Slapton Ley Reed Bed
What?	Freshwater lagoon and reed bed. Site of special scientific interest (SSSI)
Inter-relationships	Margin provides shelter for insects. Pond surface allows fish to prey on insects like dragonflies. Decomposers live on the pond bottom.
	Fertilisers from fields draining into the pond may cause eutrophication. Increases algae but depletes oxygen.



3. Large scale natural ecosystems		
Biome	A large ecosystem.	
Name	**Distribution**	**Characteristics**
Polar	At the poles.	Very cold and dry all year round (<250mm). Ice.
Tundra	Along Arctic Circle.	Winters very cold, short summers, little rainfall.
Temperate deciduous	UK biome.	Trees lose their leaves in the winter. 4 seasons.
Mediterranean	40° – 45°N.	Hot and dry summer with mild winters.
Desert	Along the Tropics.	Hot 40°C (cold at night), very low rain (<250mm).
Savanna	Between 15° – 30°.	Grass land. (Lion King)
Tropical rainforests	Along the equator.	High temperatures and heavy rainfall (>2000mm). Low pressure area.

Paper 1 Geography - Living World

4. Rainforest characteristics	
Characteristic	**Description**
Climate	Hot (27-29°C) and wet (rainfall over 2000mm/year)
Soil	Some nutrients near the surface, but mostly infertile.
Structure (4 layers)	• Emergents • Upper canopy • Lower canopy • Shrub layer 
Biodiversity	Very high >50% of all the species
Plants	Plants grow all year. Dense canopy blocks light from forest floor.
Nutrient cycling	Nutrients released quickly into the soil due to heat and moisture.

7. Sustainable management	
Rate of deforestation	Decreasing in Brazil. Increasing in Indonesia.
Strategy	**Explanation**
Selective logging	Only high value trees are cut. Encourage growth of smaller trees.
Conservation	Nature reserves are set up where trees are protected.
Education	Educating locals on how to make money without cutting down trees.
Ecotourism	Small scale tourism, employs locals, educates tourists.
International hardwood agreements	Agreeing to stop illegal logging.
Debt reduction	Debt cancelled in exchange for trees to be protected.

8. Tropical rainforest case study	
Name	Amazon Rainforest, South America
Background	Largest area in Brazil. Deforestation decreased in 2000s but has increased since 2019.
Causes of deforestation	
The cutting down and removal of trees.	
Farming	65-70% land cleared for cattle ranching and soybean production.
Subsistence farming	20-25% Indigenous tribes and small-scale farmers cut down
Logging	2-3% Hardwoods such as Mahogany are very valuable
Road building	4000 km Trans-Amazonian-Highway connects Brazil – Columbia – Ecuador through Amazon rainforest
Mineral extraction	Gold, iron ore and copper are all mined. Areas are cleared and water is polluted.
Energy development	Balbina dam near Manaus, Brazil, flooded 2400 km2 of rainforest.
Population growth	Brazilian government offers rainforest to poorer people from cities
Impacts of deforestation	
Soil erosion	- 100 tonnes of topsoil lost per hectare each year. No canopy = exposed soil. No roots mean heavy rain washes the soil away.
Climate change	- Trees absorb CO_2 during photosynthesis. Amazon stores 140bn tonnes of carbon. Fewer trees mean less CO_2 is absorbed, increasing climate change.
Economic development	+ Provides jobs which leads to more tax. March 2018 Brazil exported $600m of beef.

5. Adaptations to tropical rainforests			
	Name	**Description**	**Explanation**
Plants	**Drip tips**	Waxy leaves shaped like a funnel.	Sheds water quickly to prevent rotting, can still photosynthesise
	Buttress roots	Wide, shallow roots visible above the surface.	Support tall trees to access sunlight and absorbs nutrients from the shallow soil.
Animals	**Poison dart frog**	Bright colour.	Warns predators against eating it.
	Spider monkey	Prehensile tail.	Allows the spider monkey to be able to grasp the branches of trees.

6. Value of tropical rainforests	
To people	**To the environment**
25% of all **medicines**. Resources to sell like **wood, nuts, rubber**.	>50% of all **plants and animals** Trees **absorb carbon** (slowing climate change) 28% of world's **oxygen**.

9. Hot desert characteristics	
Characteristic	**Description**
Climate	Hot (45°C) in the day, cold (0°C at night). Rainfall less than 250mm/year
Soil	Sandy, infertile
Biodiversity	Low – few plants and animals can survive
Plants	Cacti
Nutrient cycling	Nutrients are released slowly into the soil due to lack of rain-fall
Interdependence	Few plants mean few animals. People are using more water, reducing the number of plants and animals that can survive.

11. Causes of desertification		
The process by which land becomes drier and degraded.		
Cause		**Explanation**
Human causes	**Population pressure**	Our population is increasing which is leading to more…
	Removal of fuel wood	Trees cut down to build fires for cooking. Fewer roots mean the soil is eroded, so fewer plants can grow.
	Over-grazing	Animals eat vegetation so nutrients aren't returned to the soil.
	Over-cultivation	Crops remove nutrients but does not replenish them so over time soil degrades.
Physical	**Climate change**	Higher temperatures and more unreliable rain. Dry soil erodes easily.
	Soil erosion	Bare soil is exposed to wind and rain and so erodes. Made worse by human activity.

12. Strategies to reduce desertification	
Strategy	**Explanation**
Water and soil management	Bunds prevent soil washing down hills
	Irrigation takes water from rivers to water crops (but causes salinisation)
Tree planting	Tree roots hold soil together, provide shade, add moisture to soil. Great Green Wall.
Use of appropriate technology	Solar cookers = less deforestation. Refugee camps in Chad

10. Adaptations to hot deserts			
	Name	**Description**	**Explanation**
Plants	**Succulents (cacti)**	Large, fleshy stems. Thick, waxy stems.	To store water during times of reduced rainfall. To reduce water loss by evaporation.
	Dormant seeds	Germinate with rain.	Seeds germinate when it rains so they survive. They grow, flower and release seeds quickly so species doesn't die out.
Animals	**Camel**	Wide feet. Long eye lashes.	Spreads the weight to make it easier to walk on sand. To keep sand out of their eyes.
	Fennec fox	Large ears. Nocturnal	Provides a large surface area to maximise heat loss. Hunts at night when temperatures are cooler

13. Hot desert case study	
Name	Sahara Desert, north Africa
Background	Largest hot desert on Earth
Development opportunities	
Mineral extraction	Phosphate – Morocco is the world's third largest exporter
Energy	12 hours of sunshine a day – Tunisia launched a 100KM2 solar development
Farming	Needs irrigation – large aquifers (underground water supply) in Sahara
Tourism	Camel trekking popular – 4 day trek €150 PP to visit nomadic tribes in Sahara
Challenges for development	
Extreme temperatures	Temperature = 45°C+ (day) to 0°C (night) Working outside is hard. Crops struggle
Water supply	Some parts of Sahara less than 70mm of rainfall per year. Groundwater used too quickly – in Morocco groundwater fell by 1.5m.
Inaccessibility	Traditional forms of transport like camels in the inner desert. Takes 5 days 5 days to export salt out of the desert in Mali.

Paper 1 Geography - Living World - Coasts

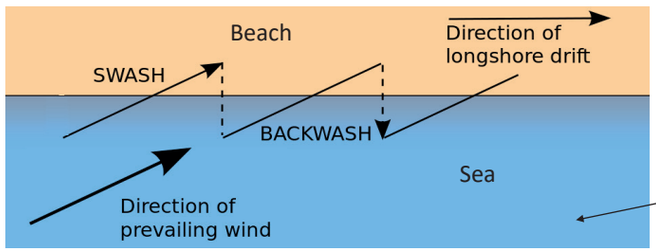
1. The UK's diverse landscapes

Term	Definition
Relief	Shape of the land.
Upland areas	Land over 200m. Highlands. Steep.
Lowland areas	Land below 100m. Flat or rolling hills

2. Waves

Term	Definition
Swash ↗	Movement of the water UP the beach. (Prevailing wind)
Backwash ↓	Movement of water DOWN the beach at right angles (90°) due to gravity.
Constructive waves	Build up the beach. Strong swash. Weak backwash. Low height, long wave length. Low frequency.

Destructive waves	Erode the coast. Weak swash. Strong backwash. Tall height, short wave length. High frequency.



3. Processes

Sub-aerial processes (above the sea)

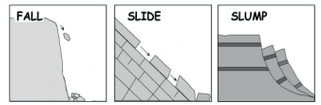
Weathering

Breakdown of rocks in situ.

Mechanical weathering	The breaking down of rocks without chemical reactions. e.g. freeze thaw
Chemical weathering	The breaking down of rock caused by chemicals.

Mass movement

The downhill movement of material under the force of gravity.



Rockfall	Free fall of rocks under force of gravity.
Sliding	Material collapsing in a straight line.
Slumping	Material collapsing along a curved slip plane.

Marine processes

Erosion

The wearing away of land.

Hydraulic power	The sheer force of the water compressing air into cracks causes bits to break off.
Abrasion	Sediment scraping against the cliff (like sandpaper) removing small pieces.
Attrition	Sediment collides causing it to become smaller and more rounded.
Solution	Minerals in the rock dissolve into the water.

Deposition

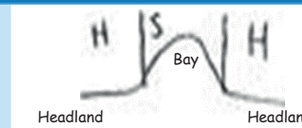
Dropping of material	Occurs when there is a loss of energy. e.*g.*. Sheltered bays / when the wind drops.

Transportation

Longshore drift	Zig zag movement of sediment along the coastline.

4. Erosional landforms

Headlands and bays



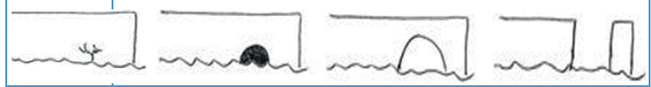
Step 1	Coastlines with bands of hard (chalk) and soft rock (clay).
Step 2	The soft rock is **eroded** faster through **abrasion,** creating bays.
Step 3	The hard rock **erodes** slower and is left jutting out to sea forming a headland.

Wave cut platforms

Step 1	Waves **erode** cliff base between high+ low tide
Step 2	**Abrasion** creates a wave cut notch which enlarges over time.
Step 3	The rock above the notch is unsupported so will collapse due to **gravity (mass movement).**
Step 4	Cliff **retreats**, leaving a wave cut platform (the un-eroded original cliff left behind).

Cave, arch, stack

Step 1	**Hydraulic power** enlarges cracks in headland
Step 2	Over time they turn into a cave.
Step 3	Back of cave is deepened by **abrasion** until it **erodes** through the headland > arch.
Step 4	**Weathering** and **erosion** wear away at the arch until it eventually collapses (gravity).
Step 5	A stack is formed.



Example of a UK coastline. Dorset coastline.

Headlands and bays	Swanage Bay
Wave cut platform	Kimmeridge
Arch	Durdle Door
Stack	Old Harry

5. Depositional landforms

Beaches e.g. Swanage

Step 1 **Step 2** **Step 3**	Beaches form when **deposition** occurs. There needs to be a source of sediment nearby like soft cliffs. Constructive waves **deposit** material in sheltered areas like bays.

Sand dunes e.g. Studland

Step 1 **Step 2** **Step 3** **Step 4**	Wind blows sand up the beach (**saltation**). Obstacles such as seaweed cause the wind speed to decrease resulting in **deposition**. Over time sand dunes build up and are colonised by marram and lyme grass. This vegetation stabilises the sand dunes.

Spits e.g. Sandbanks

Step 1 **Step 2** **Step 3** **Step 4**	Longshore drift transports sediment along the coast in the direction of the prevailing wind (**swash** and backwash). Where the coastline changes direction… Sediment is **deposited** in calm weather out to sea. Can form a hooked end and a salt marsh behind the spit where it is sheltered.

Bar

Step 1 **Step 2**	When a spit joins two headlands. A lagoon forms behind the bar.

6. Coastal management

Hard engineering

Man-made structures built to control the sea. Reduces flooding and erosion.

Strategy	Explanation	Costs	Benefits
Sea walls	A hard wall made from concrete that reflects waves back out to sea	Expensive (£2000 per/m).	Prevents flooding and creates a promenade
Rock armour	Boulders piled up along the coast. These erode rather than the coast.	Boulders can be moved by waves and need replacing.	Absorbs wave energy
Gabions	Wire cages filled with rocks at the base of cliffs. Absorb wave energy.	Metal corrodes over time and ugly	Cheap and easy to build.
Groynes	Wooden fences at right angles, preventing longshore drift = wider beach.	Starve beaches further along the coast = more erosion there.	Stops longshore drift removing beaches.

Soft engineering

Schemes set up using a natural approach to managing the coast.

Strategy	Explanation	Costs	Benefits
Beach nourishment	Adding sand to beaches. Wider beaches stop erosion and flooding	Needs redoing every 5 years.	Blends with existing beach. Larger beaches = tourists.
Reprofiling	Sediment is moved to make beaches steeper.	Needs to be redone lots.	Cheap and simple. Reduces energy of the waves.
Dune regeneration	Creating or restoring sand dunes by planting marram grass to stabilise the sand	Protects only a small area.	Sand dunes create a barrier between the sea and land.
Managed retreat Coastal realignment	Remove current defences, allow sea to flood the land behind. Over time land becomes a marshland.	Land is lost = conflict (farmers)	Cheap and easy. New habitats created.

7. An example of a coastal management scheme

What?	Reasons for management	Management strategy	Effects and conflicts
Lyme Regis Coastal Management Scheme	Destructive waves from the SW Beach important for tourism (£42 million). Homes and A3052 Road at risk from collapsing cliffs.	New sea wall (phase 4, cost £19.5 million), beach nourishment (Phase 2, cost £26 million), rock armour (Phase 1), Phase 3 not carried out due to high cost	✓ Beaches = More tourists = 20% increase in income ✕ Conflict: locals vs tourists (more litter, traffic and pollution)

Paper 1 Geography - Living World - Rivers

1. The water cycle

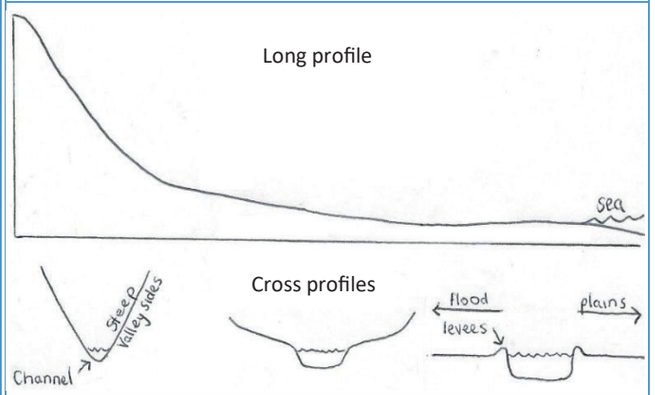
Term	Definition
1.Precipitation	Moisture falling from the atmosphere as rain, snow, sleet, hail.
2.Evaporation	Water changing from a liquid into a gas (water vapour).
3.Transpiration	Evaporation from plant leaves.
4.Condensation	Water vapour in the air changes into liquid water (clouds).
5.Interception	Water stored on the leaves of plants.
6.Surface run off	Water travelling over the surface of the land (increases when soil is saturated). ➔
7.Infiltration	Water soaking into the soil. ➓
8.Through flow	Water flowing sideways through soil ➔
9.Percolation	Water going down into the rock. ➓
10.Groundwater flow	Water flowing sideways through rock below the water table. ➔
Saturated	Holding as much water as can be held.

2. Parts of rivers

Term	Definition
Source	The start of a river.
Mouth	The end of a river where it joins the sea.
Drainage basin	The area of land drained by a river.
Watershed	The high land that separates one drainage basin from another.
Tributary	A smaller river, which joins a larger river.
Confluence	The point where two rivers meet.
Valley	Area of lower land between surrounding hills. Has a river channel at the base.
Channel	Part where the river water is.

3. How does a river change?

Long profile	Shows changes in the gradient of the river from its source to its mouth.
Cross profile	It is a cross section (slice) across the river showing the shape of the valley.



Upper course	**Middle course**	**Lower course**
Steep gradient V shaped valley Shallow + narrow channel	Medium gradient Gently sloping sides Wider + deeper channel	Gentle gradient Flat, wide valley Very wide + deep channel

5. What causes flooding?

Physical factors	**Prolonged rainfall**	Saturates the soil so no infiltration.
	Heavy rainfall	Water arrives too quickly to infiltrate > more surface runoff.
	Relief	Steep land means water reaches the river channel faster.
	Geology	Rocks like granite are impermeable
Human factors	**Urbanisation**	More impermeable surfaces = more surface run off.
	Deforestation	Trees intercept rainfall and soak up water. Cutting trees down means more water entering river.
	Agriculture	In winter, a lack of crops means more water enters river channel.

4. Fluvial processes

Erosion

The wearing away and removal of material by a moving force such as a river.

Vertical erosion	In the upper course, rivers erode downwards deepening the river channel
Lateral erosion	In the middle course, rivers erode sideways widening the river valley.
Hydraulic action	The sheer force of the river against the banks can cause air to be trapped in cracks causing bits to break off.
Abrasion	Sediment carried by the river wears away the riverbed (like sandpaper).
Attrition	Sediment collides causing it to become smaller and more rounded.
Solution	Minerals in the rock dissolve into the water.

Transportation

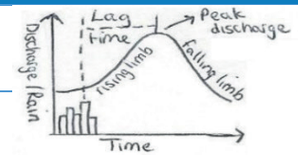
Traction	Large, heavy pebbles roll along the bed.
Saltation	Pebbles are bounced along the bed.
Suspension	Lighter sediment is carried by the water.
Solution	Some material is dissolved within water.

Deposition

Dropping of material	Occurs when there is a loss of energy. E.g. Discharge / velocity ➘, at the mouth

6. Hydrographs

A graph that plots river discharge after a storm.
It also displays rainfall.



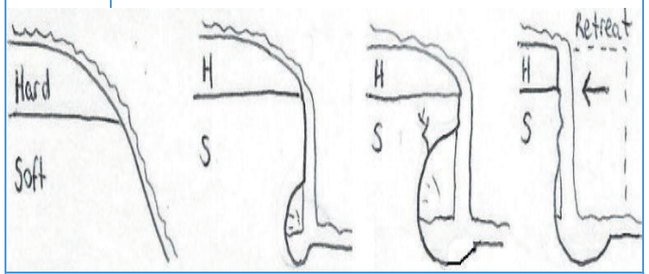
Discharge	Volume of water flowing per sec. Cumecs
Peak discharge	Highest discharge.
Lag time	Delay between peak rainfall + discharge. Shorter the lag time, worse the flood risk.
Rising limb	Increase in river discharge as rainfall flows into the river (can be steep/gentle).
Falling limb	Decrease in river discharge.

7. Erosional landforms

These occur in the upper course of the river.

Waterfalls and gorges

Char.	A drop in the river that water flows over.
Step 1	A band of hard rock sits on top of soft rock.
Step 2	Over time the soft rock will be **eroded** through **abrasion** creating a drop.
Step 3	The soft rock erodes further creating a plunge pool.
Step 4	This gets larger leaving an overhang.
Step 5	Eventually due to **gravity** the unsupported rock will collapse**.**
Step 6	The waterfall **retreats** upstream.
Step 7	A steep sided gorge is left behind.



Interlocking spurs

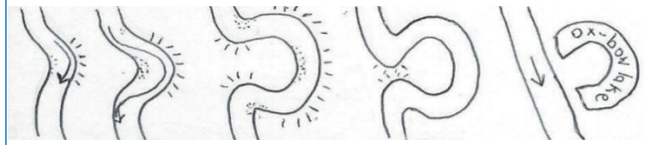
Char.	Hillsides that overlap. The river winds around them. 
Step 1	**Vertical erosion** takes place, creating steep sided, V shaped valleys.
Step 2	The river is not powerful in the upper course so it winds around areas of hard rock.
Step 3	Creating hillsides that overlap.

8. Erosion + depositional landforms

These occur in the **middle course** of the river.

Meanders and ox bow lakes

Char.	A meander is a bend in the river. An ox bow lake is a semi-circular lake detached from the river.
Step 1	**Erosion** (mainly **abrasion** on the outside of the bend creates a river cliff.
Step 2	**Deposition** on the inside of the bend creates a slip off slope.
Step 3	The meander gets bigger over time creating a narrow neck.
Step 4	When the river floods, the water breaks through.
Step 5	The bend is cut off forming an ox bow lake.



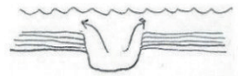
10. Example of UK river

Name	River Tees, NE England.
Upper course	V shaped valleys in Pennine Hills. High Force waterfall.
Middle	Many meanders. *e.g.* Sockburn.
Lower course	Wide mudflat estuary. Flood plains and levees south of Darlington

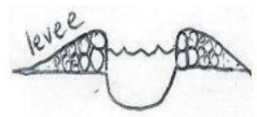
9. Depositional landforms

These occur in the lower course of the river.

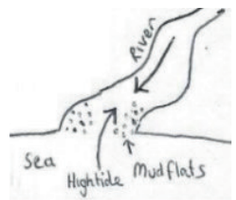
Flood plains

Char.	Wide, flat areas of land each side of a river. They flood. Fertile soil. 
Step 1	Meanders widen the valley floor through **lateral erosion**.
Step 2	After heavy rain, a river may burst its banks, and the velocity slows due to **friction**.
Step 3	The river **deposits** the **sediment**.
Step 4	Layers build up over many floods.

Levees

Char.	Natural embankments along the edges of a river channel. Taller on the side of the river. 
Step 1	When a river floods the water's velocity slows due to **friction**.
Step 2	The heaviest material is **deposited** first, but lighter material is carried further.
Step 3	This creates levees.
Step 4	These build up each time the river floods.

Estuaries

Char.	Tidal- where the river meets the sea. Often mudflats or salt marshes. 
Step 1	Water from the river collides with the sea coming up the river mouth at high tide.
Step 2	Velocity slows so sediment is **deposited**.
Step 3	At low tide, mud flats are exposed.

11. River management			
Hard engineering			
Man-made structures built to control the flow of rivers and reduce flooding.			
Strategy	**Explanation**	**Costs -**	**Benefits +**
Dams and reservoirs	Barriers built across the river that control river flow. A reservoir (lake) forms behind.	Very expensive to build. Floods towns when created.	Makes hydroelectricity. Prevents flooding.
Channel Straightening	Meanders are removed to make the river straighter. Increases velocity.	May cause more flooding and erosion down steam.	Faster velocity means water leaves the area quickly reducing flood risk.
Embankments	Raised walls built along riverbanks (man-made levees). Increases capacity of the river.	Risk of severe flooding if flood water goes over or they break.	Floods less frequent as river can hold more water.
Flood relief channels	Channels built to divert water around towns. Town doesn't flood.	River can flood when the channels merge.	Removes excess water from the river reducing discharge.
Soft engineering			
Schemes set up using knowledge of a river and its processes to reduce the effects of flooding.			
Strategy	**Explanation**	**Costs -**	**Benefits +**
Flood warning and preparation	Environment Agency warnings. Residents can add sand bags to their doors prior to floods	Some don't get the warning. Doesn't stop floods but reduces the damage.	People have time to protect their properties or evacuate.
Flood plain zoning	Restrictions prevent building where flooding is likely. Farmland goes near the river.	Not always possible to change existing land uses.	Flood risk reduced as less impermeable surfaces. Impacts reduced.
Tree planting	Trees intercept and absorb water, therefore less water reaches the river.	Less land is available for farming.	Trees intercept the rainfall reducing flooding.
River restoration	Making the river more natural so the floodplain floods naturally.	Local flood risk can increase.	Little maintenance is needed.

12. EG of management scheme	
Where?	**Oxford Flood Alleviation Scheme**
Why was the scheme needed?	Confluence of river Thames and Cherwell. 2007 Floods 250 homes evacuated. A420 road flooded and trains cancelled, damaging local economy.
Management strategy	⇒ Bypass channel created, 400,000m^3 of earth dug up. ⇒ Flood walls and embankments created ⇒ 20000 trees planted.
Issues	+ Homes and businesses better protected, reducing insurance costs + Improve public footpaths for recreation - Compulsory Purchase Orders (CPOs) sent to homeowners. Some did not want to sell land - Scheme is expected to cost over £150 million and not all funding is yet secured.

Paper 2 Geography - Urban Issues

1. Global pattern of urban change	
The world's population is growing rapidly.	
Urbanisation	An increasing percentage of people living in towns and cities.
HICs	Very slow rate of urbanisation. High urban population because urbanisation happened earlier.
NEEs	Fast rate of urbanisation due to natural increase and rural to urban migration. Urban population is increasing rapidly.
LICs	Fast rate of urbanisation. Urban population low (many farmers).

2. Factors affecting urbanisation	
Rural- Urban migration	The movement of people from a rural area (countryside) to an urban area (towns and cities).
Push factors	Negative factors that make people leave an area *e.g.* drought, famine, war, few services.
Pull factors	Positive factors that attract people to an area *e.g.* better access to services, better paid jobs, access to electricity.
Natural Increase	When the birth rate is higher than death rate.

3. Key terms	
Social deprivation	When the area is very poor. (No services, jobs…)
Dereliction	Abandoned buildings and wasteland.
Urban Greening	Process of increasing and preserving open space in urban areas *i.e.* parks.
Urban sprawl	Unplanned growth of urban areas into surrounding rural areas.
Integrated Transport System	Different forms of transport are linked together to make it easy to transfer from one to another.
Brownfield	Land that has been previously used and then abandoned.
Greenfield	Areas that have not been built on before.
Commuter settlements	A place where people live but travel elsewhere for work *e.g.* Yate → Bristol.

4. Megacities	
Megacity	A city of more than 10 million people living there.
How many?	There are now 34. Rapidly increasing.
Where?	Most are in Africa and Asia.

5. Urban transport strategies used to reduce traffic congestion	
Problems with congestion	↗ air pollution (global warming). Late for work, deliveries delayed. ì accidents, stress, asthma.
Case study: London	
Boris Bikes	Shared bikes in London
Elizabeth Line	Connects Reading to central London
Congestion charge	£15 charge for entering London city centre.
Oyster Cards	Integrated transport system, encourages people to use as quick and simple

6. Sustainable urban living	
Sustainable urban living	Meeting the needs of the present without compromising the ability for future generations to meet their needs.
Case Study: Curitiba	
Water conservation	All homes fitted with a water meter 2 water systems– drinking and non-drinking water
Energy conservation	84% energy generated from HEP
Waste recycling	Green exchange. 4kg of waste= 1kg of food or bus tickets
Creating green space	28 parks, tax reductions given to not build on green spaces.

Paper 2 Geography - Urban Issues - Lagos

7. Location and importance of Lagos	
Location	South coast of Nigeria.
Regional	Good transport links makes it the centre of trade.
National	80% of Nigeria's industry = 30% GDP.
International	Financial centre of West Africa. International airport.

8. Causes of urban growth in Lagos	
Rural to urban migration	1,200 migrants arrive each day from the countryside.
Natural increase	High birth rate. Migrants are young so have children.

9. Opportunities created by urban growth in Lagos	
Social	68% have a secondary education. Electricity (Lagos uses 40% of Nigeria's). 8th best city for healthcare in Africa
Economic	Wages 4x higher than in rural areas. Nollywood 2nd largest film industry.
Urban industrial areas	Groups of industries located together. Provide jobs > Wages increase > Home market increases. Increases exports + tax to government.

10. Challenges created by urban growth in Lagos	
Managing urban growth	66% live in squatter settlements like Makoko.
Providing clean water	Only 40% of the city is connected to the state water supply. Water is contaminated with sewage.
Providing sanitation	Squatter settlements do not have access to sewers. Up to 15 households can share 1 toilet. Causes health problems *e.g.* cholera.
Providing energy	Not enough power for all. Neighbourhoods have to take turns for a few hours at a time.
Providing access to services	This is better than in rural areas… but not equal for all. Poorer people are less likely to afford services.
Reducing unemployment	Not enough formal jobs. 60% work in the informal economy. *E.g.* People scavenge in rubbish dumps.
Crime	High crime rates in squatter settlements. Gangs like 'Area Boys' control Makoko so police do not enter.

11. Managing environmental issues

	Challenge	How is it being managed?
Waste disposal	Only 40% of rubbish is collected.	LAWMA starting to collect rubbish overnight.
Air and water pollution	10,000 illegal industries cause air pollution People burn fuel for generators to get electricity.	Lagos has banned the import of mini generators.
Traffic congestion	40% of Nigeria's cars are registered in Lagos. Bad traffic congestion- 2 hour 'Go Slow'.	Make bus services better.

12. Example- How urban planning improves the quality of life for urban poor

What?	How does it improve QoL?	Was it successful?
Makoko Floating School Educated 100 children.	Collects rainwater – drinking water reduces risk of disease Improved job prospects for children	Increased quality of life. ✕ Collapsed after a storm in 2016. ✕ Didn't help enough children.

Paper 2 Geography - Urban Issues - Bristol

13. Distribution of population and major cities in the UK	
Population	66 million. Distribution is very uneven. 82% live in urban areas.
Cities	Most in flat areas and on the coasts. London is the capital.

14. Location and importance of Bristol	
Location	South west of the UK.
Importance within the UK	8th most popular city for foreign tourists. 2 universities
Importance to wider world	International airport (links to Europe). Many TNCs located there (AirBus, BMW)

15. Impacts of migration on the growth and character of the city	
National migration	1851 - 1891 population doubled as people arrived looking for work.
International migration	Now, international migration is most important. 50 countries.
Impact on character	Diversity provides many cultural opportunities. St Paul's Carnival attracts 10,000/year

16. Urban change in Bristol
Population growing steadily Population is becoming more ethnically diverse Deindustrialisation (factories closed). Regeneration of Temple Quarter

17. Opportunities created by urban change	
Cultural mix	Caused by international migration. St Paul's Carnival (attracts 40,000).
Recreation and entertainment	Caused by a younger population. Entertainment (The Bristol Old Vic). Shopping (Cribbs Causeway).
Integrated transport	Caused by improved accessibility. Links different types of public transport. Reduces congestion in the city.
Employment	Caused by regeneration. 50 silicon businesses- quaternary jobs.
Urban greening	> 90% live within 350m of park/water. 2015 European Green Capital status.

18. Challenges created by urban change	
Urban deprivation	Lacking access to services or low income areas. E.g. parts of Filwood.
Spiral of decline	A loss of jobs leads to further businesses closing
Inequality in housing	Filwood– 48% housing owned Stoke Bishop– 75% housing owned
Inequality in education	In Stoke Bishop more are educated to degree level.
Inequality in health	Life expectancy: Filwood– 80 years. Stoke Bishop- 85 years.
Employment	More are unemployed in Filwood (5%) than Stoke Bishop (3%)
Dereliction	Buildings that have been abandoned
Building on brownfield	Land already built on but now derelict, expensive to clean
Building on greenfield	Land not used before, destroys habitats
Waste disposal	>1/2 million tonnes of waste/year.
Urban sprawl	The growth of the city into the surrounding rural areas
Commuter settlement	Where people live e.g. Harry Stoke but travel to a nearby city e.g. Bristol for work

19. An example of an urban regeneration project			
Example	**Why did it need regeneration?**	**What are the main features?**	**Successful?**
Temple Quarter, Bristol	Brownfield site- poor environmental quality. By the train station- poor impression for new visitors. Deindustrialisation left derelict buildings.	Enterprise Zone *e.g.* low rents. Bristol Arena music venue planned for Temple Island, moved to Filton Brunel's Engine Shed £1.7million.	🏳 4,000 new jobs by 2020. 🏳 Redeveloped brownfield site. ✕ Arena moved to rural-urban fringe.

Paper 2 Geography - Economic World

1. What is development?

Term	Definition
Development	People getting richer and quality of life improving.
Development gap	The difference between HICs and LICs.
Quality of life	A measure of happiness and health.
Standard of living	A measure of wealth $
Economic development	People getting richer. Jobs changing from primary and secondary to tertiary and quaternary.

Ways to classify the world

LIC	**Low income countries**. GNI per capita of under $1,045. (Poor) e.g. Haiti.
NEE	**Newly emerging economies**. Countries with recent, rapid economic development.
HIC	**High income countries**. GNI per capita of over $12,746. (Rich) e.g. UK.
Brandt line	A line drawn in the 1980s that split the world into rich north and poor south.

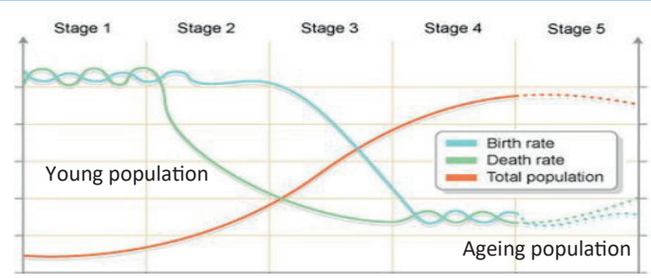
5. Consequences of uneven development

Disparity	Difference
Disparities in wealth	Africa owns just 1% of global wealth $
Disparities in health	Health care in LICs is poor. E.g. Life expectancy: UK 82, Nigeria 52
International migration	People move from LICs to HICs for better jobs and higher quality of life.

2. Measuring development

Term	Cat.	Definition
Arrow shows how the indicator changes with development.		
GNI per capita	💰↗	Average income. Total income divided by the population.
Birth rate	🧍↘	The number of babies born in a year per 1000 people.
Death rate	🧍↘	The number of people that die in a year per 1000 of the population.
Infant mortality rate	🧍↘	The average number of deaths of infants under the age of 1, per 1000 births per year.
Life expectancy	🧍↗	The average number of years a person might be expected to live.
People per doctor	🧍↘	The number of people who depend on a single doctor.
Literacy rate	🧍↗	The percentage of people who can read and write.
Access to safe water	🧍↗	The percentage of people who have access to clean water.
HDI	💰 🧍 ↗	Human Development Index. A combined measure that includes GNI per capita, life expectancy and adult literacy rate. Out of 1. + Best indicator as it includes 💰 and 🧍 data.
General problems	Difficult to record data in conflict zones or areas with unstable government.	

3. Demographic Transition Model



-	LIC	NEE	HIC	HIC
High BR	High BR	Falling BR	Low BR	Low BR
High DR	Falling DR	Low DR	Low DR	Low DR
Lack of clean water and reliable food	Healthcare improves so fewer people die	People don't need many children as fewer are farmers	Women have careers, marry later, and have children later so fewer children. Good healthcare means low death rate.	

4. Causes of uneven development

Cat	Factor	Explanation
Physical	**Natural disasters**	Government must spend money rebuilding rather than education.
	Land-locked	No coastline so it is difficult to trade. e.g. Nepal.
	Extreme climates	If it's too hot or cold farming is difficult e.g. Thar Desert.
Economic	**Debt**	Money goes to pay off debt instead of healthcare and education.
Historical	**Colonialism**	European countries controlled resources in Asia and Africa. After regaining power, they were poor and civil wars often occurred.
	War	Money spent on weapons instead.

6. Strategies to reduce uneven development		FAT MIDII
Strategy	**Explanation**	**Evaluation**
Fairtrade	When farmers are guaranteed a fair price for their products e.g. coffee.	+ Higher income means farmers can afford better education and healthcare. Poorest can't afford certification.
Aid	When a country donates resources (money, food, people) to another country.	+ Nets For Life have provided 82,500 mosquito nets in Nigeria, reducing illness. Aid might not reach the people who need it.
Tourism	Visitors spend money in a country and infrastructure is improved.	+ tourism provides jobs. Income can be seasonal.
Microfinance loans	Very small loans which are given to people to help them start a small business.	+ Women can benefit from loans. Can lead to debt.
Investment	Countries or TNCs can invest in a country. E.g. Shell in Nigeria	+ Triggers multiplier effect. Profits may go back to home country.
Debt relief	Money spent on education and healthcare instead of repaying loans. E.g. Nigeria's debt was cancelled 2005.	+ Improves quality of life. Corruption may mean people don't benefit.
Intermediate technology	Cheap and easy to use technology. E.g. bicycle ambulances.	+ Affordable Small scale
Industrial development	Developing the secondary sector (factories). This brings jobs and higher income.	+ Triggers multiplier effect Causes air pollution

7. Tourism to reduce uneven development	
Kenya	LIC in East Africa. Attracts tourists for culture, safari, warm climate and scenery. Tourism will boost economy.
Advantages	+ 4% of Kenya's GDP + 1.1 million jobs (9% of all employment in Kenya) + Fees charged in national parks used to protect the environment and animals
Disadvantages	- Small proportion of money earned goes to locals. Most returned to TNC's based in HICs. - Tourist vehicles damage the environment and disturb animals - Terrorist attacks in Kenya means numbers have fluctuated
Summary	Provides jobs but it is unreliable.

Paper 2 Geography - Economic World - India

8. Introduction to India

India is located in southern Asia and has the world's largest population

Importance of India	
Globally	Member of G20 and WTO.
Regionally	Trade links with countries in the Indian Ocean
India's context	
Political	➔ Former British Colony
Environment	Varied landscape - Himalayas in North and Thar desert in North West. Floodplains of Indus and Ganges rivers provide fertile farm-land
Social	Large inequalities - 20% live in poverty.
Cultural	Bollywood films are exported worldwide.

9. India's changing industrial structure

Term	Definition
Industrial structure	The proportion of primary, secondary, tertiary, and quaternary workers.
Primary sector	Fewer farmers as people move to cities. 42% workforce/15% GDP
Secondary sector	More jobs in factories 24% workforce/28% GDP
Tertiary	More jobs providing services such as banking and hairdressing.
Quaternary	Research and Knowledge.

10. Transnational corporations

Term	Definition
Transnational corporation	Companies that operate in more than one country
Unilever in India	
Advantages	+ 16,000 jobs + 40% tax to Indian Government
Disadvantages	- Profits leave India as Unilever is a British-Dutch company - Environmental harm in Kodaikanal due to dumping mercury waste
Summary	The economy benefits but the environment suffers.

11. Impacts of economic development

A growing manufacturing industry stimulates economic growth.

Positive multiplier effect

12. Impacts of economic development

Impact on the environment	New Delhi has the worst air pollution in the world Coal India opening 55 new coal mines by 2025, destroying habitats of Bengal tiger
Impact on quality of life	Wages have increased by 42 Rupees a day Water sanitation improved by 20% between 1990-2008

13. India's changing relationships

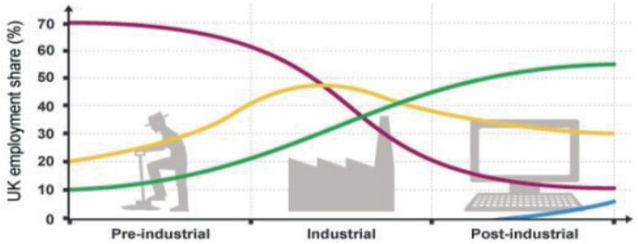
Political relationships	TAPI pipeline will carry natural gas from Turkmenistan to India, through Afghanistan and Pakistan
Trading relationships	India is part of APTA, the Asia-Pacific Trade Agreement, which gives free trade with Bangladesh, China, South Korea and Sri Lanka.

14. Aid in India

Term	Definition	Example
Short term	Money / supplies in emergency	UNICEF provided supplies after floods in northern India
Long term	Investment in development projects	Until 2015, UK government sent £200m / year to India
Top down	When an organisation or government decides how to use aid -> they have control	Sardar Sarovar dam provides water / HEP, but displaced 300,000 local people
Bottom up	Given directly to locals, who decide how aid is used -> locals have control	Women trained to repair water pumps in Gujarat, which led to more reliable water supply

Paper 2 Geography - Economic World - UK Futures

15. Economic change in the UK



Primary	Mining decreased
Secondary	Factories closed
Tertiary	More jobs providing a service
Quaternary	High-tech jobs including research and IT

Why has our economy changed?

Deindustrialisation	The closure of factories because it's cheaper in NEEs.
Government policies	A plan decided by a government to manage issues in a country.
Globalisation	The process which has created a more connected world e.g. migration and TNCs.

16. Post-industrial economy

Tertiary and quaternary sector employ 81%.

IT	Employs over 1.3m people.
Services	Retail is the largest sector.
Finance	London is the world's leading centre.
Research	Government invested £33 bill in 2016.
Science parks	Groups of high-tech industries.
Business parks	Purpose built areas of offices and warehouses (on edge of cities).

17. Environmental impact of industry

Air and water pollution.

Releases CO_2 increasing the rate of global warming.

Transport of materials is by road ↗ air pollution.

Example of modern industry being environmentally sustainable

Torr Quarry	Industrial site located in Somerset
Transport	Limestone is transported around the country by rail, not lorries travelling on the local village
Landscaping	200 acres of land on the border of the quarry has been landscaped by planting trees
Pollution	Noise, vibrations, dust and water quality are monitored regularly.

18 Changes in the rural landscape

Population decline	**Cumbria**
Social changes	Declined 0.8% from 2005-2015. Ageing population = pressure on healthcare
Economic changes	Shops shut Higher unemployment
Population growth	**North Somerset**
Social changes	Grew 7.8% 2005-2015 Traffic congestion on roads to Bristol Oversubscribed schools
Economic changes	↑ house prices, less affordable Employment / wages above average

19. Improvements in infrastructure

Road	Upgrading 'smart motorways' M4. New construction jobs, boost economy.
Rail	Faster journey times between London and other cities e.g. HS2 connecting Birmingham to London.
Port	For trade (imports and exports) e.g. London Gateway
Airports	Heathrow expansion. 3rd runway £18.6 billion, 700 planes a day

20. North South divide

Causes	Decline of heavy industry in North (coal). Investment in finance and service industry in the South.
Impacts in north	Higher unemployment / lower wages (40%) Poor health, lower life expectancy (10 years)

Strategies attempting to resolve regional differences

Devolving Powers	Devolved governments in Scotland, Wales and Northern Ireland.
Northern Powerhouse	A plan to attract investment to north. Improving transport links and £70 M invested into schools.
Local Enterprise Partnerships	Encouraging businesses to work with local authorities (the government). Reduced taxes, planning to attract business. E.g. the Sheffield Enterprise Zone.

Paper 2 Geography - Resources

1. What are resources?	
Term	**Definition**
Resource	A supply of something that has a value (food, energy, water).
Significance for well being	
Resources are key to human wellbeing. Their social and economic benefits increase standard of living.	
Food	Calories provide energy which are vital for people (work, school). More than 1 billion are malnourished (this ↑ chance of diseases).
Water	Needed for drinking, cooking, and washing. Dirty water kills (diseases like cholera).
Energy	Allows industry to develop, creating jobs and making countries richer.
Resources inequality	
Distribution: Uneven	Not all countries have oil or lakes for fresh water.
Dependent on wealth	Rich countries can buy resources from other countries.
Consumption	• **HICs** consume the most • Rapidly increasing in **NEE**s. • Low in **LICs**. Can't afford to exploit resources or import them.

2. Food in the UK	
Demand	**Increasing**
Importing 40% food	Greater demand for exotic foods. We want seasonal foods all year round.
Problems with importing food…	
Carbon footprint	A measure of the greenhouse gases produced.
Food miles	The distance our food has travelled. The smaller the better.
Current food trends in the UK…	
Agri-business	Large scale, industrial farming aimed to maximise the amount of food produced.
Organic produce	Food grown without the use of chemicals.
Eat local	Buy from local farms = lower food miles.

4. Water in the UK	
Demand	Demand is increasing (70% since 1985). Higher pop. > more houses > more water intensive appliances.
Water quality	Water quality improving. But pollution present from fertilisers, oil spills, vehicle pollutants.
Managing pollution	Stricter regulations on fertilisers, filtering water for sediment, purifying water (chlorine).

3. Energy in the UK	
Demand	Increasing (but consumption decreasing because of better technology).
Energy mix	The different energy resources used by a country. Renewable + non-renewable.
How is it changing?	Less coal used. More renewables.
Reduced domestic supplies coal, gas, oil	North Sea oil and gas is running out.
Issues with energy exploitation	**Economic** 💰 Extraction is expensive. 💰 UK must pay to import energy. **Environmental** Fracking can cause mini earthquakes. Burning fossil fuels release CO_2.

Areas of deficit	South east. High population = high demand but low rainfall.
Areas of surplus	North + west. High rainfall but low population.
Water transfer	From areas of surplus to areas of deficit. eg Kielder Reservoir (in North) to London BUT expensive, affects wildlife, social conflict.

Paper 2 Geography - Resources

1. Water overview	
Water insecurity **Affected by:**	Not having enough clean water. • Rainfall available • Access to water • Size of population • Amount used
Water surplus	More than enough water. (supply>demand)
Water security	Having enough clean water to meet everyone's needs.
Water deficit	Not enough water. (demand>supply)
Water stress	When demand exceeds water supply for a certain period.
Aquifer	Underground layer of water stored in permeable rocks.
Permeable rock	Rock with pores (air spaces) in that can store water.

3. Impacts of insecurity	
Pollution	When water is scarce people might use contaminated water causing diseases such as cholera.
Reduced food production	Water shortages mean less irrigation, causing malnutrition.
Industrial output	Water shortages means less manufacturing, means less jobs/ taxes.
Potential for conflict	Some countries share water sources. E.g., Afghanistan and Iran share Helmand River. This can cause conflict.

2. Factors affecting water demand	
↑Population	More water for drinking, washing, etc.
Irrigation	70% of water used in agriculture More people > higher food demand.
Industrialisation	More water in manufacturing.
Energy production	50 billion m^3 of freshwater used each year to generate electricity.
↑Living standards	More water used for toilets, showers.

4. Water supplies can be increased	
Dams/reservoirs	A storage dam across a river traps water creating a reservoir.
Water diversion	Redirects water (but doesn't store it).
Water transfer	Moving water from dams to drier areas by canals.
Desalination	Removing salt from sea water.

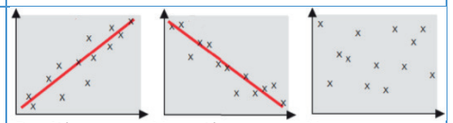
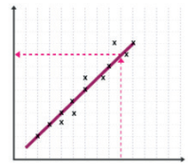
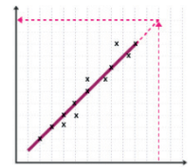
5. Water transfer example – STNWTP	
Example	South to North Water Transfer Project, China
Water insecurity in North of China	**High population** and **rising living standards** increase demand for water in the north. **Development** increases demand from industry and agriculture. Less rainfall than south.
STNWTP	**$62bn project**, transfers 44.9bn m^3 of water from south to north through canals + tunnels.
Advantages	**20 cities have clean water** including Beijing and Tianjin (**100m people benefited)** **Development =** positive multiplier effect.
Disadvantages	**Large areas flooded** destroying habitats. 345 000 people moved (received little compensation). **Water in Beijing is expensive**, due to costs of transporting and building infrastructure.

6. Sustainable water supply	
Sustainable water supply	Having enough clean water to meet everyone's needs today, without preventing future generations from meeting their own needs.
Water conservation	Using less water e.g. Fixing leaks and dual flush toilets (saves 3.5L).
Groundwater	Water stored in rock, managed by laws + fines.
Recycling	Using water again. E.g. for irrigation and industry.
Grey water	Recycled water that is used then treated e.g. water from showers used for watering plants

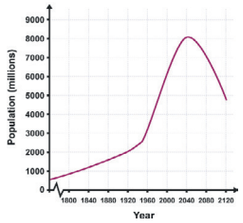
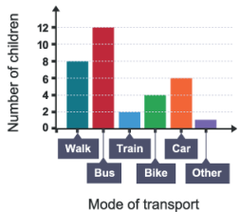
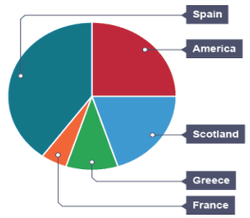
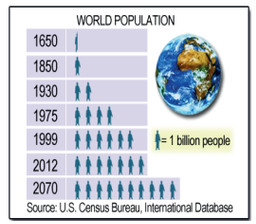
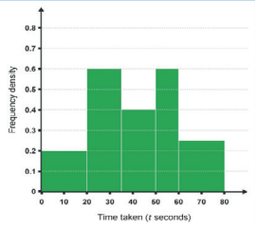
7. Sustainable water supply example – Sand dams, Kenya	
Example	1m high sand dams built across rivers to store water in Kenya, East Africa.
Water insecurity	Hot and dry most of the year. In dry season people travel 6-9 hours for water.
Who?	UDO - Utooni Development Organisation
Sand Dams	Water trapped in sand behind 1m wall. Sand stops evaporation. Water extracted by digging a well in the sand or installing a pipe into the sand.
Advantages	Cheap, local materials, reduced distance travelled to collect water.
Disadvantages	Small scale benefits.

1. Measures of central tendency		
Key term	**Definition**	**Example: 9 3 5 4 7 3 8**
Mean	Total of items ÷ number of items.	(9+3+5+4+7+3+8 = 39) ÷ 7 = **5.57**
Median	Middle value (when they are in order). Or position can be calculated using (n+1) ÷ 2	3 3 4 **5** 7 8 9 = **5** (7+1) ÷2= 4th position
Mode	Most common.	3 (appears twice) There can be several modes.
Modal class	Most common class.	-
Range	Difference between the highest and lowest value.	Highest 9 – lowest 3 = **6**
Upper quartile	Value ¾ of the way through ordered data (smallest to largest).	3 3 4 5 7 **8** 9 = **8**
Lower quartile	Value ¼ of the way through ordered data (smallest to largest).	3 **3** 4 5 7 8 9 = **3**
Interquartile range	The difference between the upper and lower quartile.	Upper quartile 8 – lower quartile 3 = IQR 5

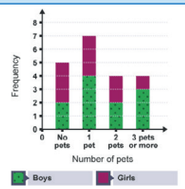
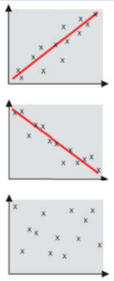
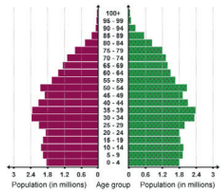
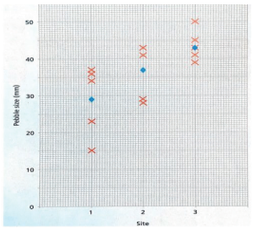
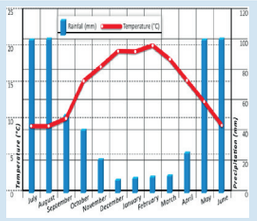
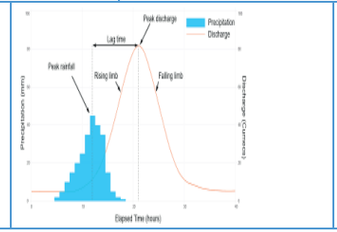
2. Percentages		
Strategy	**Description**	**Example**
Percentage	To give the amount (X) as a percentage of a sample (Y): X ÷ Y x 100	45 out of 50 people travel by car… 45 ÷ 50 x 100 = 90%
Percentage increase	To calculate the percentage something has increased by. Work out the difference between the two numbers (the increase). Divide the increase by the original number. Multiply the answer by 100%.	Population in 2020 = 65mill. Population in 2000 = 52 mill. 65m – 52m = 13m 13m ÷ 52m = 0.25 0.25 x 100 = **25% increase**
Percentage decrease	To calculate the percentage something has decreased by. Work out the difference between the two numbers (the decrease). Divide the decrease by the original number. Multiply the answer by 100%.	Cars in 2020 = 40 Cars in 2000 = 70 70 – 40 = 30 30 ÷ 70 = 0.43 0.75 x 100 = **43% decrease**
Use of percentiles	Percentiles are used to indicate the value below which a given percentage of observations fall. For example, the 80th percentile is the value below which 80% of the observations occur and above which 20% of the observations occur.	

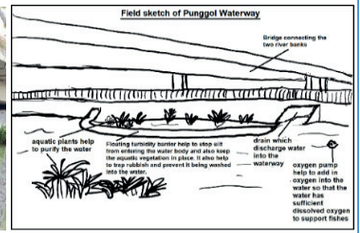
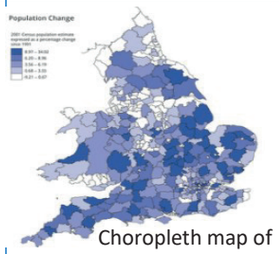
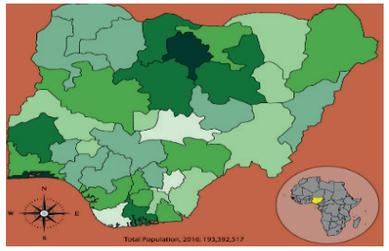
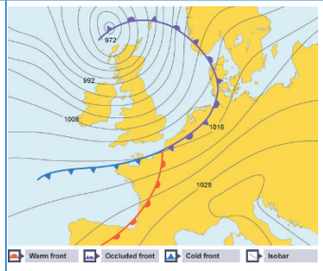
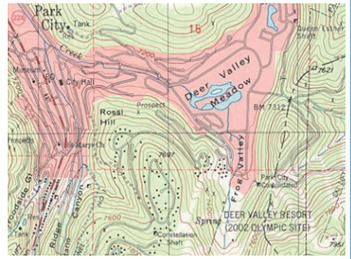
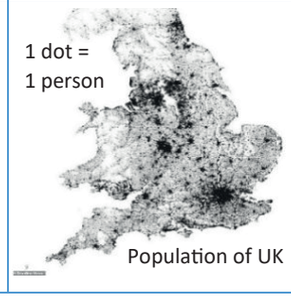
3. Relationships in bivariate data	
Strategy	**Description**
Bivariate data	Data for two variables that may be related. e.g. GNI per capita + life expectancy.
Graphed on…	Scatter graphs.
Lines of best fit	A straight line through the data. *Try to ensure an equal number of points each side of the line.*
Correlation	 Positive Negative None The closer the crosses to the line of best fit the stronger the correlation.
Interpolate	Estimating an unknown value from within the data set. 
Extrapolate	Estimate an unknown value that is outside the data set. Makes the data more uncertain. 

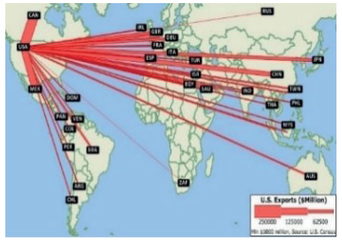
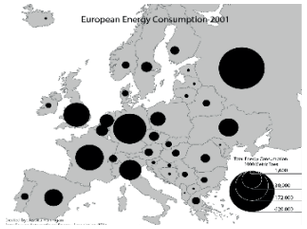
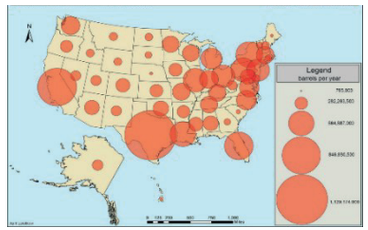
Geography - Graphs

Graphical skills				
Name	**Picture**	**Description**	**Example use**	**Evaluation**
Line graph		Shows how variables change over time.	For continuous data *e.g.* the number of vehicles (buses, cars and motorbikes) that travel to an area over the day.	Able to estimate (interpolate) data using the trend of the line. Easy to spot anomalies. Data points can cluster making it difficult to draw the line.
Bar graph		Each bar is the same width but of varying heights. Usually there is a gap between the bars.	For data which fits into categories *e.g.* the number of different types of car, plants or pets.	Simple to draw and read. Difficult to find fractions or percentages without further analysis.
Pie chart		Shows the proportion of something by dividing a circle into different parts (slices).	To show percentages *e.g.* the percentage of people working in different employment sectors.	Visually effective at showing how a total quantity is divided up. Small quantities are difficult to represent with narrow slices.
Pictogram		Shows the quantity of something by using appropriate symbols/pictures that are drawn to scale.	For data which fits into discrete categories *e.g.* the world population in different years shown with picture(s) of people to represent the quantity.	Visually effective at showing quantities. Difficult to accurately interpret data from symbols/pictures.
Histogram		Shows the frequency of something by using bars of different heights. Bars are touching.	For continuous data *e.g.* the amount of rainfall across a continuous timescale of 24 hours.	Visually effective at showing how frequency changes. Inappropriate intervals on x axis can distort data representation.

Geography - Graphs

Graphical skills				
Name	**Picture**	**Description**	**Example use**	**Evaluation**
Divided bar chat		Each bar is the same width, but the bars are individually subdivided to show how the total quantity is divided up.	For discrete groups of data *e.g.* the percentage of people working in different employment sectors in different years.	Summarises large sets of data, allowing comparison. Can be difficult to identify trends.
Scatter graph	 Positive correlation Negative correlation No correlation	Shows whether there is a relationship between two sets of data. Where data points are plotted close to the line of best fit the correlation is said to be strong.	For data for which you want to identify if there is a relationship between *e.g.* plotting life expectancy against GNI per capita.	Line of best fit can be drawn to show correlation, effectively showing a relationship. A correlation may be chance.
Population pyramid		A type of histogram in which the length of the bars is determined by the number of people in a population in that age group.	e.g. to show the structure of a population by identifying the number of males and females in age categories.	Visually effective at showing which age group has the greatest quantity of people in. Detail can be lost if large age intervals are used.
Dispersion graph		Shows the range of a set of data. The values are plotted on a vertical axis to show the spread.	e.g. to show the range of pebble sizes at different locations on a beach.	Visual representation of the range of a data set. Difficult to plot if the range is small and data points plot close together.
Climate graph		A climate graph shows the average precipitation for each month in a year with a bar graph (blue) and the average temperature each with a line graph (red).	Hydrographs	 A hydrograph shows the amount of precipitation over a continuous timescale on a histogram. It also shows the river discharge as a line graph.

Graphical skills			
Map type	**Example**	**Description**	**Evaluation**
Photos and sketch maps	 Photo of Underpass  Sketch of Underpass	Photos give real world data on a location, are easy to interpret and are cheap and easy to produce. Field sketches allow the artist to pick important geographical data relevant to their enquiry. Photos can include aerial and satellite.	+ Shows human and physical features of location (land use, vegetation etc). Photos only show a single moment in time.
Choropleth map	 Choropleth map of population change.  Population density in Nigeria.	Uses colours or shades to show data. Used for population density, age or income.	+ Very easy to identity spatial patterns and trends. Assumes that all area has the same data.
Isoline map	 	Isolines can be on a map, graph or image. They connect locations of the same value. Most commonly seen as contour lines. Air pressure on weather maps.	+ Useful for showing gradual changes. Requires a lot of data to be effective.
Dot maps	 Population of UK  World cities with population	Dot maps are dots of a fixed size that are used to represent a data set. For example, one dot could be equal to one individual or one million for population size and distribution.	+ Easy to identify patterns. Clustering of dots makes it impossible to read data.

Graphical skills			
Map type	**Example**	**Description**	**Evaluation**
Desire lines and Flow line maps	 Desire lines showing US exports.  Flow line- Immigration	**Desire lines**: Shows movement with a straight line. i.e. goods, trade, people. Line length can show distance. **Flow lines:** Have arrows and show the specific direction of movement (curved lines). Width of the line can show quantity.	+ Easy to understand. General trends are obvious. Can get difficult to read if there are too many lines.
Proportional symbols	 EU Energy Consumption 2015  Population of USA states in 2018	Maps that use symbols drawn in proportion to the size of the data. Any symbol can be used but circles are most common. Used for: energy consumption, cars owned, forest fires per state.	+ Easy to read as symbols are proportional. Difficult to calculate actual value.

Paper 3 Geography - Fieldwork

1. Stages in a fieldwork enquiry		
Stage		**Example**
1	**Question / Hypothesis**	Tourism has an environmental impact in Swanage.
2	**Data collection**	Questionnaire. Environmental Quality Survey.
3	**Data presentation**	Bar chart, pie chart. Radar graph.
4	**Data analysis**	70% said tourists leave litter.
5	**Conclusion**	Tourism DOES have an environmental impact.
6	**Evaluation**	I need to increase my sample size for my questionnaire.

2. Possible enquiries	
Coasts	Does hard engineering restrict longshore drift?
Rivers	Velocity increases with distance downstream.
Urban	Regeneration has created social and economic opportunities in Boscombe.

3. Suitable location?	
Distance	Can you get there and back in a day?
Access	Is the site public access? Can you get there?
Sampling opps.	Will it be busy enough to get a reliable sample size? Enough locations to survey?

4. Risk assessment		
This is where you consider what could cause people harm while completing fieldwork and think about how to reduce the likelihood of this happening.		
Physical fieldwork	Drowning	Face the sea. Stay 5m from the water.
	Heat stroke	Check the forecast. Take suntan lotion and a hat.
Human fieldwork	Getting lost	Arrange a meeting spot. Carry a map.
	Traffic accident	Always cross at a crossing. Concentrate- no distractions.

5. Key terms	
Key term	**Description**
Data collection methods	How will you collect the data? e.g. questionnaire, river depths.
Data presentation	How will you present your data? e.g. bar graph, flow arrow map…
Accuracy	How close to the true value? (Is it correct to the nearest mm?)
Reliability	The extent to which an investigation produced consistent results. (If you do it again, would you get the same results?)
Validity	How suitable were your methods for answering the question it was intended to?
Limitations	Problems with what you did.
Anomalies	A result that is unusual or does not follow the trend of the other data.
Evaluation	How can you improve your enquiry?

6. Types of data		
Key term	**Definition**	**Examples**
Primary data	Data that is collected first hand.	Measuring pebble size on a beach yourself.
Secondary data	Data that has been previously collected by someone else.	July temperatures for the last 30 years.
Quantitative data	Numerical data.	River depths.
Qualitative data	Opinion based data.	Questionnaire data / field sketches.

7. Sampling		
Why sample?	To save time. To avoid bias.	
Sample size	Number of data sets collected. Larger sample sizes make data more representative. (Reliable)	
Strategy	**Description**	**Example**
Random sampling	Collect data using a random number generator.	Picking up stones from a riverbed using a random number generator.
Systematic sampling	Collect data at specific intervals.	Sampling every 5th groyne.
Stratified sampling	Collect data from different groups of a population to ensure fair representation. (Deliberately introducing bias.)	Surveying 3 residential locations and 3 town centre locations.

8. Conclusion and evaluation	
Improve your methods	Is there better equipment you could have used? Should you have used a different sampling method?
Increase the reliability	Increase your sample size. Collect data at different times of the day or days of the week.
Increase the accuracy	Use digital fieldwork equipment. Take measurements 3 times and take an average.
Future studies?	Go at a different time of day / year? Add additional methods?

Own fieldwork: Swanage				
	Physical Investigation	**Justification**	**Human Investigation**	**Justification**
Location & hypothesis	Hard engineering reduces longshore drift in Swanage	Swanage is 25 miles away so we can get there and back in a day. Has groynes.	Tourism has an environmental impact in Swanage	We live in a tourist resort, like Swanage, so impact of tourism affects us.
Primary data collection method	Groyne drop survey, measuring drop on N and S side at a random spot, repeated every other groyne, over 5 groynes.	Shows build-up of sand on one side. Random sampling on the groyne to find a spot without a tourist. Systematic sampling covers a larger area of beach.	Environmental quality survey (EQS). Judging the surroundings in 3x tourist (T) and 3x non-tourist (non-T) areas.	Quantitative data. Stratified sampling used to compare env. quality in T vs non-T areas.
Primary data presentation	Bar charts	Simple and easy to plot. Drawing groyne in the middle shows drop clearly. But doesn't show location so difficult to analyse.	Radar graphs	4 axes to plot the scores for different criteria. Can show different sites on the same graph, but multiple sites are harder to read as lines overlap.
Secondary data collection method	Annotated aerial photo	Shows view from above to see pattern repeated over many groynes.	Annotated photo	Visual representation of the environmental quality
Results	Average drop on north side was 22cm lower, showing groynes trap sediment on south side. Photo showed wider beach on S side of groynes.		Tourist sites scored average of 42, non-tourist sites scored average of 64. Tourist sites scored 22 points lower, showing lower environmental quality.	
Conclusion	Hypothesis accepted; hard engineering reduces longshore drift in Swanage.	We can be confident because: • All 5 groynes showed a lower drop on North side. • Average difference between north and south was 22cm. However, need to go back at a different time of year with different weather.	Hypothesis accepted; tourism has an environmental impact in Swanage.	We can be confident because: Tourist locations scored 42 compared to 64 for non-tourist. Taking an average of 3 sites reduces the likelihood of anomalies skewing results. However, might be different on a weekend
Evaluation	Accuracy: Tape measure wasn't always held completely straight so might be inaccurate. Reliability: We only sampled 5 groynes.	BUT this wouldn't change our conclusion. Digital tape measure would improve accuracy. BUT we used systematic sampling (every other groyne) to cover a large section of the beach.	Accuracy: The EQS data was subjective, so people scored places differently. Reliability: Our data was collected on a weekday morning. It would have been different on a sunny Saturday.	BUT the difference between the sites was 22, which is a significant gap so this would not affect conclusions. BUT this is only likely to have lowered the tourist site scores so we would have reached the same conclusion.

Physical fieldwork

Hypothesis: Hard engineering reduced longshore drift at Bournemouth

Location	Risks	Data collection	Data presentation	Results
Bournemouth	Drowning Tripping	Quantitative: Groyne drop survey	Bar graphs	All 5 groynes = larger drop to east. Av E drop 45cm lower
		Qualitative: Photo analysis	Photo annotation	Beach is wider to the west of ALL groynes

Conclusion: Hypothesis proved.

Groynes do prevent longshore drift

Evaluation

Reliable? Yes, large extent
- ✓ 5 groynes
- × But only one time of year, could survey more

Improve reliability
- ◎ Survey more than 5 groynes

Accurate? Large extent
- ✓ Rulers
- × Not to the nearest mm. Some rulers weren't held straight

Improve accuracy
- ◎ Digital tape measure
- ◎ Do it 3 times and take an average

Human fieldwork

Hypothesis: Tourism has an environmental impact in Bournemouth.

Location	Risks	Data collection	Data presentation	Results
Bournemouth	Getting lost Tripping	Quantitative: Environmental quality survey	Radar graphs	Tourist 42/80 Non T 62/80
		Qualitative: Photo analysis	Photo annotation	Environmental quality worse in tourist areas

Conclusion: Hypothesis proved. (Hopefully!)

Tourism DOES have an impact on the environment

Evaluation

Reliable? Yes, SOME extent
- ✓ 6 sites
- × But only 1 time of day / week day

Improve reliability
- ◎ Survey more sites and on different days / weathers

Accurate?
- × Our version of what a 4 vs 5 look liked may have changed

Improve accuracy
- ◎ Make a photo key to help us make judgements on the criteria

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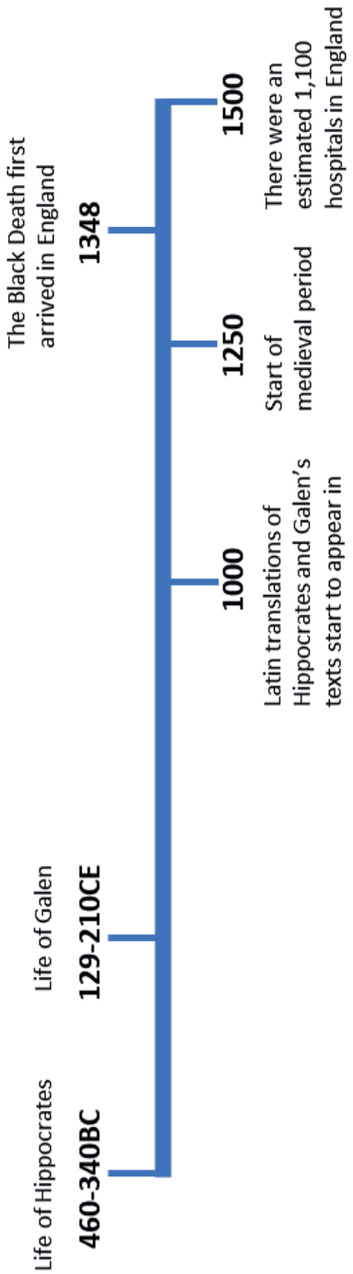
History

Medieval Medicine

1	Classical ideas	Name the four humours theorised by Hippocrates.	Yellow bile, black bile, blood, phlegm
2		How was it believed the four humours caused illness?	Being unbalanced
3		How did Galen develop treatment ideas in the Theory of the Four Humours?	Opposite treatments
4		What did Galen dissect to make his anatomical discoveries?	Animals
5		How many books did the Ancient Greek physician Galen write?	350
6	Causes of disease	Between which years was the medieval period?	1250-1500
7		Which believed cause of disease was a bad air thought to be filled with harmful fumes?	Miasma
8		What three things would physicians check in the urine when making a diagnosis?	Smell, colour, taste
9		What two reasons did people think God would send illness for?	Punishment, test of faith
10		In the Bible, which disease did God send as a punishment?	Leprosy
11		Which institution wrote books, therefore controlling medieval medical education?	The Church
12		Since the church believed that the body needed to be buried whole for the soul to go to heaven, what was banned?	Human dissection
13		What was the believed cause of disease that involved studying the alignment of planets and stars?	Astrology
14	Treatments for disease	What were the three most common religious treatments?	Praying, fasting, pilgrimage
15		What was the most common treatment to balance the humours?	Bloodletting
16		What type of chart showed points in the body where bleeding was recommended for specific illnesses?	Phlebotomy chart
17		What did enemas, emetics and laxatives do to balance the humours?	Purge the body
18		Which common herbal remedy could contain up to 70 ingredients?	Theriaca
19		Which herbal remedy was prescribed to improve digestion?	Aloe vera
20		What was regularly prescribed to help dissolve blockages in the humours?	Bathing

21	Preventions	What was the sum of money people gave to the Church each month called?	Tithe
22		What loose set of instructions advised people on healthy living?	Regimen Sanitatis
23		It was important to medieval people to stay clean, in what two ways did they achieve this?	Bathing and washing hands regularly
24		Which sweet herb was used to prevent miasma?	Lavender
25		What was a large locket full of herbs to prevent miasma called?	Pomander
26	Medics and hospitals	Who often looked after the sick within their own communities?	Women
27		What were university-trained doctors known as until the 17th century?	Physicians
28		Why did people not commonly see university-trained doctors?	They were rare and expensive
29		What was an early chemist called that mixed herbal remedies?	An apothecary
30		Who performed small surgeries, such as pulling teeth and bleeding patients?	Barber surgeons
31		What did medieval hospitals focus on?	Care not cure
32		Which institution ran most medieval hospitals?	The Church
33		How many hospitals were there in England by 1500?	1,100
34		Which types of patient were often turned away from medieval hospitals?	Infectious or terminally ill
35	The Black Death	In which year did the Black Death first arrive in England?	1348
36		What proportion of the population is the Black Death estimated to have killed?	One-third
37		How quickly did the Black Death usually kill its victims?	3-5 days
38		What was the main natural believed cause of the Black Death?	Miasma
39		What were the three main pieces of advice given to people by priests during the Black Death?	Pray, go on a pilgrimage, self-flagellation
40		During the Black Death, how many days did people new to an area have to stay away from everybody else for?	40 days

Medieval Medicine



What were the key themes in the medieval period?

Believed causes of disease– Theory of the Four Humours, Religion (punishment from God/test of faith), miasma (bad air), astrology (alignment of stars and planets creating a disease on Earth)

Diagnosis– Colour, smell and taste of urine examined. Examination of the alignment of the planets and stars when ill and from birth. Using medical books of Hippocrates and Galen for what to do with different symptoms (treated each symptom differently).

Treatments – Religious treatments- prayers, pilgrimages, fasting, paying for a special mass to be said. Balancing the humours- bloodletting (cutting a vein, leeches, cupping), purging (emetic, laxative, enema). Phlebotomy charts used to show points in the body where bleeding was recommended for specific illnesses. Herbal remedies, including theriaca. Bathing- to dissolve blockages in the humours.

Surgery– Amputations, trepanning (drilling into the head), and cauterisation (burning the wound to stop the flow of blood). Low success rate due to problems of infection, blood loss and pain. Minor surgery such as teeth-pulling and bloodletting was carried out by barber-surgeons.

Preventions– Religious preventions: leading a sin-free life, regular prayers, confessions, tithes. Preventing miasma: sweet herbs such as lavender spread, carrying a posy (bunch of flowers), pomander (herbs inside a locket), swept floors, rushes on floor to soak up any mess, the wealthy would have a private bath, public baths or swimming in rivers, washing hands before and after every meal, some measures to keep towns clean. Humoral preventions: Not eating too much, regular purging. Regimen Sanitatis- instructions for healthy living

Medics– Physicians- university trained for 7-10 years, expensive because very rare. Would look at urine, faeces, blood, consult star charts and then come up with a course of treatment. Apothecaries- apprenticed with other apothecaries, mixed herbal remedies and had good knowledge of the healing power of herbs and plants. Barber-surgeons- performed small surgeries such as bloodletting or pulling teeth. Quacks- unqualified and dishonest person selling fake cures. Wise women- herbal remedies, spiritual remedies and charms.

Hospitals– By 1500 there were 1,100 hospitals- ranged in size from just a few beds to hundreds. About 30% of hospitals were owned and run by the Church, led by monks and nuns who lived in nearby monasteries. The rest were funded by an endowment but still often run by the Church. Setup to care for patient not to cure them. Good places to rest and recover- kept very clean and the bed linens and clothing changed regularly, however some patients would share beds. Infectious and terminally ill patients usually rejected. Lazar houses- special hospitals for those with leprosy.

What were the significant factors in the medieval period?

Individuals– Hippocrates and Galen's natural theories continued to be popular during this period, however these ideas went unchallenged.

Institutions– After the fall of the Roman Empire, the Catholic Church became extremely powerful in Europe. They controlled education, and monks copied books out by hand, therefore controlling the spread of knowledge (including medical knowledge). Because the Church also controlled the universities, almost all physicians also supported Galen's ideas and methods. The Church also collected tithes to support the poor and ran hospitals. Religious reasons for disease were widely believed (punishment from God and test of faith) and therefore many treatments and preventions were religious-based. The Church limited progress due to their control on medical education, promoting of Galen and their banning of dissections.

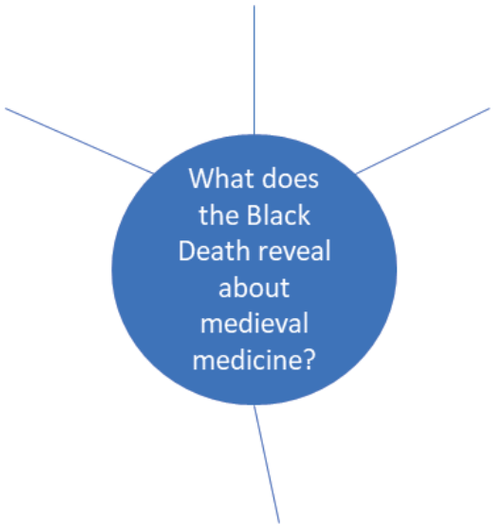
Science – Some rational thinking, mainly involving Hippocrates and Galen's theories. Due to the banning of dissection no progress in anatomical understanding.

Technology– The printing press was invented during this period, however had limited impact until the renaissance. Lack of technology limited progress.

Social attitudes– People were deeply religious and didn't question Church teachings.

The Black Death was a major epidemic of the bubonic and pneumonic plagues, which first arrived in England in 1348.

The disease was horrifying and could kill within 3-5 days. People therefore tried many ways to treat and prevent the disease. Treatments included bloodletting and purging, herbal remedies, bursting the buboes, and religious treatments. Preventions included quarantining new people to an area, carrying herbs, and religious preventions. Ultimately, they had no idea how to stop the disease, which was very scary for people at the time.



Medieval people had no idea that the disease was caused by bacteria that grows in the stomach of fleas, which would have lived on rats and then transferred to humans once the rat had died. They thought it was caused by punishment from God, an alignment of the planets, and miasma.

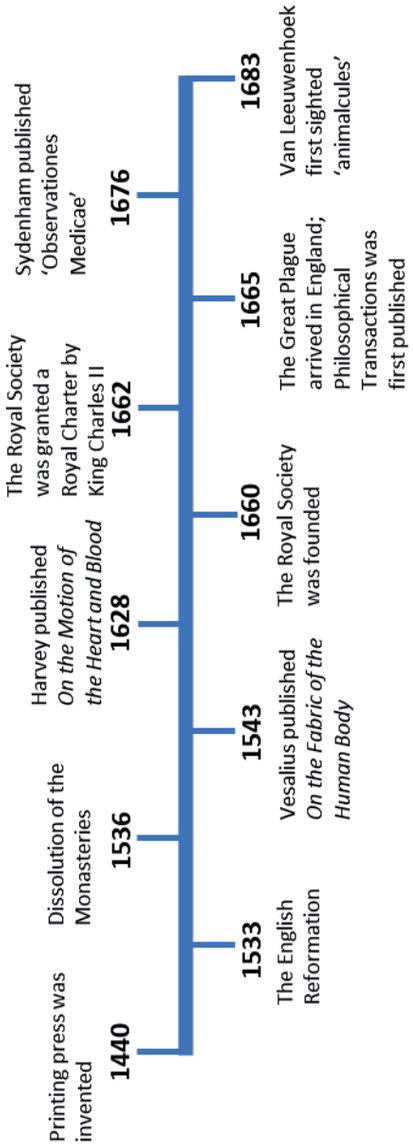
It is estimated that one-third of the English population died as a result of the Black Death.

Renaissance Medicine

1	Causes of disease	Between which years was the Renaissance period?	1500-1700
2		Which event in 1533 reduced the influence of the Church?	The English Reformation
3		Which movement promoted a return to classical thinking and extending human knowledge and understanding of the world?	Humanism
4		Which cause of disease did physicians no longer believe in, but the public did?	Theory of the Four Humours
5		Who created microscopes allowing the first sighting of bacteria?	Antony Van Leeuwenhoek
6		What was bacteria referred to as after the first sighting of it?	Animalcules
7		What was Thomas Sydenham's nickname?	'The English Hippocrates'
8		What two things did Sydenham suggest was important when diagnosing?	Closely observing the symptoms, treating the disease causing them
9		Which two diseases did Sydenham identify were separate diseases?	Measles and scarlet fever
10		Which textbook did Sydenham publish, which became the standard medical textbook for two centuries?	Observationes Medicae
11		Which 1440 invention enabled information to be spread accurately and quickly?	The printing press
12		In which year was the Royal Society formed?	1660
13		Why was it important that in 1662 King Charles II gave the Royal Society a royal charter?	It gave them credibility
14		What was the name of the scientific journal that the Royal Society published?	Philosophical Transactions
15	Treatments	Which new renaissance treatment believed a disease could be moved onto something else?	Transference
16		During the Renaissance, where did many new herbs come from?	New World / the Americas
17		The growth of alchemy, led by Paracelsus, led to which type of treatments?	Chemical cures
18		Why did people take small doses of antimony?	To sweat
19	Preventions	Which disease had spread through bathhouses, making bathing less popular?	Syphilis
20		What happened to homeowners that didn't clean the street outside their home?	They were fined
21		Which punishment did minor criminals have to do to prevent miasma?	Removing sewage/cleaning streets

22	Medics and hospitals	What did surgeons and apothecaries need to practice their trade?	A licence
23		What were apothecaries organised into during their training?	A guild system
24		What did trainee physicians have more access to?	Medical textbooks
25		What were individual copies of pictures of the anatomy called?	Fugitive sheets
26		Which 1536 event led to the closure of many hospitals?	Dissolution of the Monasteries
27		Which new type of hospital catered only for people suffering from plague?	Plague houses
28	Anatomy	How many errors did Vesalius find in Galen's work on anatomy?	Around 300
29		In which year did Andreas Vesalius publish his book 'On the Fabric of the Human Body'?	1543
30		Why had Vesalius been able to carry out a large number of human dissections?	He was able to use the bodies of executed criminals
31		What did Vesalius discover about the jawbone?	It was 1 bone, not 2
32		Who disproved Galen's work on the circulatory system?	William Harvey
33		Which piece of technology inspired research on the heart?	Mechanical water pumps
34		Why did better anatomical understanding have limited impact?	Didn't affect causes or treatments
35	The Great Plague	In which year did the Great Plague arrive in England?	1665
36		How many people in London did the Great Plague kill?	100,000
37		What did those who believed in transference suggest to treat the plague?	Strapping a chicken to the buboes
38		Why did physicians wear masks full of herbs during the Great Plague?	To ward off the miasma
39		Which type of 'doctor' took advantage by selling fake cures?	Quack doctor
40		Which three animals did the government order killed to prevent the spread?	Cats, dogs, and pigeons

Renaissance Medicine



What were the key themes in the Renaissance period?

Believed causes of disease– Miasma now the main believed cause- bad air causes disease. Only in times of epidemics were supernatural causes believed (religion and astrology). Theory of the Four Humours was no longer believed by physicians but was still believed by the public. Early ideas of chemicals going wrong inside the body.

Diagnosis– Closely observed the symptoms and treated the disease causing them (rather than treating each symptom differently). Detailed records encouraged to describe symptoms- all developments of Sydenham.

Treatments – Balancing humours- bleeding, purging, sweating continued. Herbal remedies- often chosen because of their colour or shape. New plants appeared from the New World. Sydenham popularised the use of cinchona bark for malaria. Transference- an illness could be transferred onto something else (rubbing an onion on a wart). Chemical cures- antimony promoted sweating.

Surgery– Improved knowledge of anatomy due to challenges to Galen started by Vesalius- improved accuracy of surgery. Harvey discovered the circulation of blood and the role of the heart. New wounds on the battlefield meant more surgery was necessary. Continued low success rate due to problems of infection, blood loss and pain.

Preventions– Preventing miasma: homeowners fined for not cleaning the street outside their homes, projects set up to drain swamps and bogs, rubbing oneself down with linen and changing clothes regularly. Bathing became less fashionable due to belief it spread syphilis- Henry VIII closed all bathhouses. Practising moderation in all things- avoiding exhaustion, rich and fatty foods, too much strong alcohol. Regimen Sanitatis

Medics– Improved education of surgeons- new wounds on the battlefield. Both surgeons and apothecaries had to possess licences to be able to practice their trade- guild system. Apothecaries developed through discovery of the New World and iatrochemistry. New subjects in medical curriculum at university such as iatrochemistry and anatomy, but most learning still from books. More challenging of old knowledge and investigation. Dissection now legal but difficult to get fresh corpses. More access to medical textbooks due to printing press and fugitive sheets.

Hospitals– Number of hospitals dramatically decreased due to 1536 Dissolution of the Monasteries. Hospitals now out of church control. Physicians often visited hospitals to observe the symptoms and prescribe treatments. Same caring routines also in place. Increase in hospitals specialising in one particular disease- plague houses.

What were the significant factors in the renaissance period?

Individuals– Vesalius: challenged Galen's studies, promoted human dissection, found around 300 mistakes in Galen's work, advanced understanding of the anatomy, inspired other anatomists. Harvey: proved blood was pumped around the body by the heart, proved that veins had valves, questioned the usefulness of bloodletting, suggested that blood was not a fuel, inspired further circulation discoveries. Sydenham: promoted closely observing the symptoms and treating the whole disease causing them, categorised similar diseases, found the difference between scarlet fever and measles, wrote a textbook which became the standard medical textbook for two centuries.

Institutions– The crown supported groups such as the Royal Society. The government introduced preventative measures during the Great Plague. The Church had lost influence due to the English Reformation- no longer had control over medical training and there were fewer hospitals due to the Dissolution of the Monasteries.

Science – Dissections were considered more acceptable, but bodies were hard to find. Advances were made in anatomical knowledge through better scientific methods. Medical chemistry grew out of alchemy to look for chemical cures (unsuccessfully).

Technology– New mechanical water pumps inspired Harvey's discoveries of circulation. More powerful microscopes were invented allowing for closer viewing of 'animalcules', printing presses became more common allowing for information to spread more widely, faster and cheaper.

Social attitudes– Rise of humanism meant that science was accepted more, and research and investigation was encouraged. Decline of religion being responsible for all aspects of life but people still stayed very religious.

Causes: Some new theories had been put forward, but almost everyone still believed that the Great Plague was caused by at least one of astrology, punishment from God (despite reduced influence from the Church), miasma, or other people.

Prevention: The plague still panicked people, so they would try everything in an attempt to prevent it. Charles II made a list of actions to try to stop the spread of the plague, and mass events were banned. Stricter quarantine measures came into place, as well as methods to ward off miasma. The government also enforced the killing of animals and mass fires to ward off miasma.

What does the Great Plague reveal about medical progress?

Treatments: There had been advances in herbal remedies, and understanding of similar diseases meant that some people tried to catch syphilis in the belief they then wouldn't get the plague. Prayer and bloodletting showed there was still a reliance on causes of disease believed in the medieval period. New methods like transference were also used. Quack doctors took advantage of the situation to make fake remedies to get rich.

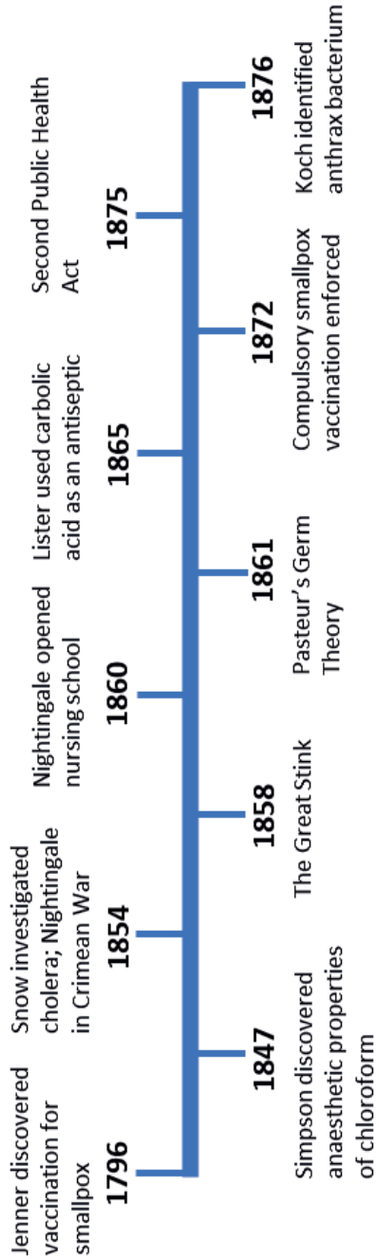
Happened in 1665. Killed about 100,000 people in in London (about a fifth of the city's population).

Industrial Medicine

1	Edward Jenner	Between which years was the industrial period?	1700-1900
2		What percentage of those who caught smallpox died in the 18th century?	30%
3		Which risky Asian medical technique was used to try to prevent smallpox in the 18th century?	Inoculation
4		In which year did Jenner create a vaccine to prevent smallpox?	1796
5		Which similar disease did Jenner create a vaccine from to prevent smallpox?	Cowpox
6		In which year did the British government enforced compulsory smallpox vaccination?	1872
7		Why did Jenner's vaccination not lead to other discoveries?	Connection was a one-off
8	Chloroform	What is a substance that removes pain called?	Anaesthetic
9		What were three problems of using ether to remove pain?	Flammable, caused vomiting, difficult to inhale
10		Who discovered chloroform as a substance that removes pain in 1847?	James Simpson
11		Who died from a chloroform overdose in 1848 during an operation to remove her toenail?	Hannah Greener
12		Which English monarch used chloroform in childbirth, popularising it?	Queen Victoria
13	Nightingale	By 1700 how many hospitals remained in England (and were all in London)?	5
14		Why did the rich choose not to be treated in hospitals?	It was safer in their own homes
15		In which 1853-1856 war did Florence Nightingale develop her ideas on nursing and cleanliness, returning a national hero?	Crimean War
16		Which design of hospitals with separate wards did Nightingale promote?	Pavilion style
17		At which hospital did Nightingale establish a school for nurses in 1860?	St Thomas's Hospital in London
18	Cholera	What did most people believe was causing cholera in the 1830s-1860s?	Miasma
19		Whose 1854 investigation suggested that dirty water was causing cholera?	John Snow
20		On which street was the water pump handle removed reducing cases of cholera?	Broad Street
21		Which organisation rejected Snow's findings due to lack of scientific evidence?	The General Board of Health
22		Who designed a new sewer system for London after the 1858 Great Stink?	Joseph Bazalgette

23	Germ Theory	Which 18th century theory suggested that rotting matter created microbes?	Spontaneous generation
24		Who published their work on Germ Theory in 1861?	Louis Pasteur
25		What did the 1861 paper on Germ Theory theorise?	Microbes caused decay
26		Which experiment proved that decay did not happen to sterilised matter?	Swan-necked flask
27	Listerism	Which English surgeon made use of Germ Theory in their surgery?	Joseph Lister
28		What is a chemical applied to a wound/medical instruments to clean and stop germs spreading called?	Antiseptic
29		What substance was first used in 1865 to stop infection in surgery?	Carbolic acid
30		Which influential surgeon lectured against Listerism, in favour of spontaneous generation?	Henry Bastian
31		By 1900 what type of surgery took place?	Aseptic
32	Bacteriology	Who identified that different germs caused different diseases?	Robert Koch
33		What was the first microbe that Koch isolated, in 1876?	Anthrax
34		In which year did Koch find the bacteria causing tuberculosis?	1882
35		What vaccine, using a weakened strain of a disease, did Pasteur develop in 1879?	Chicken cholera
36		Who developed a vaccine against tetanus and diphtheria in 1890?	Emil von Behring
37	Public health	Which phrase describes government attitude towards public health in the 18th-19th centuries, meaning 'leave be'?	Laissez-faire
38		In which year was the second Public Health Act passed?	1875
39		Who did cities have to employ as part of the second Public Health Act?	A public officer of health
40		How were the two Public Health Acts enforced differently?	1875 Act was compulsory

Industrial Medicine



What were the key themes in the Industrial period?

Believed causes of disease– Miasma most commonly believed for all disease including cholera up until the late 1870s. John Snow discovered the link between dirty water and disease due to his cholera investigation in 1854 but this was rejected by the General Board of Health. Contagionism- some diseases could pass from human to human. Pasteur discovered germs cause decay in 1861, and from the 1870s it is accepted that germs caused disease due to the work of Koch. Tyndall lectured on Germ Theory in England. Specific microbes were isolated- tuberculosis in 1882, cholera in 1883. This proved that specific germs cause specific diseases.

Diagnosis– Closely observed the symptoms and treated the disease causing them. Detailed records encouraged to describe symptoms.

Treatments – Herbal remedies continued. Bloodletting continued. Continued chemical cures- mercury continued for syphilis.

Surgery– Increasing use of anaesthetic (pain relief)- ether in 1840s, then in 1847 Simpson discovered chloroform was an effective anaesthetic. Many opposed anaesthetics. Queen Victoria popularised it in 1853. Lister applied Pasteur's Germ Theory to infection in surgery in 1865 to create antiseptic (a substance that kills bacteria) surgery- use of carbolic acid in antiseptic surgery. Franco-Prussian war showed the success of Lister's methods.

Preventions– Vaccination for smallpox 1796 discovered by Jenner (compulsory and enforced from 1872) however it was a one-off connection. Vaccination for tetanus and diphtheria in 1890 (von Behring). 1848 Public Health Act created a Central Board of Health and gave new powers to local councils. 1875 Public Health Act: providing clean water, disposing of sewage, building public toilets, employing a public officer of health, minimum quality for housing, parks for public exercise, street lighting, food quality checks.1875 Act was compulsory, whilst the 1848 one was not enforced by all local councils. Bazalgette's sewer system finished in 1875.

Medics– Improved status of nurses- impact of Nightingale and School for Nurses- rigorous training. Surgeons- by late 19th century using anaesthetics and antiseptics. Debate through 1860s regarding spontaneous generation (Dr Henry Bastian). Continuation of apothecaries, physicians (now known as doctors). Public Health Officer- looked after public health in an area after public health acts.

Hospitals– By 1700 only 5 hospitals left in the country and they were all in London. Attitudes changed- became places where sick people were treated, doctors visited regularly, and a surgeon or apothecary on site for daily treatments. More people attending meant hospitals became less sanitary. Upon return from Crimea in 1856, Nightingale changed hospitals. Pavilion plan- improved ventilation, with more windows, large rooms and separate wards. Training for nurses in sanitary matters, new hospitals built of materials easily cleanable, rigorous training inspired more nurses- respectable profession.

What were the significant factors in the industrial period?

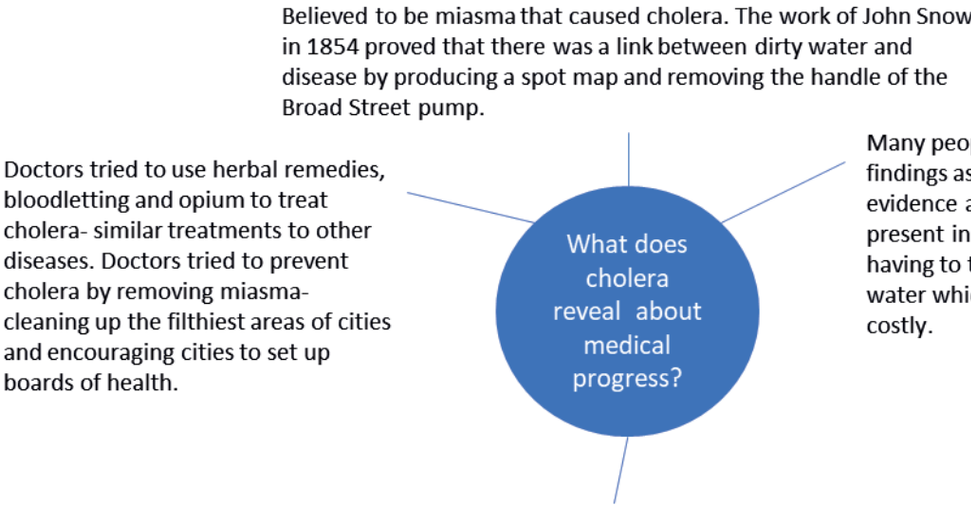
Individuals– Pasteur: proposed Germ Theory in 1861, proved that microbes in the air cause decay, created vaccine for chicken cholera. Koch: identified that specific germs caused specific diseases, created a scientific method to isolate microbes, discovered the microbes for anthrax, tuberculosis, cholera. Von Behring: developed a vaccine against diphtheria and tetanus. Nightingale: promoted high-quality cleaning in hospitals, raised the status of nursing into a profession, set up a nursing school, promoted pavilion style hospitals. Simpson: discovered chloroform as an anaesthetic. Lister: lectured on Germ Theory in England, developed carbolic acid as an antiseptic. Jenner: used cowpox germs to prevent smallpox- the first vaccination, used careful scientific method to prove his theory. Chadwick: published a report that showed filthy living conditions led to lower life expectancy. Snow: gave Queen Victoria chloroform during pregnancy, linked dirty water to cholera outbreak. Bazalgette: designed and constructed a new sewer system for London. Tyndall: lectured on Germ Theory in England.

Institutions– The government initially had a laissez-faire approach to public health. In the short term they didn't back germ theory as it couldn't explain the spread of cholera. The government did change their position and began supporting smallpox vaccinations by offering funding and later making them compulsory for the general population. They passed various laws including the Public Health Acts and funded the building of new sewers. The Royal Society spoke out against Jenner's vaccinations as Jenner was unable to explain the science behind his discovery.

Science – Scientific investigation was common as was collaborative projects. Swan-necked flask experiment proved that germs cause decay, disproving spontaneous generation. New drugs were found to advance surgical treatments and reduce risk and shock.

Technology– Better microscopes were developed which allowed microbes to be seen more clearly. Petri dishes and new dyes were used to make it easier to identify microbes. Devices were developed to regulate the dosages of anaesthetics. Extensive new sewer system in London was built to remove the wastewater and stop the contamination of drinking water.

Social attitudes– Movement such as the Age of Enlightenment and Scientific Revolution reflected people who were more willing to investigate answers rather than accept old ideas. Overcrowding meant disease spread quickly and a sick population couldn't work prompting more attention to be paid to the people. While there was an increased desire for investigation, people were still reluctant to accept change unless there was proof. Religious people question anaesthetic as it countered what was in the bible about pain.

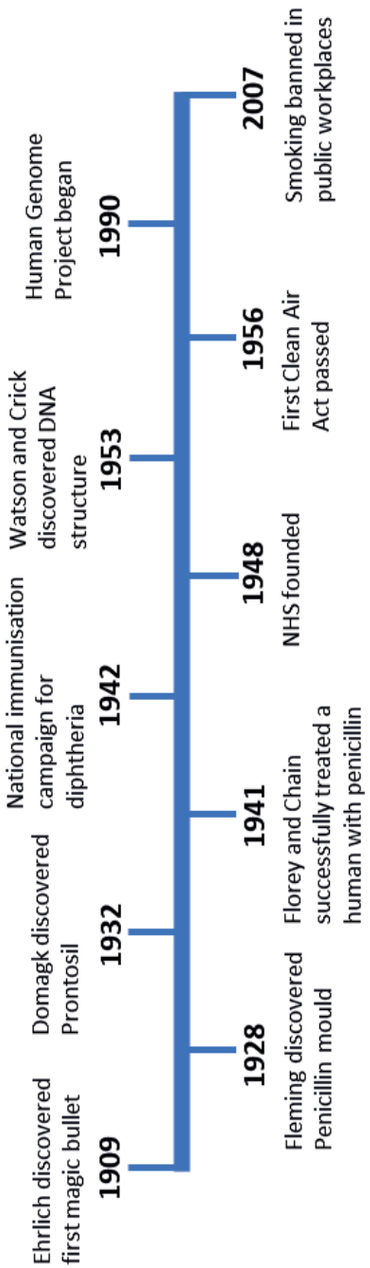


Modern Medicine

1	Causes	Which 3 methods were commonly used to diagnose in the 20th century?	Taking samples, biopsies, x-rays
2		Which type of diseases are caused by genetic factors?	Hereditary diseases
3		Who proposed in 1900 that genes come in pairs, and one is inherited from each parent?	Gregor Mendel
4		Which piece of technology, that allowed genetic study, was invented by Ruska and Knoll in 1931?	Electron microscope
5		What did Watson and Crick discover in 1953?	Double-helix structure of DNA
6		In which year was the Human Genome Project launched?	1990
7		Which actress had a preventive double mastectomy in 2013?	Angelina Jolie
8		What is the biggest cause of preventable diseases in the world?	Smoking
9		What can too much sugar cause the body to develop?	Type 2 diabetes
10		What has the fashion for tanning led to a rise in the number of cases of?	Skin cancer
11		What machines from the 1970s are a more advanced form of x-rays to diagnose tumours?	CT scans
12		What are machines with a camera on the end of a thin, flexible tube to see inside the body called?	Endoscopes
13	Treatments	What was a chemical that targeted the specific bacteria causing the illness, but had little or no effect on any other part of the human body called?	Magic bullet
14		Who discovered Salvarsan 606, made from arsenic compounds, in 1909?	Paul Ehrlich
15		Which disease did Salvarsan 606 target?	Syphilis
16		What was the second magic bullet found by Domagk in 1932?	Prontosil
17		What is the word for a medicine that kills a specific bacterium inside the body?	Antibiotic
18		Which 1960s drug did not go through testing and trialling, causing birth defects?	Thalidomide
19		In which year was the National Health Service (NHS) founded?	1948
20		Who could access free healthcare on the NHS?	Everyone
21		Which type of surgery uses tiny cameras and narrow surgical instruments to operate inside the body through tiny incisions?	Keyhole surgery
22		How have some microbes evolved, such as MRSA, causing problems for doctors?	Antibiotic resistant

23	Penicillin	Who first identified penicillin mould in 1928?	Alexander Fleming
24		Which two individuals worked on developing penicillin mould into a drug?	Florey and Chain
25		In which year was penicillin first successfully used on humans?	1941
26		Which country helped mass produced penicillin?	USA
27		What percentage of British and American soldiers is it estimated would have died in WW2 without being given penicillin?	15%
28	Preventions	Whose 1942 report encouraged the government to 'take charge of social security from the cradle to the grave'?	Sir William Beveridge
29		Which disease had a national vaccination campaigned launched in 1942?	Diphtheria
30		In which year was the last case of a person contracting polio in the UK?	1984
31		Which vaccine protects women against infection from a sexually transmitted disease that has been linked to cervical cancer?	HPV
32		What was passed in 1956 and 1968 to reduce air pollution?	Clean Air Acts
33		Which Public Health England campaign encourages healthy eating and exercise?	Change4Life
34		Which event held in October encourages people to stop smoking for a month?	Stoptober
35	Lung cancer	How common is lung cancer in the UK compared to other types of cancer?	2nd most common
36		What percentage of lung cancer sufferers are believed to have smoked?	85%
37		Why is lung cancer often difficult to treat?	Diagnosed late
38		What three machines might a doctor use to diagnose lung cancer?	CT scan, PET-CT scan, bronchoscope
39		What are three common treatments for lung cancer?	Transplants, radiotherapy, chemotherapy
40		In which year was legislation passed to ban smoking in public workplaces?	2007

Modern Medicine



What were the key themes in the modern period?

Believed causes of disease– Germ Theory continued with more microbes isolated. Understanding of hereditary diseases due to understanding the structure of DNA (1953 Watson and Crick) and the Human Genome Project of 1990 that mapped the human genome- e.g. Down's syndrome, Huntingdon's. Links discovered between lifestyle factors and diseases, such as smoking (lung cancer), sugar (type 2 diabetes), alcohol (liver and kidney disease), fat (heart disease).

Diagnosis– Examination of samples- skin, blood, or more detailed samples of flesh from a biopsy. Samples examined by medical scientists in a laboratory, using microscopes and other technology. X-rays to see what was going on inside the body. MRI scans, CT scans, ultrasound scans, ECGs, endoscopes, blood pressure monitors.

Treatments – The development of specific treatments for specific diseases. Magic bullets- Salvarsan 606 and Prontosil. Antibiotics- penicillin (Alexander Fleming discovered and then Florey and Chain developed into a treatment in 1941). Development of moulds and fungi (streptomycin).Treatments on NHS free for all. Better testing and trialling for drugs after 1960s due to thalidomide causing birth defects. Some microbes evolved to be antibiotic resistant, such as MRSA.

Surgery– By 1900 steam was used for aseptic surgery. Landsteiner discovered blood groups in 1901 so blood groups were able to be matched before transfusions. Technology has allowed microsurgery, keyhole surgery, robotic surgery and better prosthetic limbs.

Preventions– National vaccination campaigns- diphtheria in 1942, polio 1962 (last case of person contracting polio in the UK was 1984). Vaccines aimed at protecting future generations (Rubella), or target diseases that can lead to other diseases (HPV). Laws: Clean Air Acts of 1956 and 1968 due to smog, illegal to smoke in all enclosed workplaces (2007). Lifestyle campaigns: Change4Life campaign launched in 2008 encouraging eating more healthily and getting more exercise. Stoptober, Dry January. Genetic preventions- double mastectomies if gene that increases chance of cancer.

Medics– Pharmacists- drug mixing and dispensing. GPs- free healthcare for all so more people visited, GP's charter in 1966 encouraged GPs to work in group practices and gave incentives to keep up with medical developments. Surgeons- increased use of technology- microsurgery, keyhole surgery, robotic surgery. Lack of trust in medical profession has led to alternative treatments/anti-vaccination movements.

Hospitals– NHS in 1948 nationalised hospitals and widened access to hospitals as everyone could access free treatment. During the 1960s plans made to ensure that hospitals were evenly spread across the country. Aseptic environments in hospitals. High-tech treatments in hospitals using machinery- radiotherapy, heart bypasses, microsurgery etc.

What were the significant factors in the modern period?

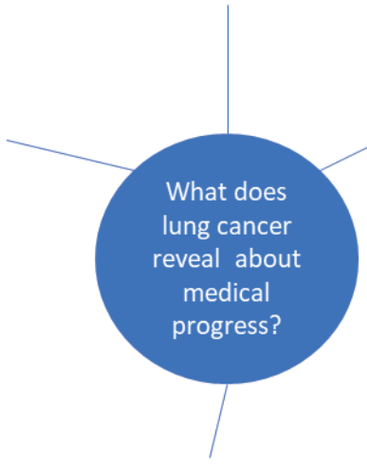
Individuals– Mendel: theorised the fundamental laws of inheritance. Watson and Crick: discovered the double helix structure of DNA, Watson later launched the Human Genome Project. Ruska and Knoll: developed the first electron microscope. Ehrlich: discovered the first magic bullet Salvarsan 606. Domagk: discovered the second magic bullet Prontosil. Fleming: isolated penicillin mould. Florey and Chain: developed penicillin into a usable treatment. Beveridge: wrote a report encouraging further government intervention in people's lives. Hodgkin: mapped the chemical structure of penicillin.

Institutions– The government introduced national vaccination and lifestyle campaigns to assist in preventing disease. The NHS was founded which offered care and treatments free of charge, assisting both treatments and preventions. The American government financed the mass production of penicillin.

Science – Research teams and collaborative working became common practice which allowed more discoveries to be made because of more specialists working together. DNA and genetic research have advanced understanding. This has helped with understanding hereditary conditions and developing preventative practices. Diagnosis is now commonly done in a laboratory using samples and biopsies. Chemical cures were found in magic bullets and antibiotics such as penicillin has led to a huge reduction in deaths from infectious diseases.

Technology– Huge advancements in technology has impacted on most areas of medicine including diagnosis, understanding causes, and developing treatments. Improved ability to scan has led to more accurate imaging such as CT and MRI scans. It is also possible to measure blood pressure, ECGs for heart activity and blood sugar levels for diabetes etc. The development of the electron microscope allows for significantly improved magnification aiding in the work with genetics. Surgical treatments have advanced using laparoscopic tools which minimise infection rate and recovery times as well as robotic surgery and laser surgery. Technology has also assisted in the mass production of tablets and medicine so that this can be done on a large and consistent scale.

Social attitudes– People are more open to change as their access to information and education has improved. Increased political rights of workers and women has meant that the government has had to offer schemes and policies that cover all classes leading to more public health interventions.



Most lung cancers are caused by external factors- around 85% of cases are people who smoke or have smoked. Other chemicals in the air, such as radon gas, are also sometimes to blame, however a small number of people develop lung cancer for no apparent reason.

The government was slow to respond to the link between cigarette smoking and lung cancer. The government have introduced laws (2007 banned smoking in all workplaces) and methods to influence people to change their behaviour (banning cigarette products from being on display, advertising the dangers of smoking)

Hard to treat as often diagnosed late. Diagnosis is difficult- x-rays can confuse tumours for other things. Now diagnosis involves a CT scan, PET-CT scan and bronchoscope. Treatments involve transplants, radiotherapy, chemotherapy. Potential future of genetic treatments?

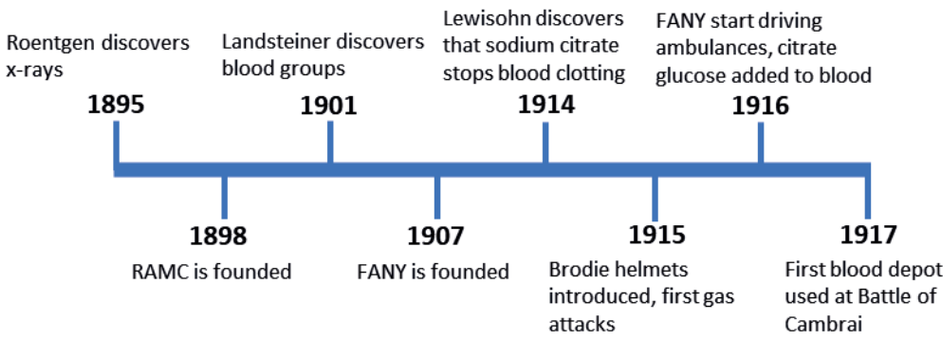
Second most common cancer in the UK. Mainly affects people over the age of 40, with diagnoses being highest among people aged 70-74.

Medicine on the Western Front

1	Context of WW1 medicine	What was used to sterilise operating theatres and equipment in aseptic surgery?	Steam
2		Who developed the x-ray in 1895?	Wilhelm Roentgen
3		What was the purpose of an x-ray?	See inside the body
4		Since blood couldn't be stored in the early 20th century, how did blood transfusions happen?	Directly from donor to patient
5		Who discovered blood groups in 1901 minimising the chance of rejection of transfused blood?	Karl Landsteiner
6	Context of the Western Front	As a result of the stalemate in WW1, what did both sides build?	Trenches
7		In which 1915 battle was the first use of chlorine gas?	Second Battle of Ypres
8		Which two new strategies were tried at the 1916 Battle of the Somme?	Creeping barrage, tanks
9		How many British casualties were there in the 1916 Battle of the Somme?	400,000
10		Where was an underground network created, which included a hospital?	Arras
11		During which 1917 battle did troops suffer in waterlogged conditions?	Third Battle of Ypres
12		In which battle was the first large-scale use of tanks?	Battle of Cambrai
13		Why was there lots of bacteria in the soil on the Western Front?	Farmers' fertiliser
14		Who would carry injured men away from the frontline?	Stretcher bearers
15		What was the problem with horse-drawn ambulance wagons?	Wounded shaken about
16		What was the problem with motor ambulances?	Got stuck in muddy terrain

Medicine on the Western Front

17	Medical problems	Which condition was caused by standing in cold mud and water?	Trench foot
18		How many British soldiers is it estimated experienced shellshock?	80,000
19		What percentage of injuries were high-explosive shells and shrapnel responsible for?	58%
20		Which two infections were caused by the bacteria in the soil?	Tetanus and gas gangrene
21		What was given to soldiers in 1915 which reduced fatal head wounds by 80%?	Brodie helmet
22		How many British soldiers died as a result of gas attacks?	6,000
23		Which three types of gas were used on the Western Front?	Chlorine, phosgene, mustard
24		How did chlorine gas lead to death?	Caused suffocation
25	Treatments	Which branch of the army was responsible for medical care?	RAMC
26		Which women's organisation provided frontline support for the medical services?	FANY
27		Where was immediate care provided, usually within 200m of the frontline?	Regimental Aid Post (RAP)
28		What was the maximum time an advanced dressing station could handle a patient?	1 week
29		Where would the most critical injuries be operated at?	Casualty Clearing Station (CCS)
30		What did Base Hospitals mainly do?	Continue treatment from CCS
31	Experiments in surgery and medicine	What were the 3 most common ways of dealing with infected tissue?	Debridement, amputation, Carrel-Dakin method
32		Which invention increased survival rates for compound fractures from 20% to 82%?	Thomas Splint
33		What were x-rays mainly used for on the Western Front?	Identifying shell fragments and bullets in wounds
34		How many mobile x-ray units were there on the Western Front?	6
35		From 1915, what substance was added to blood which removed the need for donor-to-donor transfusion?	Sodium citrate
36		Who designed a portable blood transfusion kit?	Geoffrey Keynes
37		From 1916, after adding citrate glucose solution to blood, how long could it be stored for?	4 weeks
38		Which two techniques did Henry Cushing pioneer for brain surgery?	Magnets and local anaesthetic
39		Compared to the general survival rate of 50% for brain surgery, what was Cushing's operational survival rate?	71%
40		Which surgeon revolutionised plastic surgery and facial reconstruction?	Harold Gillies



What was medicine on the British Western Front like?

Medical problems– Trench fever (caused by lice), trench foot (caused by standing in waterlogged trenches with no change of boots or socks), shellshock, wounds from shells, shrapnel and bullets, head injuries, effects of gas attacks.

Transport– Stretcher bearers used to carry the wounded that couldn't walk from the battlefield. Horse-drawn ambulances used but men got shaken about, motor ambulances used but got stuck in mud, train, barge and ship ambulances used for slow journeys to base hospitals.

Medical care– The RAMC was the branch of the army responsible for medical care- organised and provided medical treatment to the wounded and sick. Number of medical officers quadrupled between 1914 and 1918. FANY- women's voluntary nursing organisation.

Recent developments– Aseptic surgery developed by 1900 to create microbe-free surgical environments. X-rays developed by Roentgen in 1895 and radiology departments setup to see inside the body before operating. Blood transfusions developed by James Blundell experimenting with donor to patient transfusions and Karl Landsteiner discovered the existence of three blood groups.

Medical developments– Treating infection through: wounded excision/debridement, the Carrel-Dakin method, amputation. The Thomas Splint was used to keep leg rigid and injured man being transported. Mobile x-ray units used. Blood transfusions developed: Keynes' portable blood transfusion kit, Lewisohn adding sodium citrate, Robertson creating the blood bank at Cambrai. Brain surgery techniques developed by Cushing- local anaesthetic and magnets. Plastic surgery developed by Gillies.

Stages of evacuation

1. RAP: Regimental Aid Post

Close to the front line- patients would arrive either by stretcher bearer or walking there. Identified the lightly wounded and those who needed more medical attention. Immediate care was given to soldiers.

2. Dressing stations (ADS and MDS)

Emergency treatment was given to the wounded about a mile behind the front line. They did not have the facilities to tend to wounded men for more than a week. Men who had been treated would either be returned to their units or would be moved onto the next phase of the chain of evacuation.

3. CCS: Casualty Clearing Stations

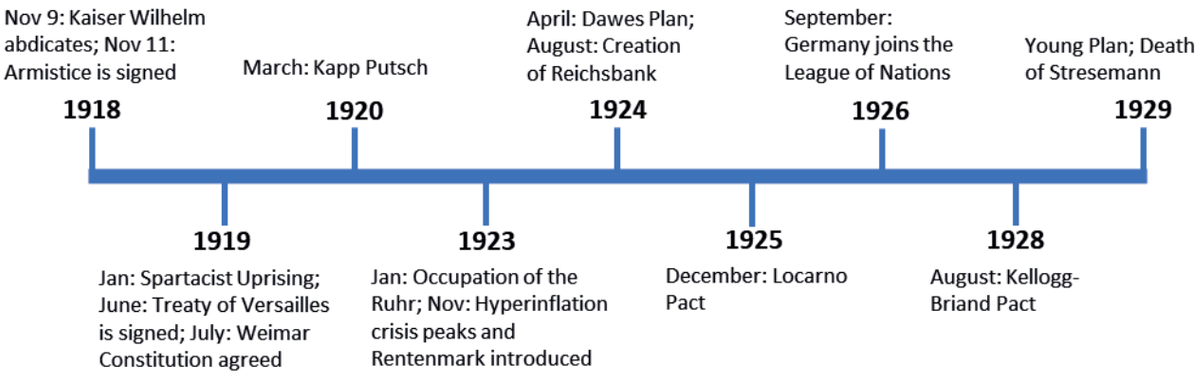
The first well-equipped medical unit that the wounded would experience, containing x-ray machines and wards with beds. These were located about 10 miles from the front line. Most surgery happened here.

4. Base Hospitals

Soldiers would arrive by train, motor ambulance or by canal. More major surgery or experimental surgery happened here. Responsible for continuing treatment that was begun in the CCS. Most patients were sent back from here to Britain.

1	Origins of the Republic	On which date did Kaiser Wilhelm II abdicate?	9 November 1918
2		On which date was the armistice signed, ending the First World War?	11 November 1918
3		What did the German representatives who signed the armistice become known as?	November criminals
4		Who was the first president of the Weimar Republic?	Friedrich Ebert
5		In the Weimar constitution, how frequently were presidential elections held?	Every 7 years
6		Which position, chosen by the president, balanced the president's power & was the head of government?	The chancellor
7		How frequent were elections for the Reichstag, the German parliament?	Every 4 years
8		Who had the right to vote in the Weimar Republic?	All men & women over 21
9		Which voting system did the Weimar Republic use?	Proportional Representation
10		Why can coalitions be a weak form of government?	Slowness of decision making
11		Which article of the constitution meant the president could bypass the Reichstag & rule by decree?	Article 48
12	Early challenges 1919-23	On which date was the Treaty of Versailles signed?	28 June 1919
13		How much was Germany forced to pay in reparations?	£6.6 billion
14		How many men was Germany's army limited to after the Treaty of Versailles?	100, 000
15		Which article of the Treaty of Versailles blamed Germany for starting WWI?	Article 231
16		Which area, that bordered France, was forced to be demilitarised?	Rhineland
17		Which area of land did Germany lose to France in the Treaty of Versailles?	Alsace & Lorraine
18		For how many years would the coal mined in the Saar go to France?	15 years
19		Which German word represents the idea that the army had been 'stabbed in the back' by politicians in the Treaty of Versailles?	Dolchstoss
20		Which two people led the communist group, the Spartacists?	Rosa Luxembourg & Karl Liebknecht
21		In which month and year did the Spartacists revolt in Berlin?	January 1919
22		Which right-wing group of demobilised soldiers helped the Weimar Republic to crush communist uprisings?	Freikorps
23		Which right-wing revolt caused the government to flee to Dresden in March 1920?	Kapp Putsch
24		How did the Weimar Republic put down the right-wing revolt?	Urged workers to not co-operate & go on strike
25		Following Germany's failure to send coal as part of reparation payments, which area of Germany did France invade in 1923?	The Ruhr
26		What happened as a result of Germany printing more money to pay striking workers in French-occupied land?	Hyperinflation
27		How much did a loaf of bread cost in Germany in November 1923?	200,000 billion marks

28	Recovery 1924-29	Who was appointed as Chancellor & Foreign Secretary in 1923?	Gustav Stresemann
29		Which new currency did the Chancellor first introduce to tackle economic problems?	The Rentenmark
30		Which 1924 plan reduced annual reparations payments & secured American loans?	The Dawes Plan
31		How did the 1929 Young Plan help Germany with reparations?	Reduced to £1.8 billion + extra 59 years to pay
32		Which 1925 pact formalised the borders of European nations?	Locarno Pact
33		Which international organisation was Germany allowed to join in 1926?	The League of Nations
34		Which 1928 pact, signed by 62 countries, aimed to not use war to settle disputes?	Kellogg-Briand Pact
35	Society	Which 1927 act provided unemployment and sickness benefits?	The Unemployment Insurance Act
36		By what percentage did real wages increase in Germany between 1925 & 1928?	25%
37		By 1932, how many women had been elected to the Reichstag?	112
38		What type of Black American music became popular in Weimar Germany?	Jazz
39		Which three types of art flourished in Weimar Germany?	New Objectivism, Modernism, Expressionism
40		Which two reasons helped art to flourish in Weimar Germany?	The Bauhaus movement & government support



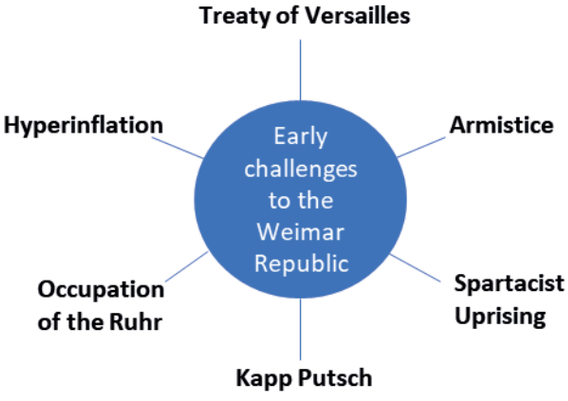
Legacy of WW1– The British blockade of ports meant that there were major food shortages and unrest led to mutinies and strikes across Germany. The Kaiser abdicated on 9 November 1918, leading to the armistice being signed on 11 November by Erzberger. The cost of the war meant that Germany was bankrupt. The SPD ruled Germany with the support of the army and established a new republic to prevent a communist revolution.

Weimar Constitution– New constitution agreed on 31 July 1919. Strengths: universal suffrage- all men and women over the age of 21 could vote, regular elections- President every 7 years, Reichstag every 4 years, systems of checks and balances- power spread across the President, Chancellor, Reichstag, and Reichsrat. Weakness: Article 48 could give the President too much power- able to make laws without the Reichstag in a state of emergency, proportional representation led to coalition governments where making decisions could take a long time.

Dictated peace settlement (diktat) which Germany had to sign. Terms: accept blame for the war (Article 231), pay £6.6 billion in reparations, army limited to 100,000, no air force, Rhineland demilitarised, Alsace and Lorraine given to France, loss of colonies in Africa, lost 10% of population.

German government kept printing more bank notes making the currency worthless. Nov 1923 a loaf of bread cost 200,000 billion marks. Middle classes lost their savings, many small businesses collapsed.

Germany could no longer pay reparations so in January 60,000 French and Belgian troops occupied the Ruhr and took raw material, manufactured goods and industrial machinery.



Some believed that the army had been 'stabbed in the back' (dolchstoss) by traitors at home and the November Criminals (those who signed the armistice).

Communist uprising in January 1919, took advantage of a general strike in Berlin and seized government offices. Weimar government had to turn to the Freikorps to put the rebellion down.

March 1920 the Weimar government announced plans to disband the Freikorps. Wolfgang Kapp led the Freikorps in a right-wing rebellion. Ebert called on the people of Berlin to go on strike- Kapp realised he could not govern and fled.

Weimar recovery:

- New currency- Rentenmark as temporary currency to stop hyperinflation crisis.
- Dawes Plan- reparations reduced to £50 million per year, USA gave loans of $25 billion to Germany.
- Young Plan- Cut Germany's total reparations down to £1.8 billion. Gave Germany a further 59 years to pay reparations.

- Locarno Pact- agreed to recognise existing borders and keep the Rhineland demilitarised.
- Joining the League of Nations showed that Germany was now an equal partner and trusted.
- Kellogg-Briand Pact- countries agreed not to use war as a method of ending international disputes.

Changes in society:

Standard of living: unemployment fell to 1.3 million in 1928, Unemployment insurance Act of 1927 provided 60 marks per week and sickness benefits, working week shortened and real wages rose, housing programmes.

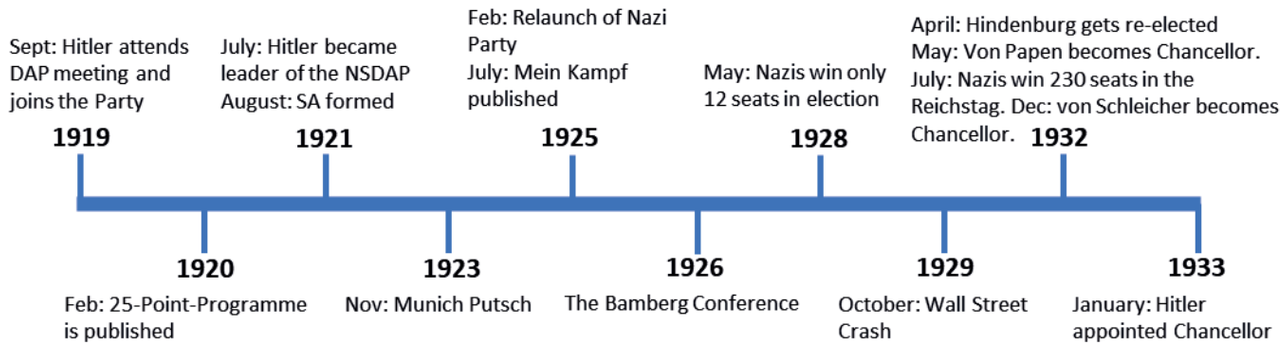
Women: Had equal rights with men under the Weimar Constitution (Article 109), progress in employment in education and medicine, new women- more independence with shorter clothing, hair, and went out unaccompanied.

Culture: Art- new styles and Bauhaus movement, modern styles focused on reality. Architecture- futuristic. Music- jazz styles and dancing. Cinema- horror films and movies with sound.

Hitler's Rise to Power

1	Early development of the Nazi Party	In which year did Adolf Hitler join the German's Workers Party (DAP)?	1919
2		Who was the leader of the DAP when Hitler joined?	Anton Drexler
3		What did Hitler & the DAP leader write together in 1920, setting out the policies of the DAP?	The 25-Point Programme
4		Which treaty did the DAP want to scrap?	The Treaty of Versailles
5		Which DAP policy wanted more living space for German people?	Lebensraum
6		What talent did Hitler have which gave him a personal appeal to voters?	Oratory (public speaking)
7		At Hitler's suggestion, what did the DAP change its name to in 1920?	National Socialist German Workers' Party (Nazi for short)
8		In which year did Hitler become leader of the Nazi Party?	1921
9		Formed in 1921, which paramilitary group protected Nazi meetings & disrupted those of their opponents?	The SA
10		Who did Hitler put in charge of the Nazi's paramilitary group?	Ernst Röhm
11	The Munich Putsch	What was Hitler's attempt to seize control in November 1923 known as?	The Munich Putsch
12		Which Italian dictator inspired Hitler's attempt to seize control by force?	Mussolini
13		How many members of the SA, with Hitler, burst into the Bavarian government's meeting?	600
14		Which famous German general supported Hitler in the Putsch?	General Ludendorff
15		Which three Bavarian leaders withdrew their initial support for the Putsch?	Kahr, Seisser & Lossow
16		Following the Putsch, how many years was Hitler sentenced to in prison?	5 years
17		How did Hitler's trial after his attempt to seize control by force in 1923 benefit him?	Hitler gained national publicity for his political views
18		After how many months was Hitler released from prison?	9 months
19		What did Hitler spend his time in prison writing?	Mein Kampf
20		After the Putsch, the Nazi Party was banned until which year?	1925
21		Following his failure to seize control by force, how did Hitler realise he needed to gain power?	Through democratic elections

22	The Lean Years	Who did Hitler appoint as head of Nazi propaganda?	Joseph Goebbels
23		Since he didn't trust the SA, which new group, later led by Heinrich Himmler, became Hitler's personal bodyguard in 1925?	The SS
24		What were the leaders of the Nazi Party's 35 regions called, created in 1925?	Gauleiters
25		How did Hitler attempt to improve the Nazi party's finances after 1925?	He befriended wealthy businessmen
26		Which conference did Hitler call in 1926 to unite the northern and southern divisions in the Nazi Party?	The Bamberg Conference
27		How many seats did the Nazis win in the general election of May 1928?	12
28		The Nazi Party's membership increased from 27,000 in 1925 to how many in 1929?	100,000
29	Rise of the Nazis	Which leading politician died of a heart attack in October 1929?	Gustav Stresemann
30		Which global economic disaster began in October 1929?	The Wall Street Crash
31		Following the economic disaster of 1929, what did the USA demand?	German loans to be returned
32		How many people were unemployed in Germany in January 1933?	6.1 million
33		How many times was Article 48 used in 1932?	66
34		Why did so many of the middle- and upper-class Germans support the Nazi Party?	Fear of communism
35		Which slogan did the Nazis use to attract working-class support?	Work and bread
36		Which wealthy gentleman became chancellor in May 1932?	Von Papen
37		How many seats did the Nazis win in the general election of July 1932, making them the largest party in the Reichstag?	230
38		Which ex-general replaced von Papen as Chancellor in December 1932?	Von Schleicher
39		Who convinced Hindenburg to appoint Hitler as chancellor, claiming he could 'control him'?	Von Papen
40		On which date did Hitler become Chancellor?	30th January 1933



Early development of the Nazi Party:

Policy– In February 1920 Hitler and Drexler wrote the Twenty-Five Point Programme explaining the policies of the DAP. A mixture of socialism and nationalism, including abolishing the Treaty of Versailles, equal rights (except for Jews), a strong leader, more land and colonies.

Hitler– A skill for public speaking (oratory) meant that he was very convincing and persuaded people to his viewpoint. This led to a growth in party membership. Hitler had publicity photos and paintings produced showing him as an orator.

Party organisation– Set up a permanent office in Munich, renamed the party to be the NSDAP to help clarify its policies, adopted the swastika and straight-armed party salute to distinguish itself from other small nationalist parties, bought a newspaper- the 'People's Observer'.

Leadership– July 1921 Hitler forced a leadership contest and defeated Drexler. Hitler appointed key individuals to crucial positions that would boost the skills and image of the party- Hess as Deputy, Goering, Streicher, and Rohm.

SA– Formed in August 1921, a private army for the NSDAP. Recruited from the unemployed and often demobilised soldiers. Used to control crowds, subdue any opposition to Hitler and disrupted opponents meetings. Their discipline and order when marching showed a sense of power and organisation.

Munich Putsch: Causes	Munich Putsch: Events	Munich Putsch: Consequences
• Long term grievances- dolchstoss, Treaty of Versailles. • Influenced by Mussolini and his 'march on Rome'. • Hyperinflation. • SA getting restless.	• Hitler burst into Bavarian government meeting, tried to take over government. • Betrayed by Kahr, Seisser and Lossow. Public didn't support Nazis. • Nazis defeated by the army.	• Hitler sentenced to 5 years in prison, only serves 9 months. • Publicity for the Nazi Party- showed they were a party of action. • Hitler changed political strategy and aimed to win power through votes.

The Lean Years of the Nazi Party

Mein Kampf– Hitler wrote down his political ideas whilst in prison in a book called 'Mein Kampf that was published in 1926. It contained themes of nationalism (overturning the Treaty of Versailles, lebensraum), socialism (improving life of working people), totalitarianism (getting rid of democracy and having one strong leader), and traditional German values (strong family values, clear male/female roles).

SS– The Munich Putsch had shown the SA to be violent thugs who were difficult to control and who had become loyal to Rohm. Hitler created the SS as an elite group who could be trusted to act as his bodyguards. Expanded to 3,000 members by 1930.

Party reorganisation– Relaunch of the NSDAP on 27 February 1925 with a new strategy of gaining political power through elections. The party was organised like a mini state, with departments for all aspects of government. The party created a women's section and youth groups. Germany was divided into 35 regions, each with a local division of the Nazi Party led by a Gauleiter. Hitler raised money from wealthy industrialists.

Bamberg Conference– The northern party activists had been emphasising socialism, the southern had been emphasising nationalism. Hitler called for a national conference to address the split. Hitler spoke for 5 hours and won Goebbels over to his nationalist side. This solidified Hitler's control of the party, allowing him to adopt any policies he liked.

The growth of unemployment:

Wall Street Crash

American banks recalled their loans.

↓

Economic effects

German banks ran out of money, and demanded the return of loans they had lent in industry and agriculture. This created the Great Depression in Germany.

↓

Unemployment

Businesses collapsed leading to mass unemployment. 6.1 million people in Germany were unemployed by January 1933.

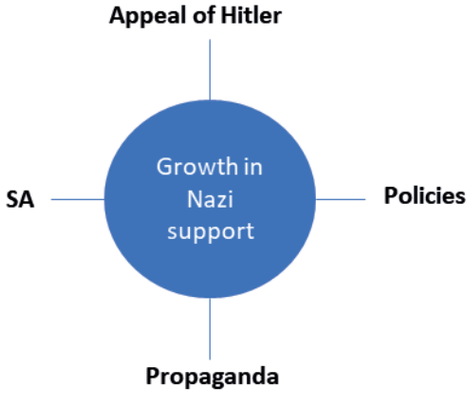
↓

Impact on people

Real wages declined, taxes rose, unemployment benefit was cut. This created hardship and poverty for the German people.

Hitler was seen as a strong leader who would restore law and order. He was very charismatic and was very good at public speaking, filling his audiences with hope.

The uniformed SA made the Nazis seem more organised, disciplined, and reliable- strong enough to control unrest and stand up to foreign powers. The SA fought communist gangs, making them popular amongst the middle- and upper-classes. The SA were used to disrupt opposition parties- tore down their posters, intimidated candidates, disrupted their rallies.



Created a simple slogan 'work and bread' on their posters to attract working-class voters after the poverty caused by the Great Depression. Traditional German values attracted people who believed there had been a moral decline under the Weimar Republic. They promised to restore German pride by scrapping the Treaty of Versailles. The Nazis promised to deal with the communist threat.

The Nazis used rallies which were colourful and full of atmosphere, promising more than other parties and showing that the Nazis could build an exciting future. They used new approaches to electoral campaigning, such as using aeroplanes. Funding came from wealthy businessmen which allowed them to use poster campaigns , radio broadcasts and the use of aeroplanes.

How Hitler became Chancellor in 1933:

Brüning

March 1932: Presidential elections. Hitler wins 11m votes, but loses to Hindenburg.

April 1932: Presidential elections. Hitler wins 13m votes, but loses to Hindenburg.

May 1932: Brüning tried to ban the SA and SS- fears of a civil war breaking out, and announced plans to buy up land from the large landowners. He put fixed time limits on unemployment benefits and proposed higher taxes to pay for unemployment benefit. Brüning lost the support of Hindenburg and the Reichstag so was forced to resign.

Von Papen

May 1932: Von Papen is selected by von Schleicher to lead a right-wing coalition using presidential decrees, named 'the Cabinet of Barons'. Hitler agreed to support it.

July 1932: Violent election campaign that resulted in the Nazis winning 230 seats and becoming the largest party in the Reichstag. Hindenburg refuses to sack von Papen or make Hitler Chancellor due to personal hatred.

November 1932: Another election as von Papen hoped Nazi seats would fall, did fall to 196 but still largest party. Von Schleicher abandoned von Papen, who had to resign.

Von Schleicher

December 1932: Hindenburg appointed von Schleicher as Chancellor- lacked political support and asked to suspend the constitution and head of a military dictatorship. Hindenburg refused. Rumours that von Schleicher was planning an army coup.

Hitler

January 1933: With no alternatives left, Hindenburg appoints Hitler as Chancellor, with von Papen as Vice-Chancellor. Hindenburg and von Papen believed they would be able to control Hitler.

1	Creation of a dictatorship 1933-34	On which date was the Reichstag fire?	27 February 1933
2		Which group did Hitler blame for the Reichstag fire?	Communists
3		Which individual was found guilty and executed for the Reichstag Fire?	Marinus van der Lubbe
4		What could Hitler use to govern after Hindenburg declared a state of emergency?	Decrees
5		What proportion of Reichstag seats did Hitler win in the March 1933 election?	2/3
6		Which law, passed in March 1933, gave Hitler the power to make laws for four years without the consent of the Reichstag?	The Enabling Act
7		Which 3 types of opposition did Hitler legally remove in 1933-34?	Trade unions, political parties, local government
8		Which leader of the SA did Hitler believe to be a threat in 1934?	Ernst Röhm
9		How many men were in the SA in 1934?	3 million
10		What is the name given to the event on 30 June 1934 which saw SA leaders arrested and shot?	Night of the Long Knives
11		How many SA members were shot without trial over 4 days from 30 June 1934?	About 400
12		Which former chancellor was murdered during the events of 30 June 1934?	Von Schleicher
13		On which date did President Hindenburg die?	2 August 1934
14		Following Hindenburg's death, what did Hitler declare himself, combining the roles of Chancellor and President?	Führer
15		After Hindenburg's death, what did Hitler force every soldier in the army to do?	Swear an oath of loyalty
16		What percentage of plebiscite votes did Hitler receive, confirming his new title in August 1934?	90%

17	Police State	Which organisation, led by Heinrich Himmler, wore black uniforms and controlled Germany's police and security forcefrvtbehtye4htdtryjhyrs?	SS
18		Which uniformed organisation, led by Reinhard Heydrich, spied on all known opponents and critics of the Nazi Party?	SD
19		Which non-uniformed secret police force relied on informants for information?	Gestapo
20		How many people were arrested for political offences in 1939 alone?	160, 000
21		What did the Nazis start using in 1933 to cope with overcrowded prisons?	Concentration camps
22		Which 3 groups of people were sent to concentration camps?	'undesirables', minorities, political prisoners
23		Which organisation did Hitler establish and force all judges to be members of?	The National Socialist League for the Maintenance of the Law
24		Which court, with hand-picked judges, did Hitler set up to hear all treason cases?	People's Court
25		What was the name of Hitler and the Pope's agreement, signed in July 1933?	Concordat
26		What was the name of the Church set up by Protestant Nazi supporters in 1936?	The Reich Church
27	Propaganda	Who was the Minister of People's Enlightenment and Propaganda?	Josef Goebbels
28		How many newspapers were closed down in 1935 alone?	1,600
29		By 1939, what percentage of German homes had a radio?	70%
30		Where was a mass Nazi rally held every year?	Nuremberg
31		Which international sporting event in 1936 showcased Nazi strength?	Berlin Olympics
32		Which organisation, overseen by Goebbels, ensured that cultural activities were consistent with Nazi beliefs?	The Reich Chamber of Culture
33		Which architect, a favourite of Hitler's, designed many of the Nazi's major buildings?	Albert Speer
34		Which style of music was banned due to its links with Black people?	Jazz
35		What did the Nazis encourage in May 1933, in order to destroy books written by Jewish people, Communists and anti-Nazi authors?	Book burning
36		What were films in German cinemas preceded by?	45-minute newsreel, publicising Germany's achievements
37	Opposition	Which Protestant pastor established the Confessing Church to oppose the Nazis?	Martin Niemöller
38		What typically happened to Christian leaders who spoke out against the Nazis?	Sent to concentration camps
39		Which group of working-class teenagers resented military discipline and stressed individual freedoms?	Edelweiss Pirates
40		Which group of middle-class teenagers admired American culture?	Swing Youth

1933 – Jan: Hitler becomes Chancellor; February- Reichstag Fire; March- Nazis won 288 seats and Enabling Act passed; July- Concordat; September- Reich Chamber of Culture

1934 – May- The Confessing Church; June- The Night of the Long Knives; August- Hindenburg dies, oath from the army, Hitler becomes Fuhrer

1936 – Reich Church and Olympics Games held

1939 – 160,000 people are arrested for political offences

How did Hitler create a dictatorship?

Reichstag Fire– On 27 February 1933 the Reichstag was set on fire. A Dutch communist van der Lubbe was blamed, leading to mass arrests of communists and Hindenburg declared a state of emergency. Hitler was able to detain people without trial and banned the communist party.

The Enabling Act– The Enabling Act gave Hitler the power to pass laws without consulting the Reichstag and these could overrule the constitution of the Weimar Republic. It was passed on 24 March 1933 in very intimidating circumstances.

Other laws– Once Hitler had the power to pass laws without consulting the Reichstag, he set about removing other sources of opposition. Trade unions were banned in May 1933 and strikes became illegal. In July 1933 all political parties excepted for the NSDAP were banned. In January 1934 the Lander parliaments were abolished, and Hitler appointed a governor to run every region of Germany.

Night of the Long Knives– Hitler purged threats from both inside and outside the Nazi Party on 30 June 1934. The SA had got too powerful, so the leaders of the SA, including Rohm, were arrested, imprisoned and shot. Other leading rival politicians, including von Schleicher were also murdered. 400 people were shot over 4 days.

Death of Hindenburg– On 2 August 1934, President Hindenburg died. Hitler combined the offices of President and Chancellor to become the Fuhrer. Hitler also forced an oath of loyalty to him from every soldiers in the army.

The Nazis created a police state to remove opposition and intimidate others into loyalty. The SS, originally bodyguards for Hitler, was expanded to 240,000 men and was able to act outside the law under the regime of Himmler. The SD was created to spy on opponents and critics. The Gestapo, a secret police, created a network of informers amongst ordinary people. Concentration camps were large prisons created to keep isolated those arrested. In law courts the judges were controlled through the National Socialist League for the Maintenance of the Law. Trial by jury was abolished, and judges decided innocence, guilt and punishments. Hitler set up a new People's Court for cases of treason- judges were hand-picked and trials were held in secret.

Police state

Goebbels designed a system of propaganda to brainwash people to believe the Nazis' key messages. The press had to print pro-Nazi messages (censorship), radio broadcasts were used and the rallies got bigger. **Propaganda**

The Nazis used the Olympic Games to showcase Nazi Germany to the world. All films scripts had to be approved by Hitler and contain propaganda themes.

How did Hitler control the German people?

Catholics- Hitler signed the Concordat to try and get the Catholics on side- a compromise between the Pope and the Nazis, however Hitler didn't keep these promises.

The Church

Protestants- Protestant Churches that favoured the Nazis combined in 1936 to form the Reich Church. Hitler made Müller the Reich Bishop of Germany. Swastikas were displayed in some churches.

Who opposed and resisted the Nazis?

The Church– Increasing resistance in the Catholic Church after the Pope's 'With Burning Anxiety' speech in 1937, leading to the imprisonment of Catholic priests in the Priests' Block at Dachau concentration camp. Niemöller set up the Pastors' Emergency League for those critical of Nazi treatment of Protestant Churches, led to the creation of the Confessing Church as a rival to the Reich Church.

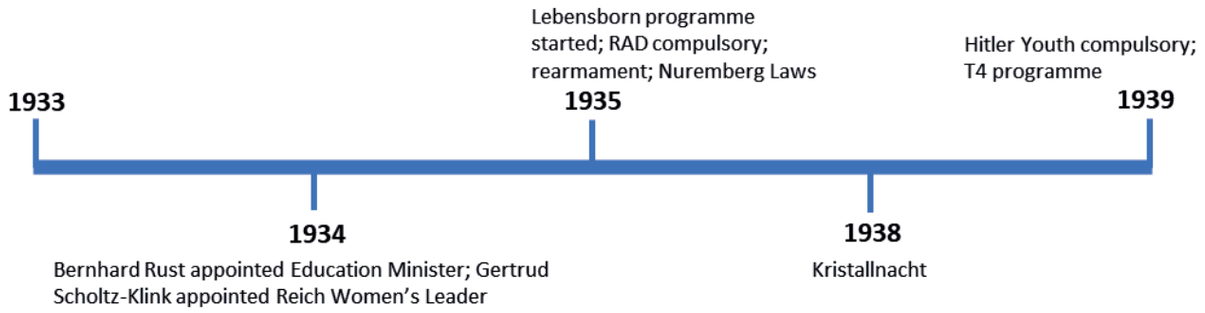
Youth– Edelweiss Pirates- made up of the working-class in cities. Inspired by styles of clothing in America and went to the countryside for area of freedom. Often attacked the Hitler Youth. The Swing Youth- mainly teenagers from wealthy families and admired American culture. They listened to jazz music and danced the 'jitterbug'.

Other opposition– The KPD continued to encourage workers to oppose the Nazis by undermining building projects, staying off work sick or damaging machinery. The SPD leaders set up abroad to campaign against the Nazis.

Life in Nazi Germany

1	Policies towards women	Which traditional roles did the Nazis believe women should have?	Mother and housewife
2		Who was appointed Reich Women's Leader in 1934?	Gertrud Scholtz-Klink
3		What was the name of the Nazi organisation for women?	German Women's Enterprise
4		Under the Law for the Encouragement of Marriage 1933, what was given to young couples to encourage them to marry?	1000 mark loan
5		To receive a gold Mother's Cross medal, how many children did you need to have?	8
6		What was the name of the policy that provided nurseries and financial aid for women who had children with SS men?	Lebensborn
7		Nazis told women to concentrate on the 'three Ks' – Kinder, Küche, Kirche. What does that translate as?	Children, kitchen, the church
8		The number of female students starting higher education fell from 17,000 in 1932 to how many in 1939?	6,000
9		In which year were women banned from professional jobs e.g., teachers + doctors?	1933
10		In which year were women with marriage loans allowed to work, due to shortages?	1937
11	Policies towards the young	What did Hitler want young people to see him as?	A father-figure
12		In which year did Hitler ban almost all youth groups apart from Nazi groups?	1933
13		What was the name of the youth group for boys aged 14-18?	Hitler Youth
14		In what two ways were boys kept fit and healthy in their youth groups?	Hiking expedition and sports competitions
15		By 1938, how many boys in the Hitler Youth were being trained in small-arms shooting?	1.2 million
16		At which age did boys enter the Jungvolk and have to swear an oath to Hitler?	10
17		What was the name of the youth group for girls aged 14-21?	League of German Maidens
18		Why did the Nazis want girls to be strong and healthy?	To become fertile mothers
19		In which month and year was it made compulsory for all young Germans to join Nazi youth groups from the age of 10?	March 1939
20		What did Nazi Education Minister, Bernhard Rust, say was the purpose of education?	To create Nazis
21		Which group was created to run political education courses for teachers?	Nazi Teachers' League
22		What happened to the amount of time spent on PE and sport in schools?	It doubled
23		In which new subject were children taught how to classify racial groups?	Race Studies

24	Employment and living standards	By 1939, how many people were unemployed in Nazi Germany?	0.3 million
25		Which organisation was setup to provide paid work for the unemployed and was made compulsory for all young men to serve for six months from 1935?	National Labour Service (RAD)
26		A 7,000-mile network of roads were built across Germany, what is the German term for motorway?	Autobahns
27		In which year did Hitler announce military conscription?	1935
28		What was it called where groups of people were not included in unemployment statistics?	Invisible unemployment
29		The average working week rose from 43 hours in 1933 to how many hours in 1939?	49 hours
30		Which organisation was setup to replace trade unions and control workers?	The Labour Front (DAF)
31		What was the purpose of the Strength through Joy organisation?	To provide leisure activities for workers
32		What was the name of the 'people's car' which workers gave 5 marks per week from their wages to with the promise of receiving one?	Volkswagen
33		What was the purpose of the Beauty of Labour organisation?	Better working facilities
34	Persecution of minorities	The Nazis believed in selective breeding. What is this science called?	Eugenics
35		Which race did Hitler believe was the master race?	Aryan
36		How many people were sterilised by 1939 under the Law for the Prevention of Hereditarily Diseased Offspring?	400,000
37		Which 1939 policy ordered that babies with severe mental or physical disabilities should be killed by starvation or lethal overdose of drugs?	T4 Programme
38		On 30 March 1933, what did the Nazis announce a boycott of?	Jewish businesses
39		Which 1935 Law took citizenship away from Jewish people?	Nuremberg Laws
40		On which dates did Kristallnacht occur?	9-10 November 1938



How did the Nazis change policies towards women?

Culture– The Nazis encouraged women to adopt a 'natural' look, with simple plaited or tied-back hair and long skirts, and were discouraged from dyeing their hair or wearing make-up. The Nazis also gained control over all women's organisations as they had to become part of the German Women's Enterprise.

Family– Reversing the declining birth rate was really important to the Nazis, therefore marriage and having lots of children was encouraged. They believed women should devote their lives to feeding and rearing their family, and the skills of needlework and cookery were stressed. Rewards were given such as the Law for the Encouragement of Marriage giving a 1000 mark loan to young couples and the Mother's Cross celebrating having lots of children.

Employment– The Nazis tried to reduce the number of women in work through propaganda and policies, such as banning women from professional posts as teachers, doctors and civil servants. However, a shortage of labour in 1937 meant that women were encouraged back to work again.

What were Nazi policies towards the young?

Youth groups– Almost all youth groups apart from Nazi groups were banned in 1933. Boys: 6-10 year olds were in the Little Fellows, 10-14 in the Jungvolk, 14-18 in the Hitler Youth. Boys had political training, physical training- as fit and healthy for work and fighting in the army, military training, and character training. Girls: 10-14 year olds were in the Young Maidens, 14-21 in the League of German Maidens. Girls received training on how to be a housewife and the importance of racial hygiene.

Education– Control of teachers through the Nazi Teachers' League that trained teachers in political ideas. New subjects were added such as Race Studies, and traditional subjects were changed to include Nazi beliefs. Sport was doubled to create strong workers, soldiers and healthy mothers. The curriculum was different for boys and girls. From 1935 all new textbooks had to be approved by the Nazis.

Policies to reduce unemployment	Policies to improve living standards
• **Public work schemes**: autobahn project and creating public buildings, bridges, and sports facilities increased the number of jobs available. • **National Labour Service (RAD)**: this organised the unemployed into work, and from 1935 became compulsory for all young men to serve for 6 months. • **Rearmament**: Military conscription was announced in 1935 and by 1939 there were 1,360,000 men in the German armed forces. This resulted in a need for more arms and equipment, boosting industry. • **Invisible unemployment**: Women and Jews did not count in unemployment figures and part-time jobs were counted as full-time- unemployment was an estimated 1.5 million higher than statistics suggested.	• The **German Labour Front (DAF)**: replaced trade unions and set out the rights of workers, maximum length of the working week and minimum pay levels. • **Strength through Joy**: aimed to improve the standard of living through leisure activities. This included sports events, films, theatre shows, outings, holidays, and a scheme to get a Volkswagen. • **Beauty of Labour**: campaigned to get employers to provide better facilities for workers, such as better toilets, changing rooms, showers, and canteens.

Persecution

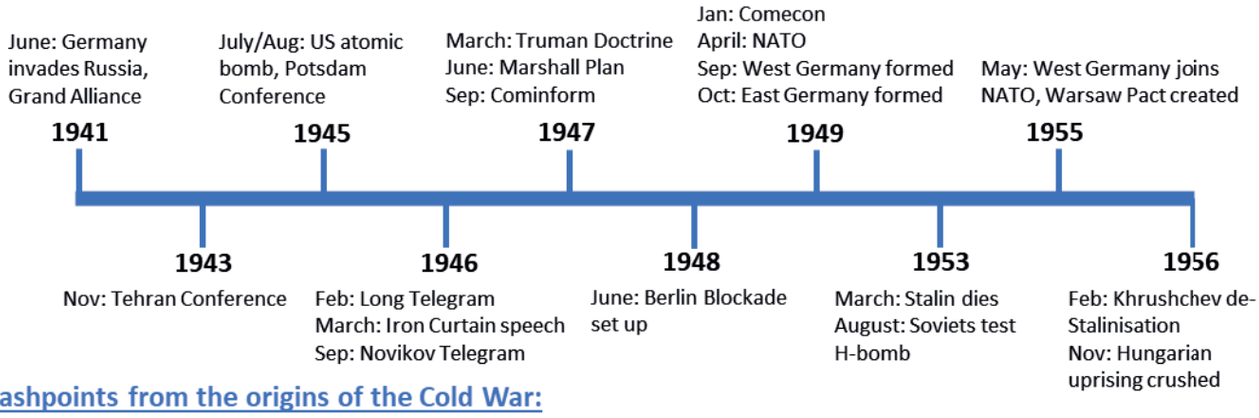
Persecution of the Jewish people increased gradually from 1933. In 1933 laws were passed excluding the Jews from aspects of society, in 1935 the Nuremberg Laws took away Jewish people's citizenship and forbade sexual relations with German citizens. In 1938 Jewish property was smashed and burned and Jews were attacked in Kristallnacht. In 1939 many Jews were evicted from their homes.

The Nazis believed that the Aryan was superior to all others, and taught that Aryans should only reproduce with other Aryans.

A number of groups were nicknamed 'undesirables'- the Nazis limited their rights. This included the Jews, Slavs, Roma and Sinti peoples, homosexuals.

1	Early developments, 1941-46	Which social ideology did America believe in?	Capitalism
2		Which social ideology did Russia turn to after their 1917 revolution?	Communism
3		Why did Russia ally with Britain and America in June 1941?	Germany invaded Russia
4		Who was the leader of the Soviet Union up to 1953?	Stalin
5		Which 1943 wartime conference led to an agreement to open a 'second front' against Germany in the West?	Tehran Conference
6		What did Stalin agree to at the Yalta Conference about the future governments of Eastern Europe?	Free elections
7		How did President Truman differ to President Roosevelt?	Was more anti-communist
8		On which date did America test the atomic bomb?	16 July 1945
9		In which months and year was the Potsdam Conference?	July-August 1945
10		How many zones was Germany and Berlin divided into at the Potsdam Conference?	4
11		Which two areas did the Grand Alliance disagree over at Potsdam?	German reparations, governments in Eastern Europe
12		Who declared 'an iron curtain has descended across the continent' in March 1946?	Winston Churchill
13		Which US telegram, sent in February 1946, suggested that Stalin wanted the destruction of capitalism but if faced with strong resistance would back down?	Kennan's Long Telegram
14		Which Soviet diplomat sent a telegram in September 1946 saying that the USA wanted to use their military power to dominate the world?	Novikov
15		What did the Soviets create in the countries of Eastern Europe after WW2?	Satellite states
16		Why did Stalin want influence across Eastern Europe?	To have a buffer zone between the Soviet Union and Germany

17	The development of the Cold War, 1947-49	On which date was the Truman Doctrine announced?	12 March 1947
18		What did the Truman Doctrine focus on the idea of?	Containing communism
19		Under the Marshall Plan, how much was spent to rebuild Europe?	$12.7 billion
20		What did the Soviets see the Marshall Plan as?	Dollar imperialism
21		Which organisation did the Soviets set up in September 1947 to coordinate the communist parties across Europe?	Cominform
22		Which organisation did the Soviets set up in January 1949 to control the economies of communist countries?	Comecon
23		What was the combined Western zone in Germany called from March 1948?	Trizonia
24		On which date did Stalin close the land routes across Soviet-controlled Germany into Berlin, beginning the Berlin Blockade?	24 June 1948
25		How did the Western Allies support West Berlin during the blockade?	Airlift of supplies
26		On 16-17 April 1949, how many tons of supplies were sent to West Berlin?	13,000
27		Which formal Western military alliance was formed in April 1949?	NATO
28	The Cold War intensifies, 1950-58	Which country was allowed to join NATO in May 1955?	West Germany
29		What was the name of the Soviet military alliance created in May 1955?	Warsaw Pact
30		In which year did the Soviet Union develop the atomic bomb?	1949
31		How many times more powerful was the H-bomb compared to the A-bomb?	1000 times
32		Which superpower developed the first hydrogen bomb in 1952?	USA
33		What was the development of nuclear weapons by the superpowers known as?	The arms race
34		Which Soviet leader believed in peaceful co-existence?	Khrushchev
35		Where was the first proxy war between the superpowers?	Korea
36		In which year was the Hungarian Uprising?	1956
37		Which Hungarian Prime Minister announced a set of reforms on 31 October?	Imre Nagy
38		Which event triggered the Soviet Union to send troops into Hungary?	Hungary announced they would leave the Warsaw Pact
39		How many tanks were sent into Budapest?	4,000
40		What effect did the Hungarian Uprising have on Warsaw Pact members?	Knew they must do as told



Flashpoints from the origins of the Cold War:

Ideology– The capitalist America believed that the communist Soviet Union was trying to spread communism around the world. Equally, the Soviet Union believed America was trying to spread capitalism around the world. These were two competing systems and each superpower wanted to show that their way of life was superior.

Conferences– At Tehran, Stalin believed the West were deliberately delaying opening a second front against Germany. At Yalta, the Grand Alliance disagreed on the future of Poland. At Potsdam, there were disagreements over the reparations Germany owed (the Soviets wanted to cripple them) and the future governments of Eastern Europe (Soviet Union wanted to control them).

Atomic bomb– The USA successfully tested the atomic bomb the day before the Potsdam Conference, and then dropped two bombs on Japanese cities supposedly to intimate Stalin and strengthen their bargaining power. This made Stalin determined to create a buffer zone to protect communism from the West.

Telegrams– Kennan's Long Telegram to the American government reported that Stalin wanted to see the destruction of capitalism but would back down if faced with strong resistance- this encouraged the American policy of containment. Novikov's Telegram to Russia showed the USA wanted to use military power to dominate the world- this encouraged the Soviets to build up their protection.

Eastern Europe– Stalin didn't give up control of the Eastern Europe countries after WW2 and set up satellite states with communist governments, breaking agreements. In January 1947 a communist government was elected in Poland, in February 1948 communists seized power in Czechoslovakia, in May 1949 communists elected in Hungary.

Truman Doctrine– Truman was concerned that the economic problems in many European countries could lead to an increase in communist support. He made a speech criticising communism and set the USA up as the leader of the fight against communism by promising to contain communism. This angered the Soviet Union.

Marshall Plan– To stop the spread of communism, America gave $12.7 billion in aid to Western Europe to rebuild their economy. The money had to be spent on US goods, so the Soviets described the move as 'dollar imperialism'. It led to closer ties between the Soviet bloc as they started to rely on trading with each other.

Cominform and Comecon– Cominform was a political organisation set up to control the communist parties of the satellite states from Moscow. All contact with non-communist countries was discouraged. This further divided Europe into two blocs. Comecon was created to control the economies of the satellite states due to the perceived threat of the Marshall Plan. Each state had a Five Year Plan, nationalised industry and collectivised agriculture. Trade with the USA and Western Europe was discouraged.

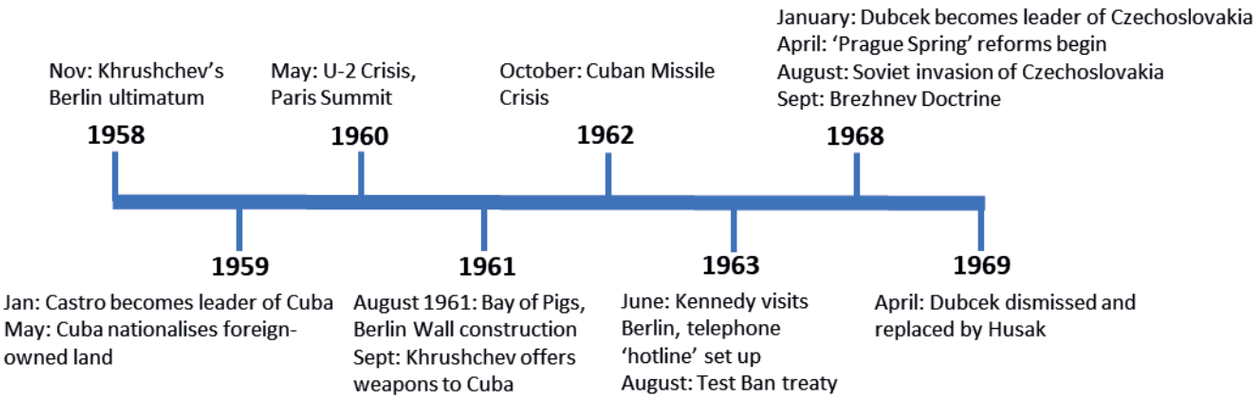
Berlin Blockade– Stalin closed Western access to Berlin after they united their zones and introduced a single currency. The Western Allies launched an airlift that transported supplies to Berlin for almost a year until the Soviets lifted the blockade.

NATO and Warsaw Pact– The Western Powers created NATO, a formal military alliance, to protect themselves from the Soviet Union- if any member was attacked all members of NATO would come to its assistance. The Soviets retaliated with an equivalent- the Warsaw Pact. This firmly divided Europe in two.

The arms race– Both the USA and USSR spent huge sums of money building up nuclear weapons to try and stop their rivals becoming more powerful. They developed atomic bombs, hydrogen bombs and ICBMs.

Hungarian Uprising– Protests in Budapest due to fuel shortages, poor harvests and lack of political freedoms led to Nagy becoming Prime Minister. Nagy announced Hungary would leave the Warsaw Pact and become neutral. Khrushchev sent in troops and tanks to remove Nagy and re-establish Soviet control. This showed that the West would not take action in already communist countries and that members of the Soviet Union had to do as told.

1	Berlin, 1958-63	By 1958, how many East Germans had crossed to the West?	3 million
2		What was the name of Khrushchev's demands on 27 November 1958, when he ordered Western troops be withdrawn from Berlin and it to become a free city?	Berlin Ultimatum
3		What happened to a U-2 spy-plane on 1 May 1960 as it flew over the Soviet Union?	It was shot down
4		Which summit did Khrushchev walk out of in May 1960?	Paris
5		Who replaced Eisenhower as president in January 1961?	Kennedy
6		How much did American spending increase by after the Vienna summit?	$2 billion
7		On which night was the Berlin Wall erected?	12 August 1961
8		How many kilometres was the Berlin Wall in total?	165km
9		Who was the first person shot for trying to cross the Berlin Wall?	Peter Fechter
10		What did both the Americans and Soviets station at the Berlin Wall checkpoints?	Troops and tanks
11		What was the name of Kennedy's speech from 26 June 1963?	Ich bin ein Berliner
12		How was the Berlin Wall bad publicity for the Soviets?	Showed they had to lock people into communism
13	Cuba, 1959-63	Who overthrew Batista in the Cuban Revolution of January 1959?	Fidel Castro and Che Guevara
14		What happened to all businesses and industries after the Cuban Revolution?	They were nationalised
15		Which Cuban import did America ban, threatening to bankrupt its economy?	Sugar
16		In which month and year did Castro sign an agreement with Khrushchev?	February 1960
17		What was the name of the invasion of Cuba by CIA trained Cuban exiles in August 1961?	Bay of Pigs
18		How many soldiers did Cuba have to fight off the 1,400 invaders?	20,000
19		What did Khrushchev announce publicly in September 1961?	He would provide arms to Cuba
20		How did Khrushchev justify placing missiles on Cuba?	Protect it from future attacks
21		On which date did a U-2 spy-plane take photographs of Cuba which showed that Soviet intermediate range missile bases were being constructed?	14 October 1962
22		Up to what distance could intermediate range ballistic missiles reach their targets?	3,500km
23		How did Kennedy respond to the Cuban Missile Crisis?	Blockaded Cuba
24		What did Khrushchev agree to do on 28 August 1962?	Remove the missiles from Cuba
25		What was set up between the White House and the Kremlin in June 1963?	A 'hotline'
26		What was signed between the USSR, USA and Britain in August 1963?	A Test Ban treaty
27	Czechoslovakia, 1968-69	In which month and year was Dubcek elected as First Secretary of the Czech Communist Party?	January 1968
28		What did Dubcek believe communist governments should offer?	Socialism with a human face
29		What happened to censorship under Dubcek?	It was relaxed
30		Who replaced Khrushchev as leader of the Soviet Union in 1964?	Brezhnev
31		On 20 August 1968, how many Warsaw Pact troops invaded Czechoslovakia?	500,000
32		Who replaced Dubcek after he was arrested and dismissed from office?	Husak
33		Which policy banned communist countries from introducing reforms to make their county more liberal?	Brezhnev Doctrine
34		Which three communist countries refused to send troops into Czechoslovakia?	Romania, Albania, Yugoslavia
35		Why did the governments of East Germany and Poland welcome Brezhnev's actions?	Made them feel more secure



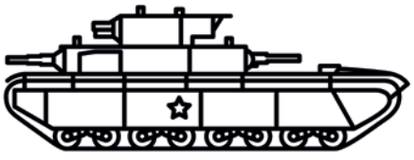
Cold War crises

Berlin

- Causes: East Germans had been going to West Berlin to flee communism, often skilled workers. This was a propaganda disaster for Khrushchev as it looked like if given the choice, they preferred the West. The West refused to engage with Khrushchev's Berlin Ultimatum, demanding Western withdrawal from Berlin and that Berlin should become a free city. Agreement could not be made at the summit meetings of 1959-61, and tensions rose when Gary Powers' U-2 spy-plane was shot down over the Soviet Union.
- Events: Khrushchev built a wall to divide East and West Berlin in August 1961.
- Impacts: Families in Berlin were divided. West Berlin became a symbol of freedom. The Wall stopped refugees leaving. It appeared that the Soviets had to lock people into East Germany and that the people preferred capitalism over communism.

Cuban Missile Crisis

- Causes: Cuba turned communist in the January 1959 Cuban Revolution and nationalised foreign-owned businesses, increasing tension with the USA. Due to America no longer buying Cuban sugar, Cuba turned to the USSR for economic support. Ties between the USSR and Cuba got closer. The CIA trained Cuban exiles to invade Cuba at the 'Bay of Pigs'- this failed.
- Events: A U-2 spy-plan revealed that the USSR were constructing nuclear missile bases on Cuba. Kennedy responded to this by blockading Cuba (not allowing USSR boats to reach Cuba). The USSR agreed to remove the missiles.
- Impacts: The events showed the real risk of nuclear war. A hotline was set up between the White House and the Kremlin. A Test Ban treaty was signed between the USA, USSR, and Britain. Kennedy's popularity increased, whilst Khrushchev's decline and he was replaced by Brezhnev in 1964.

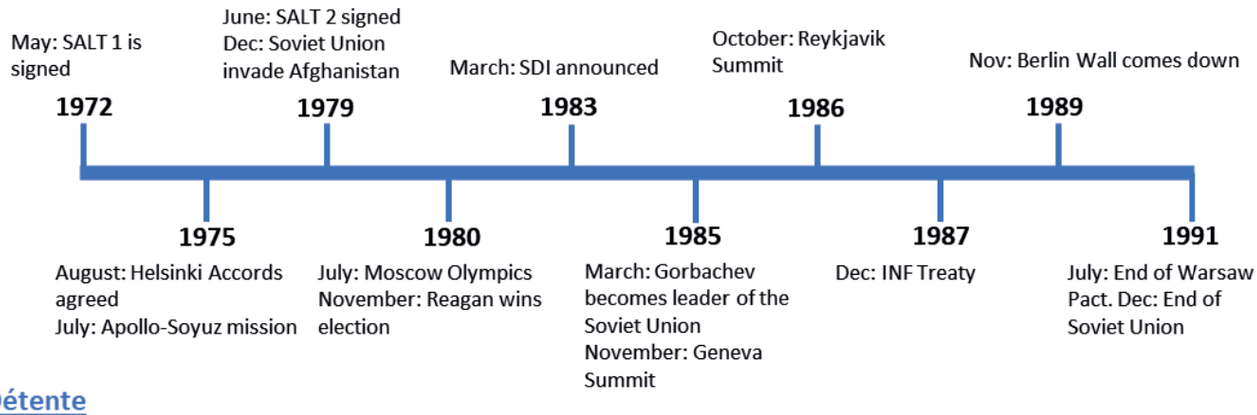


Czechoslovakia

- Causes: Dubcek, the leader of Czechoslovakia from January 1968, believed communist governments should offer 'socialism with a human face' and set about making reforms. He relaxed censorship, allowed criticism of the government, gave trade unions wider powers and increased trade with the West. Brezhnev was concerned that Czechoslovakia might reform even further and leave the Warsaw Pact and inspire other eastern European communist governments.
- Events: Brezhnev ordered 500,000 Warsaw Pact troops to invade Czechoslovakia and removed Dubcek from power.
- Impacts: Dubcek was replaced by Husak who clamped down on the unrest in Czechoslovakia. Brezhnev Doctrine- all communist countries were prevented from introducing reforms to make their country more liberal and the Soviet Union had the right to invade eastern European countries. The USA and the West were outraged by Soviet actions, but did little. Governments of East Germany and Poland welcomed Brezhnev's actions as they felt more secure as would not be challenged by reformers in their own countries. Yugoslavia, Romania and Albania condemned the invasion.

1	Attempts to reduce tension, 1969-79	What is a period of peace between two groups that were previously hostile to each other called, and how the Cold War was described in the 1970s?	Détente
2		From 1969, who was the Chancellor of West Germany that followed a policy known as 'Ostpolitik'?	Willy Brandt
3		In which year was the SALT 1 treaty agreed?	1972
4		Under SALT 1, ABMs were only allowed at two sites. What was the maximum number of missiles allowed at a site?	100
5		What was the name of the agreements made in 1975?	Helsinki Accords
6		What was the name of the joint USA/USSR space mission in 1975?	Apollo-Soyuz
7		In which continent were the USSR increasing support for communist groups during the 1970s?	Africa
8		What event led to the cancelling of the SALT 2 treaty?	Soviet invasion of Afghanistan
9	Cold War flashpoints, 1979-84	Who overthrew Taraki's pro-Soviet government in Afghanistan in 1979?	Hafizullah Amin
10		On which date did Soviet forces invade Afghanistan?	24 December 1979
11		How many troops did the Soviets first send into Afghanistan?	50,000
12		In which year was the Carter Doctrine announced?	1980
13		What was Carter's proposal for the creation of a quick-strike military force that could intervene anywhere in the world at short notice called?	Rapid Deployment Force
14		What did the USA lead against the 1980 Moscow Olympic Games?	A boycott
15		What were American athletes told would happen if they tried to travel to the Moscow Olympic Games?	Their passport would be taken away
16		Who became the president of the USA in January 1981?	Ronald Reagan
17		Which US strategy involved directing weapons at the opponent's warheads, rather than their cities, to destroy their nuclear weapons capabilities?	NUTS
18		What did Reagan call the USSR in a speech in 1982?	An evil empire
19		Which Polish workers' trade union movement did the USA give secret assistance to in 1982?	Solidarity
20		Which American technology allowed them to place satellites in space with lasers that could shoot down Soviet missiles?	Strategic Defence Initiative (SDI)
21		What was different about the Reagan Doctrine?	US would support anti-communist groups trying to overthrow communist governments
22		In which month and year was the Reagan Doctrine announced?	February 1985
23		Which Caribbean island did the US invade and topple the communist government in 1983?	Grenada

24	The collapse of the Soviet Union, 1985-91	Who became the Soviet leader in March 1985?	Mikhail Gorbachev
25		Typically, how many hours would housewives in Moscow queue to buy bread?	5 hours
26		What does 'glasnost' mean?	Openness
27		What does 'perestroika' mean?	Restructuring
28		What was Gorbachev's overall aim with his reforms?	To strengthen communism
29		At which summit was the INF treaty signed?	Washington 1987
30		Under the INF treaty, nuclear and ground-launched ballistic and cruise missiles with what ranges were banned?	500-5,500km
31		In which year did Gorbachev reject the Brezhnev Doctrine?	1988
32		With which country did Hungary open their border in May 1989, creating a hole in the Iron Curtain?	Austria
33		How many people demonstrated in East Berlin demanding democracy and free elections on 4 November 1989?	Over 1 million
34		On which date did East German people start dismantling the Berlin Wall?	9 November 1989
35		Which defeat called into question the strength of the Soviet military?	Afghanistan War
36		In which month and year was the Warsaw Pact formally ended?	July 1991
37		What was Gorbachev awarded in 1990?	Nobel Peace Prize
38		What was the name of the group that organised a coup to overthrow Gorbachev in August 1991?	Gang of Eight
39		Which three Soviet states were first to declare themselves independent?	Estonia, Latvia, Lithuania
40		On which date did Gorbachev officially dissolve the Soviet Union?	25 December 1991



Détente

Reasons for détente– Many Americans thought the USA should take a less active role in international affairs after the failures in Vietnam. The USA had many social problems to deal with- spending less money on weapons would help this. Soviet economy and living standards in decline so wanted to cut spending on weapons. Pressure for improved relations from Europe- Brandt followed policy of Ostpolitik.

SALT 1– Signed in May 1972. ABMS were only allowed at two sites and each site could have a maximum of 100 missiles. The treaty did not cover the latest technological development, multiple independently targeted re-entry vehicles (MIRVs) which carried multiple nuclear warheads on a single missile. Had major symbolic importance- both the USA and the Soviet Union wanted to reach agreement and wanted to demonstrate their better relations publicly.

Helsinki Accords– Agreed August 1975 between the USA, USSR and 33 other nations. Europe's borders were formally accepted. Closer economic, cultural and scientific links- led to Apollo-Soyuz joint space mission. Agreed to respect human rights and basic freedoms.

SALT 2– Agreed in June 1979 but was not ratified by the USA due to the Soviet invasion of Afghanistan. It included a limit of 2400 strategic nuclear delivery vehicles (ICMBs, SLBMs and heavy bombers) for each side, a 1320 limit on MIRV systems for each side, and limits on deployment of new types of strategic offensive arms.

Reagan– Reagan became President in January 1981. He made it clear that he intended to confront the Soviet Union whenever possible. 'Second Cold War'. Increased defence spending to put pressure on USSR.

SDI– Nicknamed 'Star Wars' announced on 23 March 1983. A plan for a ground- and space-based, laser-armed antiballistic missile system. Used satellites with lasers to destroy missiles.

Flashpoints, 1979-84

Afghanistan– Soviets invaded Afghanistan on 24 December 1979 due to chaos and unrest, including Amin trying to improve links with the USA. The USA supported the mujahideen.

The Carter Doctrine– In response to the Soviet invasion of Afghanistan, the Carter Doctrine stated that the USA would use military force if necessary to defend its national interests in the Persian Gulf region.

Olympic Games– The US led over 60 nations in boycotting the 1980 Moscow Olympic Games. Russia couldn't showcase communism to the world.

End of the Cold War

New thinking– Gorbachev wanted to reform and revive communism as well as improve superpower relations. Glasnost- policy of openness where people could express their opinions. Perestroika- restructuring the Soviet economy, including some capitalist practices. Ending the arms race and abandoning the Brezhnev Doctrine.

Eastern Europe– The Soviet satellite states were free to choose how they would be governed and Gorbachev made it clear he would not intervene. 'Solidarity' in Poland won a landslide victory in elections in June 1989. Hungary opened up their border with Austria in May 1989. Ceausescu in Romania is overthrown and executed.

Berlin Wall– East Germans started to leave for the West through Hungary to Austria. Gorbachev refused to help the East German government put down demonstrations. In November 1989, the East German government announced that the border crossing to West Berlin would be opened and people from both sides start pulling the Wall down.

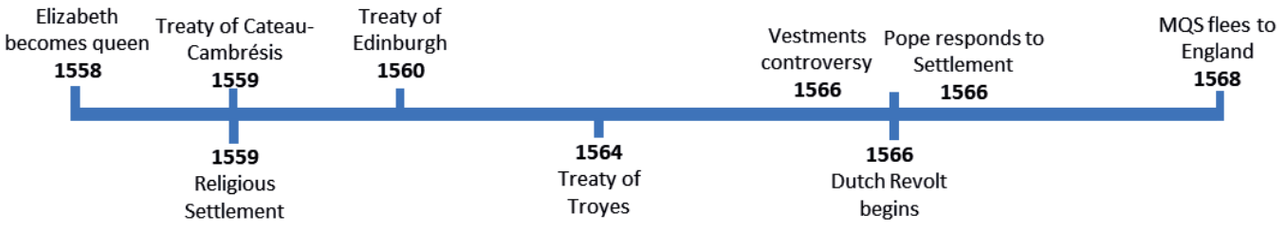
Warsaw Pact– The eastern European countries abandoning communism meant it was impossible for the Warsaw Pact to survive. Military co-operation between the member states ended in early 1990 and the Pact was formally dissolved in July 1991.

Elizabeth: Queen, Government and Religion 1558-1569

1	Situation on accession	In which year did Elizabeth become queen?	1558
2		Which part of government was a display of wealth and power and entertained the monarch?	Court
3		Which part of government met 3 times a week to advise the monarch?	Privy Council
4		Who was Elizabeth's Secretary of State, her main advisor, until 1573?	William Cecil
5		Which part of government passed laws and granted extraordinary taxation?	Parliament
6		Which local government role raised and trained local militia in their county?	Lords Lieutenants
7		Which local government role heard county court cases and implemented policies?	Justices of the Peace (JPs)
8		Which term refers to areas of policy the monarch believed they had sole control over?	Royal Prerogative
9		Who was the monarch before Elizabeth?	Mary I
10		Who was Elizabeth's mother?	Anne Boleyn
11		Why was Elizabeth's legitimacy questioned?	Catholics did not accept Henry VIII's re-marriage to Boleyn
12		By how much was the Crown in debt in 1558?	£300,000
13		What was the name of the alliance between France and Scotland?	Auld Alliance
14		Which port did England have to give back to France in the humiliating 1559 Treaty of Cateau-Cambrésis?	Calais
15	The Religious Settlement	Which 1534 event, under Henry VIII, turned England from Catholic to Protestant?	The English Reformation
16		Which religion was Elizabeth?	Protestant
17		Which regions of England were strongly Catholic?	North and west
18		What are Puritans?	Strong Protestants
19		Which part of the Settlement made Elizabeth Supreme Governor of the Church of England?	Act of Supremacy
20		Which part of the Settlement established the appearance of churches?	Act of Uniformity
21		Which part of the Settlement was a set of instructions to help churches implement Elizabeth's policies?	Royal Injunctions
22		In which language were Elizabethan church services?	English
23		Which two religious items appealed to Catholics in the Settlement?	Crucifixes and vestments
24		How did Elizabeth check churches were following the Settlement, taking place every 3-4 years?	Visitations

Elizabeth: Queen, Government and Religion 1558-1569

25	Challenge to the Settlement	How many clergy were dismissed in 1559 for not following the Settlement?	400
26		How many priests and clergy took the Oath of Supremacy to Elizabeth?	8000
27		How many new bishops did Elizabeth appoint after most refused to take the Oath of Supremacy and stepped down?	27
28		Which issue did Elizabeth back down on, after Puritan bishops threatened to resign?	Crucifixes
29		Which issue did Elizabeth keep in the Settlement, despite Puritan opposition?	Vestments
30		What did the Pope order English Catholics not to do in 1566?	Attend church
31		What proportion of the nobility were Catholic recusants? (refused to attend church)	1/3
32		Why did Elizabeth not investigate recusants too closely?	She did not want to make martyrs
33		In which two countries did Elizabeth openly support Protestant rebels in the 1560s?	Scotland and France
34		Which 1560 treaty ended the successful Scottish Protestant rebellion and said that Mary Queen of Scots would give up her claim to the English throne?	Treaty of Edinburgh
35		Which 1564 treaty confirmed England's loss of Calais after Elizabeth's failed support of Protestant rebels?	Treaty of Troyes
36	MQS	How was Mary Queen of Scots related to Elizabeth?	Second cousin
37		Which religion was Mary Queen of Scots?	Catholic
38		Who was Mary's second husband, whose murder she was suspected of?	Lord Darnley
39		In which year did Mary Queen of Scots flee to England?	1568
40		What did Elizabeth decide to do with Mary Queen of Scots in England?	Imprisoned her



What problems did Elizabeth face in 1558?

Legitimacy – Catholics questioned Elizabeth's legitimacy due to not accepting Henry VIII's marriage to her mother, Anne Boleyn. Henry also made Elizabeth illegitimate in 1536, though this was later reversed.

Gender – Patriarchal society viewed women as weaker, emotional and unfit to rule. Monarchs were still expected to lead their armies into battle. Negative gender stereotypes were worsened by Mary I's unpopularity with a failed French war and burning almost 300 Protestant martyrs. Elizabeth faced further issues with marriage – marrying may weaken her authority or give a foreign leader power in England.

Finance – Elizabeth inherited financial problems, with the Crown £300,000 in debt. This left Elizabeth vulnerable to needing to ask Parliament for tax, meaning they could pressure her on issues in return.

Foreign powers – France and Scotland were traditionally allied in the Auld Alliance, surrounding England. England was at war with France from Mary I's reign, which Elizabeth swiftly ended. Treaty of Cateau-Cambrésis caused England to humiliatingly lose Calais. The end of war between Spain and France risked these two large Catholic countries uniting against England.

Religion – Elizabeth inherited a complex religious situation. She was Protestant yet most of her subjects and bishops were Catholic. There was tension in the country with Protestants, worsened by Puritans returning to England from exile under Mary I, expecting Elizabeth to pursue strict Protestant policies.

How did Elizabeth try to settle religion in 1559?

Elizabeth's Religious Settlement involved the **Act of Supremacy**, **Act of Uniformity** and the **Royal Injunctions.**

Appealing to Catholics – Vestments and crucifixes used in services. Stained- glass windows permitted. Language around transubstantiation and pilgrimages was deliberately vague to include Catholic beliefs. Elizabeth turned a blind eye to Catholics worshipping in private.

Appealing to Protestants – Services in English, priests allowed to marry, ornaments and statues of saints banned, use of Edward's Book of Common Prayer, Elizabeth Supreme Governor of the Church of England.

Enforcement – an Ecclesiastical High Commission was established to enforce the Settlement. Visitations every 3-4 years. One shilling fine for not attending church. However, people's religious beliefs not investigated too closely and she turned a blind eye – she didn't want to make martyrs or further resistance.

How successful was the Religious Settlement?

Ordinary people – some regional variance, but the majority of ordinary people accepted Elizabeth's religious settlement and attended the Church of England services.	**Clergy –** 8000 priests and clergy took the Oath of Supremacy to Elizabeth. Only 1 bishop did. Elizabeth had to appoint 27 new bishops.
Puritans – challenge to Elizabeth's authority. Forced Elizabeth to back down over crucifixes as several new bishops threatened to resign. Despite protest, Elizabeth kept vestments by removing some bishops from their positions.	**Catholics –** in 1566, the Pope told English Catholics to not attend church services. Increase in recusants – estimated 1/3 of nobility did not attend church.
Foreign powers – Elizabeth successfully supported Protestant rebels in Scotland, ending in 1560 Treaty of Edinburgh. Supported rebels in France, but this intervention failed as the French Catholics and Protestants made peace in 1562. Permanent loss of Calais confirmed in 1564 Treaty of Troyes. Elizabeth hesitated to support Dutch Protestants in the 1560s.	

Why was Mary Queen of Scots a threat to Elizabeth?

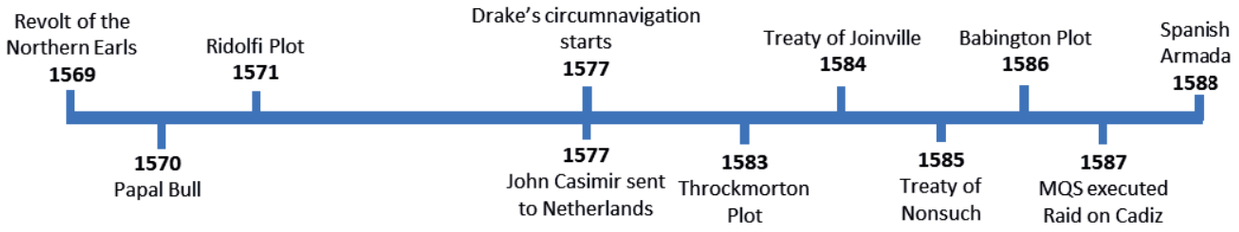
- **Legitimacy –** Mary was Elizabeth's second cousin, with an unquestioned claim to the English throne.
- **Marriage/heir** – Unlike Elizabeth, Mary was not adverse to marriage and had a young son, James, as a potential heir.
- **Religion** – Mary was a Catholic, providing a rallying point for Catholics plots in England – a Catholic alternative to Elizabeth.
- **Foreign support** – Mary had close ties with France as she grew up in the French court. As a Catholic, Mary was also supported by King Phillip II of Spain and the Pope.

Challenges to Elizabeth at home and abroad 1569-1588

1	Revolt of the Northern Earls	In which year was the Revolt of the Northern Earls?	1569
2		Which two earls were involved in the Revolt of the Northern Earls?	Earls of Westmorland and Northumberland
3		Which Protestant did Elizabeth appoint as Archbishop of Durham, angering the Catholic Northern earls?	James Pilkington
4		Who did the Catholic rebels plan would marry Mary Queen of Scots to secure the succession?	Duke of Norfolk
5		What did the Northern earls do in Durham Cathedral during their rebellion?	Celebrated mass
6		How many rebels were executed after the Revolt of the Northern Earls?	450
7		What did the Pope order English Catholics to do in the 1570 Papal Bull?	End Elizabeth's reign
8		After the Papal Bull, what did Elizabeth send the Earl of Huntingdon to lead to implement laws against Catholics?	Council of the North
9	Catholic Plots 1571-86	Which two people supported the 1571 Ridolfi Plot?	The Pope and King Philip II
10		Who uncovered the Ridolfi plot?	Lord Burghley/Sir William Cecil
11		Which noble was executed after the 1571 Ridolfi Plot?	Duke of Norfolk
12		How much were Catholic recusants fined after 1581?	£20
13		How many Catholics were imprisoned or put under surveillance after the 1583 Throckmorton Plot?	11, 000
14		Who was Elizabeth's 'spymaster' who uncovered the Throckmorton and Babington plots?	Francis Walsingham
15		In which year was the Babington plot?	1586
16		What happened to Mary Queen of Scots after the Babington Plot?	She was executed
17	Francis Drake	How did English merchants respond to Spanish licences to trade in the New World?	Ignored Spain's rules and traded illegally
18		Why was Drake's 1577-80 voyage particularly famous?	He circumnavigated the globe
19		How much Spanish treasure did Drake capture in his 1577-80 voyage?	£400, 000
20		What did Drake name the region in California which he claimed for England?	New Albion
21		Where did Elizabeth knight Drake, as a public recognition of his achievements?	On the deck of the Golden Hind
22		How did Philip II view Francis Drake?	As a pirate

Challenges to Elizabeth at home and abroad 1569-1588

23	The Netherlands	Which country controlled the Netherlands in the 1500s?	Spain
24		Who was the leader of the Dutch Protestant rebels?	William of Orange
25		What did Elizabeth allow Sea Beggars (Dutch rebels attacking Spanish ships) to do?	Shelter in English ports
26		Which French prince did Elizabeth promise to marry to persuade him to send troops to the Netherlands?	Duke of Alençon
27		Why did Elizabeth choose to only send mercenaries to the Netherlands under John Casimir?	Meant that an English army was not officially attacking Spain
28		Which two people died in 1584, leaving Elizabeth to intervene more directly in the Netherlands?	William of Orange and Duke of Alençon
29		Which 1584 treaty allied Catholic France and Spain against England?	Treaty of Joinville
30		Which 1585 treaty between England and Dutch rebels effectively meant England was at war with Spain?	Treaty of Nonsuch
31		Who led Elizabeth's military campaign in the Netherlands from 1585?	Earl of Leicester/Robert Dudley
32		Why did Elizabeth not provide enough money or troops to the Netherlands in her 1585 campaign?	She still hoped to negotiate with Spain
33	The Spanish Armada	Which term describes Drake's 1587 raid on Cadiz where he destroyed 30 ships?	'Singeing of the King of Spain's Beard'
34		In which year was the Spanish Armada launched?	1588
35		What did Philip plan for the Armada to meet up with before attacking England?	The Duke of Parma's army in the Netherlands
36		Which Spanish naval commander was inexperienced and allegedly seasick?	Duke of Medina Sidonia
37		Why were English galleons superior to Spanish ships?	Smaller and more manoeuvrable
38		Which tactic did the English use before the Battle of Gravelines to scatter the Armada's crescent formation?	Hellburners
39		How many Spanish ships were shipwrecked in a storm?	60
40		How did Elizabeth's Armada victory strengthen her Religious Settlement?	Showed victory of Protestantism over Catholicism



1569 Revolt of the Northern Earls

Causes: Earls of Westmorland and Northumberland from Northern Catholic families. Resented Elizabeth giving patronage to Protestant 'new men' from non-noble backgrounds. Angry at the Protestant James Pilkington's appointment as Archbishop of Durham. Arrival of MQS in 1568 provided a figurehead to support.

Events: Duke of Norfolk arrested and earls became desperate. Took over Durham Cathedral and held a secret mass. Mass celebrated across Northern churches, marched South. Elizabeth raised 14, 000 men and put down the revels.

Consequences: 450 rebels executed, including Northumberland. The Pope responds with 1570 Papal Bull. Elizabeth then passes harsher measures – harsher treason laws and sends the Earl of Huntingdon, a committed Protestant, to lead the Council of the North.

Plots 1571-86

Ridolfi Plot, 1571 Ridolfi (a papal spy) arranged a plot to murder Elizabeth, launch a Spanish invasion and put MQS on the throne, married to Norfolk. Supported by the Pope and Spain. Cecil uncovered the plot. Norfolk executed.	**Throckmorton Plot, 1583** Plan for the French Duke of Guise, cousin of MQS to invade England, free MQS, overthrow Elizabeth and restore Catholicism. Supported by the Pope and Spain. Walsingham uncovered plot. 11, 000 Catholics imprisoned or put under surveillance.	**Babington Plot, 1586** Plan the same as Throckmorton plot. MQS' letters to Babington about the plot intercepted by Walsingham. MQS executed Feb 1587.

Why did tension with Spain increase?

Religion – Philip used to rule England when married to Mary 1, helping to re-establish Catholicism. However, 1559 Settlement moved England in a Protestant direction (Philip/Spain = Catholic). Elizabeth supported Protestant rebels in Scotland and France in 1560s.

Plots – Papal Bull made Catholic policy to Elizabeth clear – end her reign. Philip supported all 4 plots against Elizabeth, all aimed to end her reign or life. Either offered military or financial support.

Francis Drake – English merchants ignored Spanish rules about trading in New World and traded illegally. Drake's 1577-80 circumnavigation captured £400, 000 Spanish treasure and claimed New Albion in the New World for England. Publicly knighted by Elizabeth on the Golden Hind, despite Philip seeing him as a pirate.

Netherlands – Protestant rebels trying to overthrow Spanish rule in the Netherlands. Elizabeth indirectly supported rebels throughout late 1560s and 1570s – allowed Sea Beggars to shelter in English ports, supported the French Duke of Alencon's troops financially and sent mercenaries under John Casimir. From 1585, intervened directly after Treaty of Nonsuch – sent English army under Earl of Leicester. Spain and England essentially at war over Netherlands from this point.

Why was the Spanish Armada defeated?

Drake's raid on Cadiz – April 1587, Drake sailed into Spain's main port of Cadiz and destroyed 30 ships. Known as the 'Singeing of the King of Spain's Beard'. Delayed the Armada for a year, giving England more time to prepare.

English strengths – English galleons were small, fast, and manoeuvrable allowing them to outsail the larger Spanish ships. English ships were also armed with new cannons which could fire at a greater distance and easy to reload. The English used hellburners to create chaos amongst the Spanish crescent defensive formation, causing them to panic, separate, and flee.

Spanish weaknesses – The Duke of Medina Sidonia was inexperienced in naval battle and was even seasick leading to many errors in his planning and tactics. The Spanish reinforcements from the Netherlands were not in Calais when they should have been. Spanish cannons were slow to reload and could only fire from a shorter range.

Weather: Storms around the Scottish and Irish coasts led to the destruction of 60 Spanish ships. This was due to the Spanish fleeing north after the Battle of Gravelines where there was no safe harbour/shelter. Elizabeth used the weather as propaganda and 'evidence' that God was on the side of the Protestants allowing them to beat the Spanish.

Elizabeth Society in the Age of Exploration 1558-1588

1	Education	Which Renaissance social movement promoted the importance of education?	Humanism
2		Why did Protestantism promote literacy?	People should be able to read the Bible
3		Which schools did boys age 4-7 attend?	Petty schools
4		Which schools did girls age 4-7 attend?	Dame schools
5		Where were middle class boys age 8-14 educated?	Grammar schools
6		How many new grammar schools were founded in Elizabeth's reign?	72
7		Where were older girls typically educated?	In the home
8		How were noble children educated?	By a private tutor
9		Which Oxford college did Elizabeth found to train more Protestant clergy?	Jesus College
10		By what percentage did literacy rates increase for boys in Elizabeth's reign?	10%
11	Entertainment	Which sport was particularly popular for lower class men?	Football
12		Which sports did the nobility enjoy?	Fencing, real tennis, hunting, fishing
13		Which spectator sports involving animals were popular amongst all classes?	Bearbaiting and cockfighting
14		How did plays performed at theatres change during Elizabeth's reign?	Plays became more secular (less religious?
15		Who could attend the theatre?	All social classes
16		In which part of the theatre would poor people stand?	The 'pit'

Elizabeth Society in the Age of Exploration 1558-1588

17	Poverty	By what percentage did the population increase during Elizabeth's reign?	35%
18		What happened to food prices as a result of population growth?	Increased
19		How did sheep farming worsen food shortages and poverty rates?	Less land used for crops
20		What is the term for turning common land into individual farmers' fields?	Enclosure
21		Which 1536 event under Henry VIII reduced local support for the poor?	Dissolution of the Monasteries
22		Which two types of poor did the Elizabethans distinguish between?	Deserving poor and idle poor
23		How did the 1572 Vagabonds Act punish vagrants?	Whipped and drilled a hole through ear, death penalty if arrested a third time
24		How did the 1576 Poor Relief Act support vagrants?	JPs provided vagrants with wool/raw materials to sell. Houses of Correction.
25	Exploration	Which trade was established under John Hawkins during Elizabeth's reign?	The Transatlantic Slave Trade
26		Which piece of technology enabled sailors to measure the angle between the horizon and the North Star?	Astrolabe
27		Which new type of ship could hold more cargo and travel further distances?	Galleons
28		Which invention meant maps and travel books were shared more easily?	Printing press
29		Which trade had been badly impacted by war in the Netherlands, meaning England needed to find new trading opportunities in the New World?	Wool/cloth trade
30	Virginia	Which courtier organised the 1585 and 1587 expeditions to Virginia?	Sir Walter Raleigh
31		How many colonists left for Virginia in 1585?	107
32		Which type of person was there not enough of amongst the colonisers?	Farmers
33		What was problematic about when the colonists set sail in 1585?	Left too late to plant crops
34		Which ship hit rocks as it landed on Roanoke Island, spoiling food supplies?	The Tiger
35		Which Native American tribe did the colonists over-rely on for food?	Algonquians
36		Which Native American chief led an attack against the colonisers?	Wingina
37		Which type of people, used to hard work, made up more of the second expedition in 1587?	Poor people from London
38		What happened to the colonisers involved in the 1587 expedition?	Vanished without trace
39		Which new goods were brought back from the voyages to the New World?	Potatoes, tobacco
40		How did Raleigh's expeditions encourage further American exploration?	Increased knowledge of the land and people

Elizabethan Society

Structure of society: Strictly hierarchical society to ensure order and stability. In the countryside: Nobility, gentry, yeomen, tenant farmers, labourers, vagrants. In towns: merchants, professionals, skilled craftsmen, unskilled workers, unemployed.

Education: Education expanded during Elizabeth I's reign, but this expansion was limited. Of those who did get an education, most were boys. The large majority of people were illiterate. Education for middle class boys included Petty School, Grammar School and University. Every town in England had a grammar school by 1577. Middle class girls went to Dame School only. Noble boys and girls had private tutors until the boys went to university.

Leisure: Leisure was largely determined by class. Nobility and gentry hunted on horseback and played fencing and real tennis. Working class people played football. Spectator sports included bear baiting and cock-fighting. Theatre thrived: there were many new plays and purpose built theatres, such as the Red Lion in 1567, and was popular with all classes in Elizabethan England. Protestantism led to the development of new secular plays.

The problem of the poor

Reasons for increase: Population growth of 35% during Elizabeth's reign led to rising food prices, worsened by bad harvests, and decreasing wages. Sheep farming took fewer labourers and meant less land was for crops, contributing to rising food prices. Enclosure took common land away from poorer people to use for farming and foraging. The Dissolution of the Monasteries in 1536 meant that there was less support for the poor at a local level.

Changing attitudes: As poverty levels rose, unemployment began to be recognised as a genuine problem and not always the fault of the vagrant (as had been thought previously). Distinguished between the deserving and idle poor. As problem grew, recognised a nationwide response was needed.

Government policies: 1572 Vagabonds Act focused more on punishing vagrants – e.g. whipped and drilled a hole through ear, death penalty if arrested a third time. 1576 Poor Relief Act focused more on supporting vagrants - JPs provided vagrants with wool/raw materials so they can make things to sell. Houses of Correction set up (special prison funded by poor rates for vagrants who refused help).

Why did global exploration increase in the 1500s?

Technology: The Mercator Map meant sailors had a more realistic picture of the world when plotting their journeys, using longitude and latitude. Navigation was also made easier with instruments such as the astrolabe and the quadrant. Ship design improved, with the creation of galleons, which made longer journeys possible. These ships were larger and so could transport more cargo, they were faster and easier to manoeuvre

Financial motives: England needed to find new trading opportunities due to war in the Netherlands impacting the wool/cloth trade through Antwerp. Inspired by Spain's wealth, built on New World gold and silver, England wanted to do the same. Investing in voyages made the upper classes profit.

Desire to spread ideas: Since Spain was spreading Catholicism in the New World, England wanted to limit the spread of Catholicism and compete by sharing Protestantism. The Elizabethan explorers believed (incorrectly) that the Native Americans could only benefit from their civilising influence.

Francis Drake's influence: Drake's 1577-80 was very successful, bringing £400, 000 Spanish silver and high profits for his investors. Colonising Nova Albion inspired further American expeditions. He also brought back extensive knowledge of navigating the Americas, supporting further expeditions. He was a role model to young men who wanted to emulate his fame, wealth and adventures.

Why did the 1585 colonisation of Virginia fail?

Timing of the voyage: By leaving in April 1585, the colonisers arrived too late to plant crops in time for the first harvest. This meant they had to rely on their limited supplies they brought over and the Algonquians for support.

Damage to the Tiger: The Tiger hit rocks coming into Roanoke, causing water to damage the food supplies, seeds and gunpowder. This further contributed to food shortages and the colonisers over-reliance on the Algonquians.

The colonists: Of the 107 colonisers, there were not enough farmers. The gentlemen and merchants were not willing to work hard to grow crops, and the farmers/workers did not want to grow food on behalf of the upper classes.

Algonquian resistance: Whilst welcoming at first, the Chief, Wingina, grew tired of the colonists' demands for food and many believed the English had supernatural powers due to the diseases spreading amongst the Native American communities. Wingina and other chiefs planned to attack the English in Spring 1586, though this failed and Wingina was killed.

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Religious Studies

Beliefs & Practices - Islamic Beliefs

Nature of Allah		
QUALITY	**DEFINITION**	**EXAMPLE/TEACHING**
TAWHID	**The oneness of Allah**	Shahadah- *"There is no God but Allah…"*
BENEFICIENCE	**Allah is always loving**	Forgave Adam- sent him to earth as the khalifah.
99 NAMES	**99** ways to **describe** Allah	"The most excellent names belong to Allah, use them" e.g. 'most merciful'
TRANSCENDENT	Allah is not affected by laws of nature- He exists outside the universe.	
IMMANENT	**Allah is close to us**	"Allah is closer than your jugular vein"
TAQWA	Constant awareness of Allah	
SHIRK	The sin of worshipping other idols.	

Risalah (Prophethood)	
NAME	**FACTS**
ADAM	•Made from the ***"soil of many colours"*** •Built the first **Kaaba** •**Forgiven** by Allah for the first sin
IBRAHIM	•Destroyed polytheist idols (hanif) & rescued by Allah •Willing to **sacrifice** his son (**Ismail**) for Allah •**Rebuilt** the Kaaba- footprints are there
ISA	•**Not** God- just a man. •Performed **miracles–** Virgin birth, Isa healed the blind and the leper •Isa was not crucified, Allah sent him straight to Jannah •Will return to defeat the "false messiah"
MUHAMMAD	•Spread Islam in a polytheistic Mecca. •Jibril revealed Qur'an to him over **23** years. •Reclaimed Mecca peacefully and took part in battles to defend the ummah (lesser jihad) •His sayings are recorded in the **Hadith**. •Known as the ***'seal of the prophets'***

Malaikah (Angels)	
God's immortal servants, made from light.	
JIBRIL	• Revelation –reveals good news (e.g. Qur'an) • Has seen beauty of Paradise and horror of Hell • Cleansed Muhammad's heart on Night Journey
MIKAIL	• 'Nourisher'- nourishes plants with rain • Nourishes human souls by protecting us • Keeps Shaytan (satan) out of Paradise
ISRAFIL	• Will blow horn in Jerusalem to start Judgement Day • Overcome by tears 3 times every day and every night at the sight of Hell
RAQIB & ATID	• ' *Noble recorders'* • Record our deeds and niyyah (thoughts).
SUNNI/SHIA BELIEFS ABOUT ANGELS	
SUNNI	Angels are servants of Allah and have no free will
SHIA	• Angels have limited free will but no desire to sin • This makes the Angels' obedience to Allah more meaningful

Akhirah (Afterlife)		
BARZAKH	**Soul taken by Azrail to barzakh.**	
3 QUESTIONS	Two angels ask **3** questions- *who is your prophet/ god/your religion?* Determines barzakh **comfort**	
JUDGEMENT	**Raqib and Atid** presents Allah with our book, then read aloud and weighed. *"Whoever does an atoms weight of good will see it, and whoever does an atoms weight of evil will see it"*	
AS-SIRAT	Bridge **over** Jahannam **into** Jannah- ***'thin as a hair /sharp as a sword'***	
JANNAH • Garden as eternal reward • ***'Rivers of milk and honey'*** • **7** stages of Heaven • **1st** stage= water (**Adam)** **7th** stage = divine light (**Abraham)**		**JAHANNAM** • **The depths** Physical/mental torture • *"Garments of fire reserved for disbelievers"* • 7 stages of torture- darkness, boiling water, winds • 1st stage = Least painful, for Muslim sinners • 7th stage = The worst level of Hell, for hypocrites • Potentially just **temporary** *"most merciful"*
	NO FREE WILL	**FREE WILL**
PRE-DESTINATION	• Al-Qadr • Preserved Tablet in Jannah- the destiny of the whole universe is on it • Insha'Allah (if Allah wills it)	• Adalat- Allah is always "just" • Tested Ibrahim's free will (faith) • Raqib & Atid recording deeds

Sunni vs Shia	
SUNNI ISLAM	**SHIA ISLAM**
Rightful Caliph: Abu-Bakr (Friend)	**Rightful Caliph:** Ali (Son in law)
6 Articles of Faith - Tawhid, Al-Qadr, Prophets, Angels, Holy Books,	**5 Roots in Usul ad-Din -Tawhid, Adalat, Prophets,** resurrection, Imamate (12th imam on Earth now)
AL-QADR= Allah's divine plan	**ADALAT=** God is *'most-just'- will* judge us fairly

Kutub (Holy Books)	
BOOK	**FACTS**
SAHIFAH	First holy scrolls given to Ibrahim but were lost.
TAWRAT (TORAH)	• Book given to Musa (Moses) • Contains laws & ideas on Paradise and Hell
ZABUR (PSALMS)	• Given to Dawud (David) • Contains poems praising Allah and nature
INJIL (GOSPELS)	• The Injils were teachings given to Jesus (Isa) • The Christian Gospels were written by others • Corrupted e.g. Jesus was not crucified
QUR'AN	• Given to Prophet Muhammad on the Night of Power by Angel Jibril. • The literal word of Allah. Written in Arabic. • Hafiz- a Muslim who memorises the Qur'an
HADITH	Records of Muhammed's teachings– noted by family and friends *"Paradise is at the feet of your mother".*
SUNNAH	The sayings, actions and practices of Muhammed.

Tawhid	Risalah	Ummah	Mosque	Shariah	Jihad	Halal	Haram	Hanif
The basic Muslim belief in the oneness of Allah.	Messengers and Prophets of Allah e.g. Mohammad	Worldwide community of Muslims	A place of communal worship for Muslims	Means 'straight path'/ refers to laws in Qur'an.	'Struggle'- greater is inner struggle and lesser is physical struggle.	Permitted in Islam e.g. food rules.	Forbidden in Islam e.g. eating forbidden foods (pork).	Somebody with inner knowledge of God e.g. Ibrahim

Beliefs & Practices- Islamic Practices

Five Pillars of Islam (Core Duties for Sunni Muslims)

PILLAR	FACTS	TEACHING
SHAHADAH	• Declaration of faith • Said at birth, death and reversion. • Soldiers say it in battle • Emphasises tawhid (oneness)	*"I bear witness there is no God but Allah, and Muhammad is His messenger"*
SALAH	• Prayer 5 times a day • Wudu-ritual cleansing • Set your niyyah, face Mecca (qibla) and state "Allahu akbar" • D'ua= personal prayers • Friday prayers at mosque (men)= jummah	*"The first thing a person will be judged on is prayer"* *"Glorify him in the mornings and evenings"* Night Journey- Reduced from 50 to 5 times
ZAKAT (GIVING ALMS)	• 2.5% tax donated to charity (e.g. poor and travellers) • Zakat Foundation= Hardship relief fund 2021/ raised over £25m in zakat since 2011. • Voluntary =sadaqah	*"Those who help the poor are warriors for God's cause"*
SAWM	• Fasting during Ramadan • No eating/drinking in day • Evening meal= iftar • Fast broken = dates & water • Month of Night of Power • Read Qur'an every day	• *"Those who fast are close to God "* • Prophet Muhammad fasted during Battle (Badr) • Shaytan is chained during Ramadan

HAJJ	WHAT?	WHY?
	Travel to Makkah	Birthplace of Muhammed
	Wear white robes	State of purity (ihram)
	Circle Kaaba 7 times (tawaf)	Muhammad circled Kaaba as he smashed false idols.
	Drink water from Zam Zam well	To remember Angel Jibril leading Hajar to water
	Collect pebbles from Mount Arafat and pray until sunset	Where Adam & Eve united/ place of the final sermon "Beware Shaytan"
	Throw stones at pillars of Jamarat	To remember Ibrahim stones at Shaytan to reject temptation.
	Sacrifice an animal	To remember Ibrahim being willing to sacrifice Ishmael

Jihad

TYPE	FACTS	TEACHING
GREATER JIHAD	• The **inner** struggle to be a good Muslim • **Examples**: Follow **5** pillars, go to **mosque**, **avoid** temptation. • **Farid Ahmed**: **Forgave** wife's **murderer** in **New Zealand** mosque shootings.	***"Paradise is for those who curb their anger"***
LESSER JIHAD	The **physical** struggle in self-defence.	
Origins	Muhammed peacefully fought the Meccans to defend the ummah and rededicate the Kaaba to one God (tawhid)	
Conditions	• Can't kill innocent civilians • Can't kill women/children • Must be declared by holy Muslim leader e.g. caliph • Cannot use exceeding force	***"Fight for God those who attack you"***

Obligatory Acts of Shia

10 acts that Shia Muslims must perform.

ACT	MEANING	EXPLANATION
SALAH	3 times a day	**Combine** 5 prayers (Zuhr and Asr).
SAWM	Remember Ali during Ramadan.	On the 20th day, Shia will remember the death of Ali
PILGRIMAGE	May visit Shia shrines.	May visit **Husayn's** grave outside Mecca (source of divine blessings & rewards)
KHUMS TAX	**20%** tax on wealth	Tax for the **wealthy to Muslim scholars.**
TAWALLA	To **love** those who love Allah	**Associate** with Muslims who show **faith** and **love**.
TABARRA	To hate those who do not follow Allah	**Dissociate** with people who do **not** follow the Qur'an. *"Garments of fire will be cut out for disbelievers"*

Festivals

FESTIVAL	WHY?	HOW IS IT CELEBRATED?
ID-UL-ADHA (FESTIVAL OF SACRIFICE)	Marks **end of Hajj**. Remembers Ibrahim's willingness to **sacrifice** Ismail.	• New clothes, gifts. • Animal **sacrificed/** meat **shared** with poor. • Say Id Mubarak. • Salat-ul-Adha (special prayer) • **In Britain:** Muslims may ask a butcher to slaughter a sheep.
ID-UL-FITR (FESTIVAL OF FAST BREAKING)	3 days to celebrate **the end of Ramadan** (fasting)	• Houses **decorated** e.g. banners/lights. • Special **meals.** • Say 'Id Mubarak' • Donate Zakat-ul-Fitr • **In Britain:** May take **day off** work/ school.
ASHURA	**Shia** Muslims remember **death** of **Husayn** (Ali's son) in battle.	• Grieve, wear **black**, **march** through streets, re-enactment of Battle of Karbala. • **Self-flagellation** (cut/whip selves) • Visit Husayn's **shrine**. • In Britain: **donate** blood
NIGHT OF POWER (Laylat Al Qadar)	Remembers Jibril **revealing** Qur'an to Muhammad.	• Stay up and **recite** Qur'an • Break fast with family and friends • Visit the mosque to pray "Holier than 1000 months"

Is it Difficult Being a Muslim in the UK?

ISSUE	DIFFICULT?	NOT DIFFICULT?
GREATER JIHAD	**Temptation** in UK (alcohol, gambling)	Focus on **taqwa** (God-consciousness)
SAWM	• Temptation of **food** and work/school **do not** close early	• Can drink/eat if **very ill**. • Some schools allow no PE/ homework
SALAH	**No time at work/school**	Combine prayers later in day.
HAJJ	• Costs **£3000.** • **Id-Ul-Adha:** sacrificing an animal is illegal. • **45^0** heat causes heatstroke.	• Only must go **once.** • Can have a **butcher** slaughter an animal. • **Foreign office** provides support.
ISLAMOPHOBIA	**TELL MAMA**– anti-Muslim hate has tripled since Hamas' attacks in October 23.	Increasingly **pluralistic** society as shown by Census: Islam increased from 4.9% (2011) to 6.5% (2021)

Beliefs & Practices- Christian Beliefs

Nature of God		
Omni-benevolent	All-loving	*"For God so loved the world that He sent His only Son"*
Omniscient	All-knowing	*"Even the very hairs on your head are numbered."*
Omnipotent	All-powerful	God created world ***'ex nihilo'***
The Trinity	Father, Son and Holy Spirit	***God is both three and one:*** ***Father:*** *The Creator, overseer of all creation and humans* ***'The Word'/Jesus:*** *"In the beginning was the Word"* **Spirit:** Holy Spirit e.g. "breath of life"

THE PROBLEM OF EVIL	
Epicurus	"If God is omnipotent and omnibenevolent, why does evil and suffering exist?"

CHRISTIAN RESPONSES (THEODICY)	
Genesis 3: Free Will	• **Moral evil caused by humans not God (free will).** • Adam and Eve ate from the Tree of Knowledge of Good and Evil which caused sin to enter the world 'The Fall'.
Theodicy of Job	• **God's wisdom is beyond us.** • God permitted Satan to test Job's faith "curse God and die" • God asks Job impossible questions about universe that show Job how little he can understand of God's ultimate plan.

Salvation	
Atonement	Jesus' death healing the rift between us and God.
Salvation	To be saved from sin and death.
Sin	Bad actions distancing us from God—a barrier to salvation.

FOLLOW GOD'S LAW TO ACHIEVE SALVATION	
Protestant	• Faith in Jesus is needed for salvation: *"those who believe in me shall not die"* • Bible is God's law: a *guidebook* for all on how to achieve salvation i.e. believe in Jesus and follow his teachings (Agape, Sheep and the Goats etc.) • Penitent thief: those who believe in Jesus will go to heaven.
Quaker	Agape in action is required for salvation. Parable of Sheep and Goats ("When I was hungry you fed me")
Catholic	• Pope and magisterium needed to help understand the Bible and give guidance on God's law. • E.g. Sacraments like **Baptism** and **Eucharist** are *necessary* for salvation ("*This is my body, broken for you*")

GRACE AND HOLY SPIRIT	
Grace	The Holy Spirit carries God's grace (**mercy**) and helps people receive spiritual healing (for example in Evangelical worship)

Creation		
GENESIS 1		
Ex nihilo	From nothing	'God said, ***"Let there be light."'***
Creation	6 days	'And on the 7th day, God rested.'
Imago Dei	Image of God	"He created them in His image."
GENESIS 2		
Adam	Made from dust, given a soul ***("breath of life")***	
Eve	Made from Adam's rib, made as a '**companion'** for Adam	
ROLE AND NATURE OF HUMANS		
Nature	Made in the image of God (Imago Dei) but sinful by nature (original sin).	
Role	To procreate & rule over nature *("fill the earth and subdue it") / to evangelise "preach the gospel")* be stewards *"care and cultivate"*	

Life of Jesus	
Isaiah	Old Testament prophet who made predictions about a 'messiah'.
"Born of a virgin"	Jesus born to Mary who was a virgin.
"He will be pierced for our transgressions"	Roman soldiers pierced Jesus' side with a spear to check he had died/prove he was human.

LIFE OF JESUS

- **Incarnation:** God in human form e.g. the birth of Jesus.
- Gabriel announced to Mary/born in a stable.
- ***"If you have seen me, you have seen the Father."***

- **Crucifixion:** Jesus' death on a cross; Roman method of capital punishment
- Carried his own cross/Crown of thorns/Pierced with spear by Romans/ Died to atone for human sins.
- ***"Forgive them Father for they know not what they do."***

- **Resurrection: W**hen Jesus rose from the dead 3 days after death
- Empty tomb found by 2 women/ Appeared to people with 'stigmata' / Doubting Thomas touched his wound
- ***"He appeared to more than 500 brothers and sisters"***

- **Ascension:** Jesus physically rose back up to Heaven (angels lifted behind clouds).
- Disciples witness Jesus ascending to live for eternity in heaven with God.
- 40 days after resurrection from a hill in Bethany.
- ***"I will be with you always" (***Holy Spirit guides Christians today).

Interpretations of Creation	
MODERN PROGRESSIVE	
Genesis = an allegory	• God did **not** make the universe in exactly 7 days. • "***yom***"= Hebrew - 'period of time'.
Evolution	God started evolution process and **guides** it through T**heistic-Guided Evolution.**
The Big Bang	God **caused** the Big Bang ***ex nihilo***. God is the first cause.
FUNDAMENTALIST	
Creationism	• The Genesis story is **100%** accurate. • '***Scripture is God-breathed.'***
Young Earth	Earth = **10,000** years old Biblical family tree traced to Adam.
Evolution	Evolution is a test of faith we must reject - 6 days.

Eschatology (Afterlife)		
Bodily resur-rection	We will be raised with immortal bod-ies.	"The body is sown perishable and raised imperishable."
Jesus as the Judge	Jesus will save those who have helped others.	*"No-one comes to the Father except through me"*
	Fundamental View: Physical	**Progressive view: Spiritual**
Heaven	• Rapture: We will physically ascend to Heaven (as Jesus did) • ***God created the "Heavens and the Earth"*** • God's dwelling, angels, a new "tree of life."	• A feeling of closeness to God: "Heaven is within you" • Universalism: All souls will even-tually experi-ence Heaven. • "My Father's house has many rooms"
Hell	• An eternal place of torture & darkness. • ***"Weeping and gnashing of teeth"***	• Sinners will not be resurrected. • ***"Sinners will not reach eternal life"***

Beliefs & Practices- Christian Practices

1. Sacraments

Baptism

Holy water stored in a baptismal font. Water poured on head or fully submerged– baptised in the name of the Father, Son and Holy Spirit.

CATHOLIC	Must be performed as young as possible to remove original sin. One of the 7 sacraments– necessary for salvation. "No-one may enter Heaven unless born of water"- Jesus
PROTESTANT	May wait until the person is old enough to decide. Symbolic rather than actually cleaning original sin. Jesus was an adult when baptised in the River Jordan.

Eucharist

Church community gathers, ask for forgiveness, listen to a sermon. Bread (wafer) & wine brought to the altar, say Lord's Prayer, eat (from Priest)

CATHOLIC	Transubstantiation– The bread & wine **literally** *become* the body/ blood. ***"This is my body, broken for you"- Last Supper***
PROTESTANT	The bread and wine **symbolise** Jesus' sacrifice on the cross. ***"Do this in memory of me."- Last Supper***

2. Nature of worship

LITURGICAL (Catholic)

• Traditional structure– priest led. • Hymns/set Prayers/sacraments.	"For where two or more gather in my name, I am with them."

INFORMAL (Evangelicals)

• Spontaneous– inspired by Holy Spirit. • Music/talk in tongues/ dancing. • Led by a preacher or pastor.	Remember Holy Spirit at Pentecost -"spoke in tongues"/ received God's grace.

INDIVIDUAL– (Quakers/Society of Friends)

• Sat silently in a circle. • May speak if filled with Spirit– called 'giving ministry'	"Go to your room, close the door, pray to your Father."

3. Prayer

Purpose	The Lord's Prayer
• **A**doration: **Praising** God. • **C**onfession: Saying **sorry**. • **T**hanksgiving: **Thanking** God. • **S**upplication: **Asking** for something.	• "Our Father, who art in Heaven" • "Forgive us our sins" • Taught by Jesus to his disciples when asked how they should pray.

Type of Prayer

Set	**Formal** prayer recited by heart e.g. Lord's Prayer. Follows tradition and connects to past Christians.
Informal	**Improvised** prayers e.g. in time of need. Helps to develop a personal relationship with God

4. Pilgrimage

Taize (Tayzay)	• Founded by **Brother Roger** in France in 1940 • **Ecumenical**– Special 'youth weeks' are held each year (over 100,000 young pilgrims visit in one year) • Pilgrims live in groups doing chores, chanting prayers by candlelight and meeting to worship with monks 3 times a day.
Walsingham	• **Norfolk**- Replica of house where Gabriel visited Mary (Holy House– shrine of Mary called 'Our Lady of Walsingham') • **Ecumenical**– Ruins visited by Catholics & CoE • Pilgrims may walk **barefoot** to the shrine as an act of **penance** • 'Sprinkling of the Well'- holy well water on forehead.

5. Celebrations

	How	Why
Christmas	• **Advent=** 4 weeks - Christmas • Nativity scenes, presents, hymns, Midnight Mass, advent calendars	Celebrates **incarnation**. ***"If you have seen me you have seen the Father"***
Easter	• **Holy Week**= Maundy Thursday (last supper), Good Friday (crucifixion) and Easter Sunday • **Lent**= Fasting 40 days before Easter • Easter eggs, Church services, Easter cards	Celebrates **resurrection** ***'Wounded victor'*** God promised in Genesis 3.

6. Church in the UK

Role of the Church in the local community

Religious	Worship services/weddings/funerals.	
Social/ Community	Food banks/youth groups/night shelters for homeless	"When I was hungry you fed me…" Parable of Sheep & Goats

Is the UK a Christian country?

Yes	• **26** bishops in House of Lords (total 779) • Laws based on 10 commandments e.g. ***'Keep sabbath holy'*** • Still the biggest religion in the UK • 56% of Britons say the UK is still a Christian country (YouGov)
No	• Christmas has become **commercialised** (Average person spends £1,108) • Only **10%** of Christians regularly go to Church • 2011-2021 **census** (Christianity– **59% to 46%)** • Increasingly **pluralistic** society: Islam increased from 4.9% (2011) to 6.5% (2021)

7. Worldwide Church

Reconciliation– Resolve conflicts between groups.

Ecumenical Movement	Started in 1910 to unite all denominations. Work carried on by the World Council of Churches.
World Council of Churches	• Key aims are unity, justice, peace • 350 member churches • Annual 'prayer week' for togetherness' • Encourage all denominations to fight issues e.g. war, climate change. • "Blessed are the peacemakers"

Charity Work

Tearfund	• Agape in actions– aims to end poverty • Works in over 50 countries • Rubbish Campaign– Reduce worldwide pollution and how it affects those in poverty.

Evangelism

Mission	Travelling, doing good deeds and evangelising Rapid church growth in Africa and S. America.

Persecution of Christians

Past persecution	•Disciples all killed– Peter crucified upside down. •Oscar Romero shot while giving mass •"He who endures til the end will be saved"
Current persecution	•Open Doors– Charity, set up World Watch List for countries that persecute Christians. •1 in 7 Christians are persecuted worldwide. •North Korea– Illegal to own a Bible, 60,000 Christians in re-education camps.

Thematic- Relationships & Families

1. Marriage

Purpose	• To show commitment to your partner and God. • Act of worship as it is one of the sacraments (action that gives you a blessing from God) • Unite with partner *"The two become one flesh"*	
Christianity		
Vows	Promises the couple say to each other, and to God.	*"Til death do us part"* *"For better, for worse"*
Ring	Wedding ring represents eternal, everlasting love.	
Church	Takes place in a church in the presence of God.	
Islam		
Arranged Marriage	Parents can suggest a potential partner who is well-suited to their child. Dating is an act of sin.	*"Allah created partners so you may take comfort in them."*
Payment	Money or gift given from the groom to the bride, specified in the marriage contract.	
Ceremony	Contract signed and couple say 'I accept' to be legally wed.	
Feast	'Walimah' held to celebrate the union and join both families. 'Sunnah' act to slaughter sheep or goat or go to butchers.	

2. Same-Sex Relationships

Christianity		
Catholic	No same-sex marriage due to Primary Precept to 'Reproduce' ***"You shall not lie with a man as you lie with a woman"***	Pope Francis 2023– permitted civil unions and blessed same sex couples as we are all "children of God"
Quaker	• Campaigned for same-sex marriage since 2009. • Wrote a book- *Towards a Quaker View of Sex 1963*	***"An act that expresses affection isn't sinful."***
Islam		
Some oppose	Forbidden under Sharia Law. Saudi Arabia- death penalty	*"As for two men guilty of lewdness, punish both."*
Some support	All couples should be accepted if they ***"take comfort"*** in each other.	**IMAAN**- UK's leading LGBTQ+ charity (online forums, group iftar)

3. Purpose of Sex

Catholic	Reproduction within a marriage (Natural Law Precept) ***"Continue the species"***
Quaker	Encourage intimacy and the union between a couple.
Islam	An act of devotion to Allah. Main aim to procreate.

Views on sex outside of marriage

Cohabitation	Adultery	Homosexuality
Catholics– sex is reserved for marriage (chastity) Islam– pre marital sex is haram ***"Let those unmarried remain chaste".***	No religious believer permits adultery. • Islam– 'zina' • Catholic– contravenes vows • Quaker– unloving (against principle of agape)	Quakers accept LGBTQ+ relationships ***"an act of affection is not sinful"*** Islam- 'zina'=unlawful sexual act

4. Gender Roles in the Family

Importance of family	Children= gift from god, parents should teach spiritual values, important for communities ***"Honour your father and mother"***	
Christianity		
Traditional view	Patriarchal view e.g. man as the 'breadwinner'.	*"Christ is head of man, man is head of woman."*
Progressive view	Flexible roles– 2021 census - 75% mothers in work	Imago Dei
Islam		
Equally important different roles	• Men are providers ***"guardians of the household"*** • Women– valued mothers, able to lead salah prayer at home **"Paradise lies under the feet of your mother"** Hadith	

5. Gender Roles in Worship

Christianity		
Catholic	• Traditional approach- Priests represent Jesus (a man). • Women have equally valued but separate roles e.g. hand out eucharist, visit sick, nun. • Women cannot be ordained into the priesthood.	Only men can transubstantiate eucharist ("This is my body, broken for you"- Last Supper)
Church of England	• Progressive approach • 1994- first female priests ordained. • Libby Lane- first female bishop (2015)	*"Neither male nor female.. all one in Christ."*

6. Divorce

Christianity		
Catholic Not recognised	• 'Marriage Care' charity- reconcile couples • Allow annulment if marriage invalid (not consummated) • Remarriage is seen as adultery.	*"What God has joined, let no man separate."*
Quaker Accepted	• Divorce and remarriage accepted if marriage is not loving. • Up to individual conscience. • Members vote on remarriage in their own Quaker meeting hall.	*"Small still voice of God."*
Islam		
Iddah– 3 month trial period *(accepted but not ideal)*	• Qur'an promotes reconciliation first (seek imams guidance). • Divorce and remarriage as last resort. • 3 months before woman may remarry. Cannot be pregnant. • Husbands says 'I divorce you' 3 times (once a month).	*"Of all things permitted, Allah hates divorce the most"*

Adultery	Divorce	Cohabitation	Commitment	Contraception	Gender Equality	Responsibilities	Roles
When a married person has sex with somebody who is not their husband or wife.	To legally end a marriage.	To live together in a sexual relationship before marriage.	Being dedicated to something e.g. a marriage.	Methods used to prevent a woman from becoming pregnant e.g. the pill.	People of all genders having the same rights. E.g. equal pay	Actions/duties you are expected to do e.g. priest leads the eucharist	The behaviour expected of a person e.g. act feminine and nurturing.

Thematic-Religion & Life

Creation

Origin of the universe

Christian	Humanist
Genesis 1: • God created universe ex nihilo in 6 days and rested on 7th. • Created humans Imago Dei.	Big Bang: • A theory that states the universe is expanding from a **singularity** (13.7 billion years ago). • Developed by Stephen Hawking. • Richard Dawkins (atheist) critiqued Big Bang as a 'God of the Gaps' argument.

Origin of humans

Christian	Humanist
Genesis 2: • Adam= dust, Eve=rib • Adam receives "breath of life" (soul)	Evolution: • A theory that states humanity has evolved by the process of natural selection— Useful, random mutations are passed down and species gradually change. • First formulated by Charles Darwin. • Richard Dawkins argued genes behave in a way that ensures their own survival (Selfish Gene). Supported Darwin.

Christian Interpretations of Genesis

Creationist ***Evangelical***	• Genesis is a factual, historical account. • World is 10,000 years old (Adam & Eve's family tree) • Ken Ham (Young earth creationism) - USA
Progressive ***Catholic***	• Allegory- Genesis is not a historical account, but has hidden meanings e.g. "breath of life" shows God is close to us and we have a spiritual nature like God. • Theistic guided evolution- God guided evolution over 7 'yom' (period of time) • Big Bang- God is the first cause of the Big Bang (proposed by George LeMaitre)

Environment

Christianity

Stewardship	A God-given special responsibility to care for creation	• *"Care and cultivate" Garden of Eden.* • *Imago Dei- We represent God on earth.*	• Christian Climate Action- Work with Extinction Rebellion e.g. blocking London roads.
Dominion	God-given power to rule over nature on God's behalf.	• *"Fill the earth and subdue it"* • *"Rule over the fish of the sea and birds of the sky"*	• Permission to use world's resources in a sustainable way e.g. fossil fuels, meat industry.

Humanism

Humanist Climate Action	A group of UK Humanist volunteers who campaign for policies that are low-carbon and promote sustainability.	• 'Plant a humanist forest'- A 2022 project.
Utilitarianism	Moral philosophy based on '*greatest good for greatest number*'.	• Reduce extinction rates.
Global citizenship	Humans have a duty to leave a legacy for future generations of a healthy planet.	• Humanist and scientist, Hermann Bondi: 'I want my grandchildren to see elephants'

Sanctity of life vs. Speciesism

Religious view– Christianity and Islam

Sanctity of life	• All life is sacred and belongs to God. • Humans were made as the pinnacle of creation. • *"Breath of life"/ "Imago dei"*

Humanist view

Equality of all life forms	• All **sentient** beings (ability to experience pain/pleasure) should have the same protections. • Veganism, campaigning against animal testing.
Speciesism (Peter Singer)	Religious attitudes are speciesist as they encourage humans to discriminate against other species. *"Christianity is our foe"*

Abortion

Catholic- Always wrong	• Contravenes first primary precept 'self preservation'- Natural Law. • "Before I formed you in the womb I knew you"- Bible • "Abortion is not the lesser of two evils" Pope Francis
Islam - Can be acceptable (halal)	• Acceptable before the foetus receives a 'ruh' (soul) at 120 days. • Is not acceptable for financial reasons (zakat can be used): "Do not kill your children for fear of want" Qur'an
Humanist- Individual's choice.	• We have autonomy (control) over our bodies, not God. • Utilitarianism- "*Greatest good…"* Reduces backstreet abortions • Guided by law– The Abortion Act 1967

Quality of life	Sanctity of life	Afterlife	Evolution	Global Citizenship	Euthanasia	Abortion	Environmental Sustainability	Soul
The standard of health or happiness experienced by an individual	All life is sacred and given by God	The belief that life continues after death	The process where physical characteristics of living creatures change over time	The idea that we should work as a community to look after the world.	Assisted suicide- ending a patient's life to relieve suffering	The deliberate termination of a foetus up to 24 weeks	To use natural resources responsibly to preserve them for future generations.	Non-physical, immortal part of a human

Euthanasia	
Catholic- Always wrong.	• *"It is a false act of compassion"*- Pope Francis • "Thou shall not kill" 10 Commandments • Support the hospice movement. Hospices provide spiritual and physical comfort for those entering the dying process.
Islam- Rarely acceptable.	• *"The term of every life is fixed by Allah"*- Qur'an • Passive euthanasia may be acceptable if it is artificially sustaining life (e.g. patient is brain dead).
Humanist- Individual's choice	• Dignity in Dying= campaign to legalise euthanasia in the UK- supported by 90% of the UK. • Influence MPs, using social media to mobilise support, holding local debates and inviting guest speakers. • We should have autonomy over our bodies (e.g **Paul Lamb** failed to overturn ban in Supreme Court).

The Soul	
Dualism	The belief that we are made up of a spiritual soul & physical body
Christianity	
God-given	God breathed first soul into Adam through the "breath of life"
Immortal	Unlike our current bodies, our soul will live forever.
Judgement	We will be judged on the content of our souls, not our bodies.
Islam	
Ruh	The Arabic word for soul.
Allah-given	Allah breathed a "ruh" into Adam's nostrils
Fitrah	Our souls have inner knowledge of Allah & good/evil.
Humanism	
Materialism	The belief that only the physical/empirical world is all there is. There is no evidence for a soul.
Bertrand Russell	A Humanist philosopher- *"When I die, my body shall rot. No part of shall survive."*

Funerals	
Christian Practice	**Link to afterlife**
Prayers and Hymns from the Bible e.g. *the lord is my shepherd.*	Communicating with God in the hope the deceased with achieve a place in heaven.
The priest will light candles in a church.	Physical representation of hope and light– Jesus leading us to salvation.
Islamic Practice	**Link to afterlife**
Shahadah is recited *"There is one God Allah and Muhammed is his messenger".*	Said as a reminder of a Muslims lifelong faith. Faith will be tested by two angels in the afterlife, so the Shahadah acts as a prompt.
Buried in a white shroud, facing Mecca.	This garment represents equality in death "*equal as the teeth of a comb*". Facing this direction will increase their chances of reaching Jannah.
Humanist Practice	**Link to afterlife**
Celebrant	A Humanist celebrant leads the service.
Music / eulogy	Music with meaning and messages from relative may be shared with no mention of God or faith. Instead a focus on the legacy they have left behind.

Judgement		
Christianity		
Bodily resurrection	On Judgement Day we will be raised with new, immortal bodies.	"The body is sown perishable and raised imperishable"
Parable of the sheep & Goats	Jesus will judge everybody and those who have helped others will go to Heaven.	"When I was hungry, you fed me"- Jesus
Islam		
Barzakh	A cold sleep our 'ruh' waits in until judgement. Asked three questions to determine barzakh.	
Day of Judgement	Allah is 'most-just' and will judge us on our book of good and bad deeds presented by Raqib and Atid	

Afterlife		
Traditional View: Physical place		**Contemporary view: Spiritual**
Heaven: • Rapture- Christians believe they will physically ascend to Heaven (as Jesus did) • God created the "Heavens and the Earth" • God's dwelling, angels, a new "tree of life."		• A feeling of closeness to God and comfort • "*Heaven is within you*" • Universalism- All souls will eventually experience Heaven.
Hell: • An eternal place of torture- darkness and fire. • *"Weeping and gnashing of teeth"*		• Sinners will not be resurrected. • "Sinners *will not reach eternal life"*
Islam		
Azrail	Angel of death is commanded to take our soul as *"the term of every life is fixed by Allah"*	
As-Sirat	Bridge crossing over to Jannah which is *"thin as a hair and sharp as a sword"*	
Jannah	Paradise, described as a garden with *"rivers of milk & honey"* 7 stages- the prophets are already in Jannah.	
Jahannam	A place of torture where people wear "*garments of fire"* 7 stages- the 7th stage is for hypocrites.	
Humanism		
No afterlife	There is no immortal part to us- only our legacy. No expectation of reward.	Bertrand Russell- *"the things we care for will continue"*

Thematic-Peace & Conflict

Peace and Conflict		
Purpose	After all wards there must be a focus on reconciliation, forgiveness, and peace.	
Christianity		
Justice	*'Act justly, love mercy and to walk humbly with your God'.*	
Peace	*'Blessed are the peacemakers' & 'Turn the other cheek'*	
Forgiveness	*'Father Forgive them, for they do not know what they have done'.*	"Let he who is without sin cast the first stone"
Reconciliation	The Corrymeela Community *'Blessed are the Merciful'*	"Small, still voice of God."
Islam		
Peace	*'As-Salam' & 'As-salamu alaikum'*	
Justice	*"The Just" (Al-Muqsit) and "The Justice" (Al-'Adl)*	
Forgiveness	*"Let them pardon and forgive"*	

Nuclear Weapons & WMB	
Christianity	
For *Sanctity of Life, 'You Shall not Murder', Stewardship* and *Pacifism*	Against *"Eye for an eye, tooth for a tooth, life for a life" and "Forgive not seven times, but seventy times seven!"*
Islam	
For *Sanctity of Life, Lesser Jihad- 'fruit bearing trees shall not be harm' and Khalifah*	Against *"Just cause" debated e.g. murder, adultery, homosexuality. "Allah is most merciful" 99 names*

Violent Protest and Terrorism		
	Violent protest	Non-Violent Protest
Christian	*'An eye for an eye'*	Martin Luther King Passive Resistance Civil Disobedience
Islam	Lesser Jihad	The Arab Spring
Terrorism	<u>Christianity</u> *'You shall not murder'* *Sanctity of Life* *Golden Rule*	<u>Islam</u> *Sanctity of Life* *Golden Rule* *'Do not kill each other, for God is merciful to you'*

Holy Wars	
Christian	For both Christians and Muslims, a Holy War must: Be authorised by a religious leader with great authority and Only be fought to defend the faith.
Islam	*"Fight in God's cause against those who fight you, but do not overstep the limits." (Qur'an 2:190).* *"Let evil be rewarded with evil." (Qur'an 42.40)*

Pacifism and Peacemakers	
Christian	Quakers- Pacifists *'Blessed are the Peacemakers'.*
Islam	*"Paradise is for…those who curb their anger and forgive their fellow men."*

Reasons for War	
Christianity	
Greed	*'Money is the root of all evil'*
Self Defence	*'An eye for an eye'* *'Turn the other cheek'* Pacifists- Quakers
Retaliation	*'An eye for an eye'* *'Do not repay evil with evil'*
Islam	
Greed	*"God does not like arrogant boastful people, who are miserly…hiding the bounty God has given them."* *Lesser Jihad*
Self Defence	Lesser Jihad
Retaliation	*'If you have to respond to an attack, make your response proportionate, but it is best to stand fast'.*

Just War and Jihad	
Christianity	
Just War	Criteria: ICE CARS *"If your enemy is hungry, give him food to eat; if he is thirsty, give him water to drink."* *"It is impossible to conceive of a Just War in a nuclear age."*
Islam	
Lesser Jihad	Criteria: PIT DAD *"None of you truly believe until he wishes for his brothers what he wishes for himself." (Hadith)*

Thematic-Human Rights & Social Justice

Personal conviction

Example	Life Events	Personal Conviction
Oscar Romero Archbishop of El Salvador	• Stood up against government who were killing poor people who tried to stand up for their rights • Broadcasted names of the dead on the radio & met with the Pope • Shot dead by the army	• All humans should be treated with dignity. • *"Release the oppressed" Jesus*
Example	**Life Events**	**Personal Conviction**
Malala Yousafzai Pakistan	• Stood up against the Taliban regime • Continued going to school and blogged about her experience at 11 years old • She was shot but survived and continues campaigning e.g. 'books, not bullets'	• Both genders should have the Human Right to an education • Khadija= Businesswoman

Religious Expression

Evangelism	To preach with the intention of converting others e.g. leaflets.	"Go and preach the gospel" Jesus
Religious Protest	Pro-life Christians protest outside abortion clinics with signs.	
Religious clothing	Muslim women may show devotion to Allah through wearing a hijab.	"Women should guard their modesty" Qur'an

Islam

Women- Housewife & Men- Breadwinner
Women and Men are equal but fulfil different roles
"Anyone, male or female, who does good works and is a believers, will enter paradise." (Qur'an 4:124)
A women's earnings are her own
Men and Women worship separately

Prejudice and discrimination

CHRISTIAN

DISCRIMINATING	Vatican- same-sex marriage in Ireland is a *"defeat for humanity"*
EXPERIENCING DISCRIMINATION	• Archbishop of Canterbury Christian rights *"being treated with disrespect." e.g. Greggs Christmas advert* • In some countries Christians are persecuted e.g. North Korea (Open Doors)

ISLAM

DISCRIMINATING	Same-sex relationships are illegal in many Muslim-majority countries.
EXPERIENCING DISCRIMINATION	• 42% of Mosques experienced religiously motivated attacks in the last 3 years. • 2019 New Zealand Mosque shooting

Homosexuality

Christianity

FOR	*'Image & Likeness of God'* *Golden Rule* *Agape*	
AGAINST	*'For a man shall not lay with another man'* *'Be Fruitful and Multiply'*	

Muslim View

FOR	The LGBTQ Muslim charity Imaan campaign for rights.	*Golden Rule*
AGAINST	Punishable by Death Goes against the natural order	*Sodom & Gomorrah*

Racism

CHRISTIANITY

Martin Luther King Jr	• Stood up for Civil Rights in 1960s USA through peaceful marches e.g. the March on Washington 1963 and Montgomery Bus Boycott • "I have a dream" speech.
Christians involved in the Slave Trade	Christians were heavily involved in the slave trade and used Biblical teachings to support their views. E.g. the belief that Africans were descendants of Ham and were cursed.
Racial Representation in the Church	One in 25 of the Church of England's serving clergy belong to an ethnic minority.

ISLAM

Malcolm X	• Previously supported 'African racial superiority' • Changed views after Hajj- saw all races as equal.
Qur'an	"Allah made Adam from soil of many colours"

Wealth and charity

CHRISTIANITY

Attitude	Money should not be valued over God.	"Love of money is the root of all evil"
Acquisition	Christians should choose a job that benefits others.	Gambling encourages greed and love of money.
Use of wealth	Wealth should be used to help others.	Tithe: Voluntary giving 10% to charity.
Example: Christian Aid	• Collect donations during 'Christian Aid week' and Christmas appeals. • They aim to end poverty and injustice worldwide. • Respond to humanitarian disasters such as the war in Gaza and natural disasters, showing agape in action	

ISLAM

Attitude	All wealth is Allah's.	Al Qadr; Inshallah (if Allah wills it).
Acquisition	Riba (earning interest charged on loans) is forbidden	"Interest given to increase human wealth does not increase wealth with God."
Use of wealth	Wealth MUST be used to help others and "protect the ummah"	Zakat: Compulsory (2.5%) Sadaqah: Voluntary extra
Example: Islamic Relief	• Strive for a fairer, safer world for everyone • Winter food drive in the UK to respond to the cost-of living crisis • Sponsoring children and young people in Palestine to ensure children's needs are met.	

Dignity	Censorship	Discrimination	Extremism	Human Rights	Personal Conviction	Prejudice	Relative Poverty	Absolute Poverty	Social Justice
Every person is of worth and value and should be treated equally	Stopping something being said or worn as it may be offensive.	Treating people differently based on prejudice.	Believing in ideas that are very different from what most believe e.g. ISIS.	Rights that all humans have e.g. Right to Free Speech.	Something a person believes strongly e.g. Malala believed in education rights.	Prejudging people without good reason.	Being poor compared to others in the country.	Being so poor that basic needs aren't met e.g. food.	Ensuring everybody has equal rights e.g. MLK.

Notes