The Lowry Academy
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Knowledge Organiser

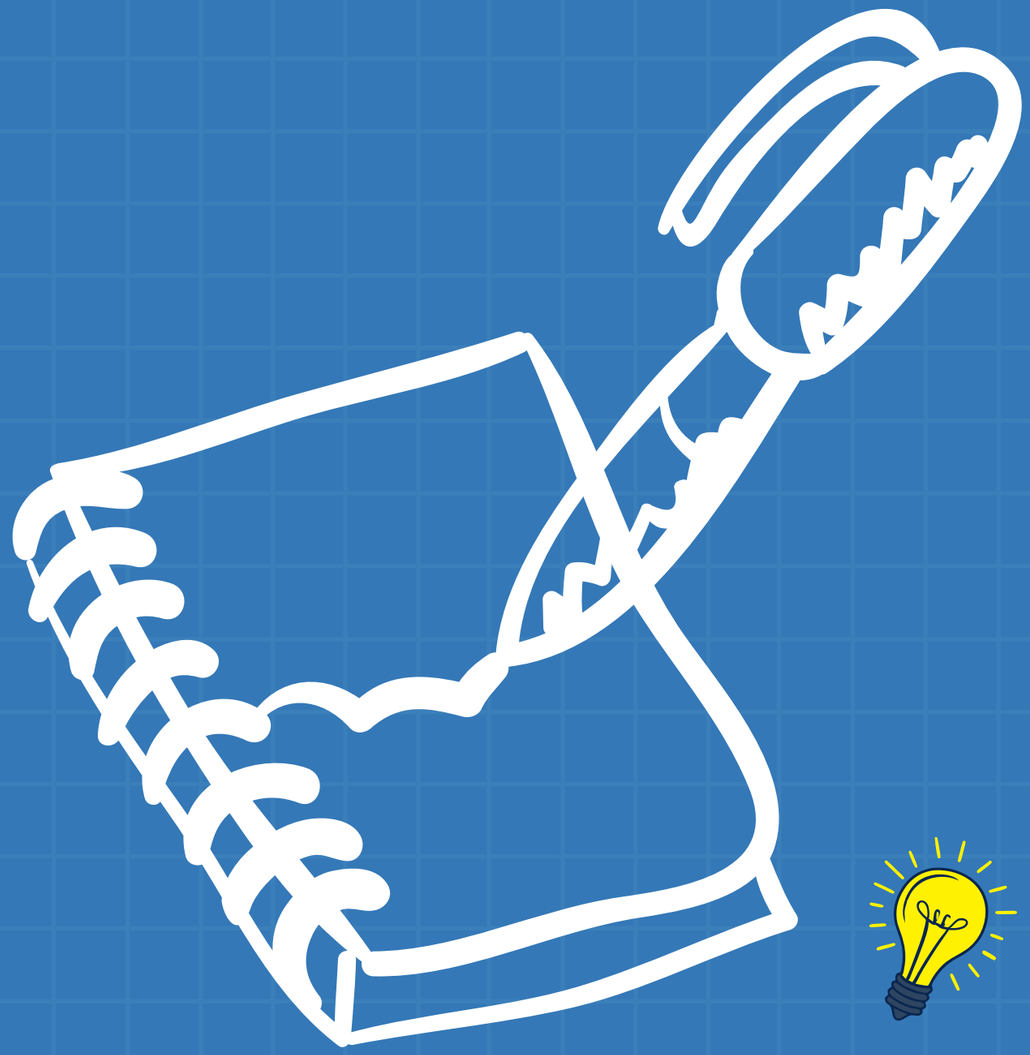
2026-27

Year 9

Aspiration | Respect | Confidence | Creativity | Resilience

YEAR 9

ENGLISH



Key Term	Definition
Metaphor	A metaphor is a figure of speech where something is described as if it is something else, even though it's not literally that thing. They use "was", "is", or "are" to make the comparison direct and powerful. Example: The wind was an icy dagger slicing through the valley.
Simile	A simile is a figure of speech that compares two different things using the words "like" or "as." Example: The wind was like an icy dagger slicing through the valley.
First person narrative	A narrative or mode of storytelling in which the narrator appears as the 'I' recollecting his or her own part in the events which occur, either as a witness of the action or as an important participant in it. (narrative perspective)
Third person narrative	A type of narrative in which the story is related by an omniscient narrator who knows the thoughts and feelings of all the characters in the story.
Exposition	Refers to part of the story used to introduce background information about events, settings, characters etc. to the reader.
Climax	The point of highest tension in a narrative.
Falling action	Occurs immediately after the climax, when the main problem of the story has been resolved.
Implicit Characterisation	This is when the author tells the reader directly what a character is like. Example: Sarah was brave and determined.

Key Term	Definition
Explicit Characterisation	This is when the author shows the character's traits through their: Speech, thoughts, effects on others, actions or looks. Example: Sarah stepped into the blizzard without hesitation, her jaw set.
Resolution	Also known as the denouement, the resolution is when conflicts are resolved and the story concludes.
Flashback	An interjected scene that takes the narrative back in time from the current point in the story.
Rising action	A related series of incidents in a literary plot that build toward the point of greatest excitement/interest.

Questions

1. What is explicit characterisation?

2. Which of the following is an example of implicit characterisation?
A) “Tom was a kind and generous man.”
B) “Tom have his last sandwich to a hungry stranger without hesitation.”
C) “Tom was tall and had brown hair.”

3. Rewrite this sentence to make the characterisation implicit instead of explicit: “Lena was nervous about the exam.”

4. Explain how a writer might use implicit characterisation to show that a character is dishonest. Give an example in your answer.

5. What is the difference between first-person and third-person narrative?

6. Read the sentence below. Is it written in first-person or third-person?“I crept down the hallway, heart pounding in my chest.”

7. How does using a first-person narrator affect the reader’s connection to the story? Give one example.

8. Rewrite the following third-person sentence in first-person: “She opened the letter slowly, her hands trembling.”

9. What is a flashback in creative writing?

10. Why might a writer use a flashback in a story? Give one example.

Questions

1. Look closely at the image. Identify five key nouns that contribute too the atmosphere of the scene.

2. Choose three adjectives from the list below that best match the tone of the house in the image:
warm – lonely – peaceful – bright – cluttered – joyful.

3. Why might the following simile be ineffective in describing the mood of the elderly person’s room? “The room was as lively as a summer festival.”

4. Create your own metaphor to describe the contrast between the inside of the room and the scene out side the window.

5. Choose three adjectives that best describe the mood of the study room.

6. Why might the following simile be ineffective? “The study was as bright and modern as a city skyscraper.”

7. What is the rising action in a story, and what is its purpose?

8. What is the climax of a story?

9. What is the falling action, and how is it different from the resolution?

10. What is the resolution of a story, and why is it important?

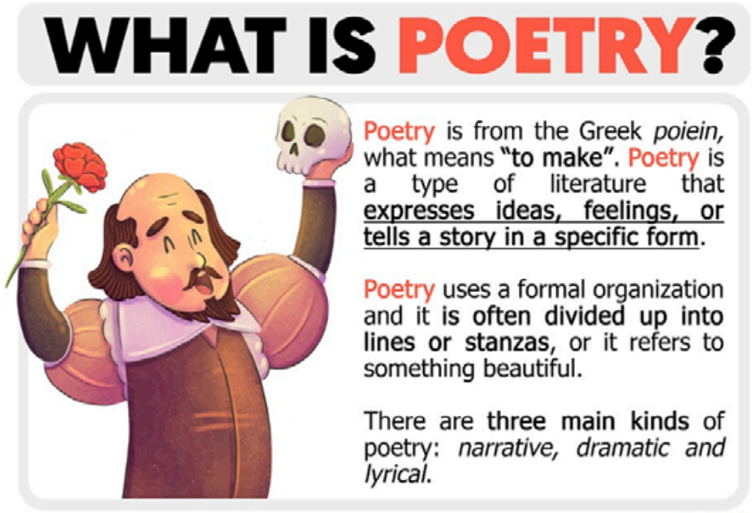
Read this short summary and identify the climax: “After weeks of training, Mia finally faces her biggest fear: performing her solo in front of a huge audience.”

Why is the rising action important for building suspense or interest in a story?

Write one sentence that includes a clear climax.

Key Term	Definition
Extended metaphor	A metaphor which is developed across the text.
Caesura	Caesura (pronounced see-ZOO-ra) refers to a break or pause in the middle of a line of verse indicated by a piece of punctuation.
Free verse	Refers to the form of a poem that does not have a regular pattern of rhyme or rhythm.
Simple Sentences	A sentence with one independent clause. It needs one subject, one verb and it needs to be a complete thought. Example: We need to make a change.
Sonnet	A poem that has 14 lines and a particular pattern of rhyme. Often sonnets are associated with the theme of love.
Elegy	A poem or song that is written in dedication to someone who has died.
Enjambment	When a line of poetry runs over into the next without punctuation.
Simile	A simile is a figure of speech that compares two different things using the words "like" or "as." Example: The grass swayed in the wind like waves on a beautiful green ocean.
Rhyme	Words that sound the same at the end (e.g. cat and hat).

Key Term	Definition
Rhythm	The pattern of stressed and unstressed syllables in a line of poetry.
Repetition	Repeating words or phrases for emphasis or effect.
Symbolism	When an object or word represents a deeper meaning (e.g. a dove = peace).
Tone	The poet's attitude or feeling shown through the language used.



Poetry is one of the oldest forms of literature, dating back thousands of years. Some of the earliest known poems were part of oral traditions and were used to tell stories, preserve history, and pass down cultural beliefs.

Questions
1. Why might a poet use symbolism in a poem?
2. Why might a poet use metaphors in their writing?
3. Why might a poet choose words from the same semantic field?
4. Why might a poet use imagery in their poem?
5. Why might a poet repeat certain words or phrases?

Questions
1. Why might a poet write about personal experiences?
2. Why might a poet write about social or political issues?
3. Why might a poet use poetry to explore identity?
4. Why might a poet write poetry during difficult times?
5. Why might a poet want to connect with their culture or heritage through poetry?

Questions
1. According to the poster, where does the word “poetry” come from, and what does itmean?
2. According to the poster, what are some things poetry can do?
3. According to the poster, how is poetry usually organised on the page?
4. According to the poster, what are the three main types of poetry?
5. According to the poster, what objects is the character in the image holding, and what might they represent?

1. Enjambmentis used in poetry when a sentence runs over more than one line without _____ , creating a sense of flow or urgency.
2. Acaesurais a _____ in the middle of a line, often marked by punctuation, which can create _____ effect or reflect a character’s inner conflict.
3. Poets often use _____ to give deeper meaning to objects or actions, such as usinga storm to represent emotional turmoil.
4. Iambic pentameteris a common rhythm in poetry, made up of _____ pairs ofsyllables where the second syllable in each pair is _____.
5. Anextended metaphoris a comparison that continues _____ a poem or asection of it, helping to explore complex ideas like identity or conflict in more depth.

Key Term	Definition
Symbolism	A literary and artistic device where symbols—objects, characters, or events—are used to represent abstract ideas or concepts beyond their literal meaning.
Tone	In literature, tone is the attitude or manner of which a writer writes about a central theme or subject.
Pathetic Fallacy	The attribution human feelings to something non-human (ie. The weather reflects the mood of a character or can be used to create a tone).
Foreshadowing	A literary device where the writer gives subtle hints or clues about events that will happen later in the story.
Main Clause	A main clause (also called an independent clause) is a group of words that contains a subject and a verb and expresses a complete thought. It can stand alone as a full sentence.
Extended metaphor	A comparison between two unlike things that continues throughout a series of sentences, a paragraph, or even an entire piece of writing. It goes beyond a single line or phrase, developing the metaphor in depth to create a more vivid or complex understanding.
Cyclical structure	A narrative technique where the story ends in a similar way to how it began, creating a sense of closure, repetition, or inevitability.
Subordinate clause	A subordinate clause (also called a dependent clause) is a group of words that has a subject and a verb but cannot stand alone as a complete sentence.
Deliberate sentence variation	The intentional use of different sentence structures, lengths, and styles to create rhythm, maintain reader interest, and emphasize key ideas in writing. It helps make the text more engaging and dynamic.

Key Term	Definition
Parenthesis	Refers to a word, phrase, or clause inserted into a sentence to add extra information or an aside. It's usually set off by brackets or commas and the sentence still makes sense if the parenthetical part is removed.
Introductory phrase	An introductory phrase does not include the main subject or verb of the sentence. It only sets up or adds context for the main clause that follows. Eg. "After finishing her homework".
Tense	Refers to the form of a verb that shows the time an action takes place—whether it's in the past, present, or future. Tense helps readers or listeners understand when something happens.
Ambitious vocabulary	The use of advanced, precise, or sophisticated words that go beyond everyday language. These words show a strong command of language and are often used to impress, persuade, or express ideas more clearly and creatively.

Questions

1. How does the use of cyclical structure in a story affect the reader's perception of the characters' journey or fate?

2. Can you identify a moment of foreshadowing in a text you've read recently?

3. What is a symbol used in a novel or poem you've studied? What does it represent, and how does it deepen the meaning of the text?

4. How can imagery and symbolism work together in a text to convey a theme or emotion more powerfully?

1. Is this Pathetic fallacy or personification?
The old house groaned as the wind pushed against its walls.

2. Is this Pathetic fallacy or personification?
The angry storm lashed against the windows, echoing the tension in the room.

3. What ambitious vocabulary can you think of instead of the following words:
sad – big – happy – mean – scary

4. When is the only appropriate time to change tense within a creative writing piece?

5. *How does the author's choice of tone influence the reader's emotional response to the narrative?*

Questions

1. Underline the main clause in the following sentence:
Although it was raining, we decided to go for a walk.

2. Which of the following is a main clause?
A) Because she was late
B) If you finish your homework
C) He enjoys playing football
D) While the sun was setting

3. Identify the subordinate clause in the following sentence:
She stayed inside because it was raining.

4. Which sentence contains a subordinate clause?
A) The dog barked loudly.
B) I will call you when I get home.
C) He runs every morning.
D) The sun is shining.

5. In the sentence below, where can we put punctuation to create Parenthesis?
My sister who just got her driver's license offered to take me to the concert.

Questions

1. Write a sentence according to the picture and underline the main clause.

2. Write a sentence using a positive tone according to the picture.

3. Write an example of varying sentence types to change the tone, according to the picture.

4. Using the picture as an example, write a sentence including pathetic fallacy

5. Using the picture as an example write a sentence including personification

Notes

Key Term	Definition
Subversive	Something or someone that seeks to challenge or overthrow established systems, beliefs, or institutions.
Morality/Immorality	**Morality** is the system of principles and values that distinguishes right from wrong behaviour. **Immorality** is the violation of moral principles, involving actions considered wrong or unethical.
Patriarchal	Describes a system or society where men hold most of the power and authority, especially in leadership and decision-making — often leaving women with fewer rights and limited opportunities.
Expectations	Beliefs or assumptions about how someone should behave and what they should achieve. Expectations can come from family, school, society, or even ourselves.
Class	In society, class refers to a group of people who are seen as having a similar social or economic position. These can be roughly broken down into Upper, middle and lower class.
Characterisation	The way a writer shows what a character is like. This can include their appearance, actions, speech, thoughts, and how others react to them. A writer uses characterisation as a way of getting their message across.
Strength	Being strong — not just physically, but also mentally or emotionally. It means being able to face challenges, stay calm under pressure, and keep going even when things are difficult.
Gender	Gender refers to the roles, behaviours, activities, and identities that a society considers appropriate for people based on whether they are seen as male, female, or another identity.

Key Term	Definition
Society	A society is a group of people who live together in an organised way, sharing laws, traditions, values, and ways of life. Societies can be large (like a country) or small (like a local community), and they shape how people behave and interact with each other.
Integrity	The quality of being honest and having strong moral principles which you will not change.
Justice	Justice can be defined as the principle of fairness and moral rightness, where individuals receive what they are due, in terms of protection, punishment or reward. It means using rules and values fairly so that everyone is treated equally and held responsible for their actions.
Power	The ability to control people, situations, or resources, or to make decisions that affect others. Power can come from many places — like laws, money, knowledge, or social status.

Questions

1. A _____ system is one where men hold most of the power and authority, often limiting women's rights and opportunities.

2. _____ refers to actions that violate moral principles and are considered wrong or unethical.

3. How can subversive actions affect a society or institution?

1. Where do expectations come from?

2. How are people grouped by class?

3. How does writers use characterisation to show what a character is like?

4. What does strength mean beyond just physical ability? Give two examples mentioned in the definition.

Questions

1. What does the statue in the picture hold?

2. Why might the statue be blind folded?

3. Where would you find a similar image/statue?

4. How does the image link to power?

5. Consider the second image, what are the things that are tipping the scales?

6. What could this reveal about the justice system?

7. Is there any such thing as true justice?

1. Gender refers to the roles, behaviours, activities, and identities that a _____ considers _____ for people based on whether they are seen as male, female, or another identity.

2. What are the common sources of power in society? Name 2.

3. A _____ is a group of people who live together in an _____ way, sharing laws, traditions, values, and ways of life.

4. Justice is the principle of _____ where people receive _____

Key Term	Definition
Imagery	*Imagery is a literary device used in poetry, novels, and other writing that uses vivid description that appeals to a readers' senses to create an image or idea in their mind.*
Simile	*A simile is a figure of speech that compares two different things using the words "like" or "as."* *Example: Homelessness is like a plant having not roots, no soil to anchor it.*
Metaphor	A metaphor is a figure of speech where something is described as if it is something else, even though it's not literally that thing. They use "was", "is", or "are" to make the comparison direct and powerful. Example: Every homeless person is a plant lacking roots and soil to anchor it.
Personification	Personfication is where human qualities, actions, or emotions are attributed to inanimate objects, animals, or abstract ideas. Example: Homework is a thief of time and freedom.
Extended metaphor	A metaphor that is developed over several lines, paragraphs, or even an entire work.
Emotive language	Emotive language is language that is used to create an emotional response in the reader using words and phrases that evoke feelings such as sadness, anger, joy or fear.
Semantic field	Semantic field is a group of words or expressions that are related in meaning.
Anecdote OR Tone	Tone in writing is the overall mood or attitude conveyed by the writer's word choice. Tone can be formal or informal, positive or negative, light-hearted or dramatic.

Key Term	Definition
Imperatives	An instruction or a command. In transactional writing these are used to create a sense of urgency, motivation or call to action. Example: Vote today to make your voice heard.
Rhetorical Questions	A rhetorical question is a question that does not require an answer. It's purpose is to prompt though, engage readers by considering the answer themselves.
Simple sentences	A sentence with one independent clause. It needs one subject, one verb and it needs to be a complete thought. Example: We need to make a change.
Compound sentences	A sentence with two or more independent clauses, joined by a coordinating conjunction (like and, but, or, so). Example: It Is only a matter of time before this issue takes over and future generations will feel its effects.
Complex sentences	A sentence with one independent clause and at least one dependent clause (a clause that cannot stand alone). Example: Anita, like many others in rural villages, would be lost without her car to reply upon.

Questions

1. Imagery is using words to _____.

2. What is the key difference between a simile and a metaphor?

3. Is this an example of a metaphor or a simile?
People who give up their time to help are a lighthouse in a stormy sea.

4. Is this an example of a metaphor or a simile?
Like a flower deprived of sunlight, we will see creativity wilt.

1. What is being personified in the example below:
Society has turned its back on the most vulnerable, walking briskly past them as they sleep on our streets.

2. What is the difference between a metaphor and an extended metaphor?

3. In this example of emotive language, which words create a sense of sympathy?
Crammed into tiny, filthy cages, the defenceless animals are the real victims.

4. Which is not an example of semantic field?
War – Prison – Growth - Blue – Machines

5. Which of the following IS NOT an example of tone?
Optimistic – sarcastic – annoying – sorrowful

Questions

1. Which words in the sentence below are the imperatives?
Act now to support local businesses and help protect the heart of our community.

2. Change the sentence below into an imperative:
We could close the door on prejudice if we want to.

3. Why do writers use rhetorical questions in transactional writing?

4. What does a simple sentence need?

5. What does a compound sentence join together?

Questions

1. Provide one word to describe the tone suggested by the image.

2. Why would the following sentence be inappropriate in a piece of transactional writing about protesting?Joyfully, the classmates raised their placards in unison.

3. Which semantic field might you use to criticise the lack of freedom in the school system?

4. Why is this a successful metaphor to use to describe the protest Their voices rose like a storm forged in harmony, each word a lightning strike against injustice.

Questions

1. What issue is being demonstrated in the image?

2. Provide 3 emotive words which would create sympathy for the woman.

3. Provide 3 emotive words which would create anger towards the thief.

4. Why would this be an ineffective use of emotive language? The sad woman was in even more sad, watching in sorrow as the thief ran away.

5. Write a rhetorical question to encourage people to stand up against crime.

Key Term	Definition
nobility	**Nobility of character** is the quality of possessing high moral virtues such as integrity, compassion, and courage, reflecting inner greatness and strength. **Nobility also refers to a privileged social class**, usually inherited, and historically linked to titles, land, and high social rank.
Morality/immorality	**Morality** is the understanding and practice of good behaviour, based on values like honesty, respect, fairness, and kindness. **Immorality** is the choice to act in ways that go against these values, such as being dishonest, cruel, or unfair.
Abuse of power	Abuse of power is when someone in a position of authority uses their power unfairly or wrongly, to control, harm or take advantage of others. It usually involves breaking rules or acting for personal gain instead of the good of others.
Conflict	**Conflict** is a struggle or clash between opposing forces, ideas, interests, or individuals. It can occur between people, groups, or within a person's mind. Conflicts often involve a disagreement or incompatibility that creates tension and requires resolution.
Authority	Authority is the legitimate power or right to give orders, make decisions, and enforce obedience. It often comes from a recognised position, role, or social agreement that grants someone the ability to influence or control the actions of others.
disintegration	**Disintegration** is the process of breaking down or falling apart into smaller pieces, losing unity, cohesion, or structure. It can refer to physical objects breaking apart or to groups, systems, or relationships falling into disorder or collapse.
Hierarchy	**Hierarchy** is a system or organisation in which people or things are arranged according to their rank, status or authority. It establishes levels of power, importance, or classification, often creating a chain of command or order.
manipulate	**Manipulate** means to skilfully handle or control something or someone, often in a clever or sometimes unfair way to achieve a desired outcome.

Key Term	Definition
subverts	**Subverts** means to secretly weaken, overthrow, or undermine a system, authority, or established idea.
loyalty	**Loyalty** is a strong feeling of support, faithfulness, or allegiance to a person, group, cause, or idea.
Transgressive	**Transgressive** means going beyond or breaking the usual limits, rules, or boundaries, often in a way that challenges social norms or conventions.
Integrity	**Integrity** means being honest and having strong moral principles; doing the right thing even when no one is watching.
Dignity	**Dignity** is the quality of being worthy of respect and honour; having a sense of self-respect and behaving in a way that deserves respect from others.

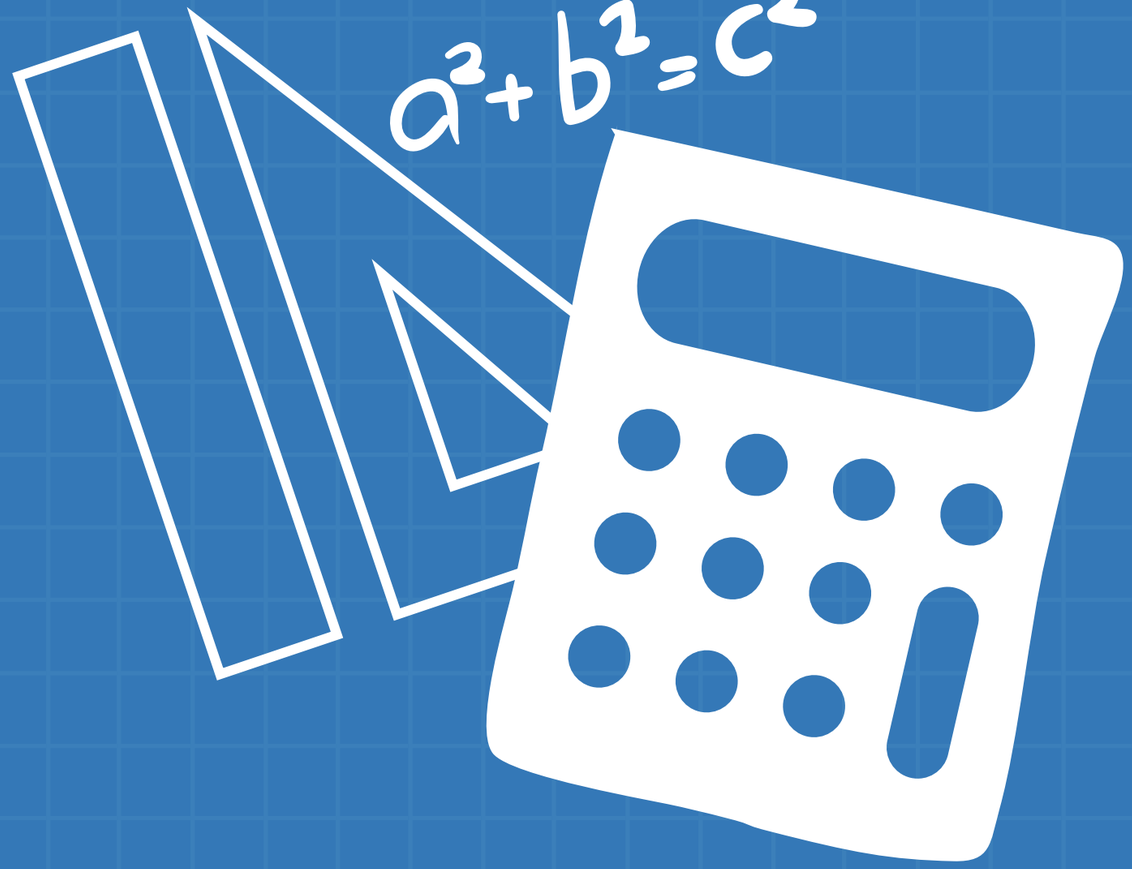
Questions
1. What are the two meanings of the term 'nobility' as defined in the table?
2. How is 'immorality' different from 'morality'? Provide an example of each.
3. What does it mean to 'abuse power'?
4. What are some ways conflict can occur according to the definition provided?

1. What is authority, and where does it typically come from?
2. Give an example of a situation where someone might have authority. Why are they given that authority?
3. Explain what disintegration means. What kinds of things can disintegrate?
4. What is a hierarchy, and how does it organise people or things?

Questions
1. How might this image relate to ‘disintegration’?
2. Examine the picture, use the word loyalty to explain what you think is happening.
3. What might the image represent about hierarchy and authority?
4. Do you think the owner of the crown was a ‘successful’ rule? Give one reason for your answer.

1. What does the word subvert mean, and how does it relate to systems or authority?
2. How would you explain the meaning of loyalty?
3. What does it mean when something is described as transgressive?
4. What is the meaning of integrity, and how does it involve being honest and sticking to strong moral principles?
5. What does it mean for a person to have or show dignity in how they carry themselves?

YEAR 9
Maths



9.01 Decimals Manipulation

1. Multiplying decimals	1) Remove the decimal points. 2) Multiply. 3) Insert the same number of decimal points in the answer as in the question. 0.5 x 0.3 5 x 3 = 15 0.5 x 0.3 = 0.15
2. Dividing a decimal by an integer	0.72÷6 = 0.12 (6 ⟌ 0.72) 0.972÷8 = 0.1215 (8 ⟌ 0.9720)
3. Dividing an integer by a decimal	1) Write as a fraction. 2) Form an equivalent fraction. 3) Divide.

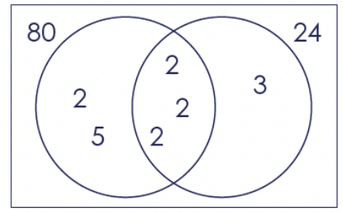
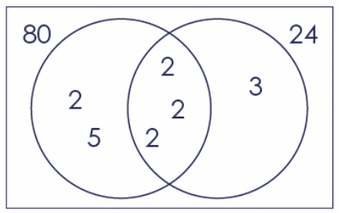
9.02 Estimation and Limits of Accuracy

1. ≈	"approximately equal to"
2. Truncation	Ignoring all decimal places past a certain point without rounding.
3. Significant figures	The total number of digits in a number, not counting the zeros at the beginning of a number or at the end of a decimal number. 345 000 has 6 significant figures. 0.3047 has 4 significant figures.
4. Estimate	Find approximate answer by calculating with numbers rounded to one significant figure.
5. Error Intervals	The range of values (between the upper and lower bounds) in which the precise value could be. **least possible value ≤ x < greatest possible value**

9.03 Related Calculations

19 x 18 = 342 19 x 180 = 3420 190 x 18 = 3420 190 x 180 = 34200 1900 x 180 = 342000	108 ÷ 9 = 12 1080 ÷ 9 = 120 108 ÷ 90 = 1.2 108 ÷ 0.9 = 120 108 ÷ 0.09 = 1200

9.04 HCF and LCM of Large Numbers

1. Prime numbers	A prime number only has two distinct factors: 1 and itself. 2 is the only even prime number. 1 is not a prime number. The first ten prime numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
2. Factor	Any whole number that divides exactly into another number leaving no remainder. Factors of 20 are: 1, 2, 4, 5, 10, 20
3. Multiple	The result of multiplying a number with a whole number. (times tables!) The multiples of 7: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70...
4. HCF–Venn diagram	 HCF of 80 and 24 = 2 x 2 x 2 = 8
5. LCM–Venn diagram	 LCM of 80 and 24 = 2 x 2 x 2 x 2 x 3 x 5 = 240

9.01 Decimals Manipulation

1. Multiplying decimals	1) Remove the decimal points. 2) Multiply. 3) Insert the same number of _____ in the question. 0.5 x 0.3 5 x 3 = 15 0.5 x 0.3 = 0.15
2. Dividing a decimal by an integer	0.72÷6 0.12 6 ⟌ 0.72 (1) 0.972÷8 0.1215 8 ⟌ 0.9720 (1 1 4)
3. Dividing an integer by a decimal	1) Write as a fraction. 2) Form an _____ fraction. 3) Divide.

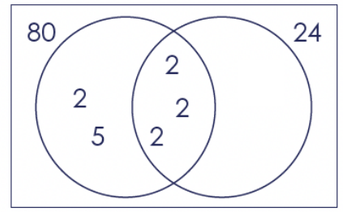
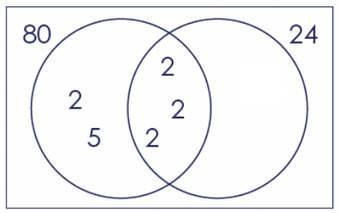
9.02 Estimation and Limits of Accuracy

1. ≈	"approximately equal to"
2. _____	Ignoring all decimal places past a certain point without rounding.
3. Significant figures	The total number of _____ in a number, not counting the zeros at the beginning of a number or at the end of a decimal number. 345 000 has ____ significant figures. 0.3047 has ____ significant figures.
4. Estimate	Find approximate answer by calculating with numbers rounded to _____
5. Error Intervals	The range of values (between the _____ and _____ bounds) in which the precise value could be. **least possible value ≤ x < greatest possible value**

9.03 Related Calculations

19 x 18 = 342	108 ÷ 9 = 12
19 x 180 =	1080 ÷ 9 =
190 x 18 =	108 ÷ 90 =
190 x 180 =	108 ÷ 0.9 =
1900 x 180 =	108 ÷ 0.09 =

9.04 HCF and LCM of Large Numbers

1. Prime numbers	A prime number only has two distinct _____ : 1 and itself. 2 is the only even prime number. 1 is not a prime number. The first ten prime numbers are: 2, 3, 5, 7, 11, 13, 17, 19, 23, 29
2. Factor	Any whole number that divides exactly into another number leaving no _____ . Factors of 20 are: _____
3. Multiple	The result of _____ a number with a whole number. (times tables!) The multiples of 7: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70...
4. HCF–Venn diagram	 HCF of 80 and 24 = 2 x 2 x 2 = 8
5. LCM–Venn diagram	 LCM of 80 and 24 = 2 x 2 x 2 x 2 x 3 x 5 = 240

9.05 Fraction Calculations

1. Writing one number as a fraction of another	Write £15 as a fraction of £25 $\frac{15}{25} = \frac{3}{5}$	**2. Reciprocal**	Reciprocal of $7 \rightarrow \frac{1}{7}$ Reciprocal of $\frac{2}{3} \rightarrow \frac{3}{2}$
3. Fractions of an amount	Divide the amount by the denominator and then multiply the result by the numerator.		
4. Add/Subtract fractions	Make the denominators the same (find the LCM). Use equivalent fractions to change each fraction to the common denominator. Add/subtract the numerators only. $\frac{2}{7} + \frac{2}{5} = \frac{10}{35} + \frac{14}{35} = \frac{24}{35}$		
5. Multiplying fractions	Multiply the numerators. Multiply the denominators. Simplify where possible. $\frac{4}{5} \times \frac{3}{8} = \frac{12}{40} = \frac{3}{10}$		
6. Dividing fractions	Keep the first fraction the same. Change the second to its reciprocal. Multiply the fractions. Simplify/convert to mixed number where possible. $\frac{4}{5} \div \frac{3}{8} = \frac{4}{5} \times \frac{8}{3} = \frac{32}{15} = 2\frac{2}{15}$		

9.06 Algebraic Manipulation

1. 2a	2 x a	**2. ab**	a x b
3. a^2	a x a	**4. $3a^2$**	3 x a x a
5. a subtracted from b	b - a	**6. a less than b**	b - a
7. a divided by b	$\frac{a}{b}$	**8. b divided by a**	$\frac{b}{a}$
9. times smaller than a	$\frac{a}{b}$ or a ÷ 4	**10. times larger than a**	4 x a → 4a
11. 5th power of a	a^5	**12. Variable**	A letter used to represent any number.
13. Coefficient	The number to the left of the variable. This is the value that we multiply the variable by. 4x → The coefficient of x is 4. x → The coefficient of x is 1.	**14. Term**	A single number, variable or numbers and variables multiplied together.
15. Simplifying	An expression can be simplified by grouping like terms. E.g. 2a + b2 - 4b + 7a = 9a+b2 - 4b	**16. Identity**	An identity is an equation which is always true no matter what value of the unknown is substituted. E.g. $3x - 15 = 3(x - 5)$

9.07 Index Laws

1. Multiplication law	Same base numbers, ADD the powers. $a^m \times a^n = a^{m+n}$	**2. Division law**	Same base numbers, SUBTRACT the powers. $a^m \div a^n = a^{m-n}$
3. Power to a power	MULTIPLY the powers. $(a^m)^n = a^{m \times n}$	**4. Raising a fraction by a power**	Raise each number or variable to the same power. $(ab)^n = a^n \times b^n$
5. Power of 0	Any number or variable to the power of zero equals 1. $a^0 = 1.$	**6. Negative powers (integers)**	A negative power represents the reciprocal. $a^{-1} = \frac{1}{a}$ $a^{-2} = \frac{1}{a^2}$ $a^{-n} = \frac{1}{a^n}$
7. Positive unit fractions	$a^{\frac{1}{2}} = \sqrt{a}$ $a^{\frac{1}{3}} = \sqrt[3]{a}$ $a^{\frac{1}{n}} = \sqrt[n]{a}$	**8. Negative unit fractions**	$a^{-\frac{1}{2}} = \frac{1}{\sqrt{a}}$ $a^{-\frac{1}{3}} = \frac{1}{\sqrt[3]{a}}$ $a^{-\frac{1}{n}} = \frac{1}{\sqrt[n]{a}}$
9. Positive non-unit fractions	$a^{\frac{m}{n}} = (\sqrt[n]{a})^m$	**10. Negative non-unit factions**	$(a)^{-\frac{m}{n}} = \left(\frac{1}{a}\right)^{\frac{m}{n}} = \left(\sqrt[n]{\frac{1}{a}}\right)^m$

9.08 Standard Form

1. Rule	Numbers written in standard form are always written in the form a×10n, where 0<a<10		
2. Powers of 10	10^1 =10 10^2 =100 10^3 =1000 10^4 =10 000 10^5 =100 000 etc.	$10^{-1} = \frac{1}{10} = 0.1$ $10^{-2} = \frac{1}{100} = 0.01$ $10^{-3} = \frac{1}{1000} = 0.001$	$10^{-4} = \frac{1}{10000} = 0.0001$ etc
3. Ordinary to Standard Form	340000 = 3.4×10^5 0.00903=9.03×10^{-3}	**6. Negative powers (integers)**	$1.09 \times 10^3 = 1090$ $8.77 \times 10^{-6} = 0.00000877$

9.05 Fraction Calculations

1. Writing one number as a fraction of another	Write £15 as a fraction of £25 $\frac{15}{25}$ = ___	**2. Reciprocal**	Reciprocal of 7 → ___ Reciprocal of $\frac{2}{3}$ → ___
3. Fractions of an amount	Divide the amount by the _____ and then multiply the result by the _____ .		
4. Add/Subtract fractions	Make the _____ the same (find the _____). Use _____ fractions to change each fraction to the common _____. $\frac{2}{7} + \frac{2}{5} = \frac{\_\_}{35} + \frac{14}{35} = \frac{\_\_}{35}$ Add/subtract the _____ only.		
5. Multiplying fractions	Multiply the _____ . Multiply the _____ . _____ where possible. $\frac{4}{5} \times \frac{3}{8} = \frac{12}{\_\_} = \_\_\_$		
6. Dividing fractions	Keep the first fraction the same. Change the second to its _____ . $\frac{4}{5}$ $\frac{3}{8} = \frac{4}{5}$ $\frac{8}{3} = \frac{32}{15} = \frac{2}{15}$ _____ the fractions. Simplify/convert to mixed number where possible.		

9.06 Algebraic Manipulation

1. 2a		**2. ab**	
3. a^2		**4. $3a^2$**	
5. a subtracted from b		**6. a less than b**	
7. a divided by b		**8. b divided by a**	
9. times smaller than a		**10. times larger than a**	
11. 5th power of a		**12. Variable**	A letter used to represent any _____
13. Coefficient	The number to the left of the _____ . This is the value that we multiply the _____ by. 4x → The _____ of x is 4. x → The _____ of x is 1.	**14. Term**	A single number, variable or numbers and variables _____ together.
15. Simplifying	An _____ can be simplified by grouping _____ . E.g. 2a + b2 - 4b + 7a = 9a+b2 - 4b	**16. Identity**	An identity is an ____ which is always ____ no matter what value of the unknown is _____ . E.g. $3x - 15 = 3(x - 5)$

9.07 Index Laws

1. Multiplication law	Same base numbers, _____ the powers. $a^m \times a^n = a^{m+n}$	**2. Division law**	Same base numbers, _____ the powers. $a^m \div a^n = a^{m-n}$
3. Power to a power	_____ the powers. $(a^m)^n = a^{m \times n}$	**4. Raising a fraction by a power**	Raise each number or variable to the _____ . $(ab)^n = a^n \times b^n$
5. Power of 0	Any _____ or _____ to the power of zero equals 1. $a^0 = 1.$	**6. Negative powers (integers)**	A negative power represents the _____ . $a^{-1} = \frac{1}{a}$ $a^{-2} = \frac{1}{a^2}$ $a^{-n} = \frac{1}{a^n}$
7. Positive unit fractions	$a^{\frac{1}{2}} = \sqrt{a}$ $a^{\frac{1}{3}} = \sqrt[3]{a}$ $a^{\frac{1}{n}} = \sqrt[n]{a}$	**8. Negative unit fractions**	$a^{-\frac{1}{2}} = \frac{1}{\sqrt{a}}$ $a^{-\frac{1}{3}} = \frac{1}{\sqrt[3]{a}}$ $a^{-\frac{1}{n}} = \frac{1}{\sqrt[n]{a}}$
9. Positive non-unit fractions	$a^{\frac{m}{n}} = (\sqrt[n]{a})^m$	**10. Negative non-unit factions**	$(a)^{-\frac{m}{n}} = \left(\frac{1}{a}\right)^{\frac{m}{n}} = \left(\sqrt[n]{\frac{1}{a}}\right)^m$

9.08 Standard Form

1. Rule	Numbers written in _____ are always written in the form _____, where __<a< __		
2. Powers of 10	10^1 =10 10^2 =100 10^3 =1000 10^4 =10 000 10^5 =100 000 etc.	$10^{-1} = \frac{1}{10} = 0.1$ $10^{-2} = \frac{1}{100} = 0.01$ $10^{-3} = \frac{1}{1000} = 0.001$	$10^{-4} = \frac{1}{10000} = 0.0001$ etc
3. Ordinary to Standard Form	340000 = _____ 0.00903= _____	**6. Negative powers (integers)**	1.09×10^3 = _____ 8.77×10^{-6} = _____

9.09 Expanding and Factorising 2

1. Expand	Multiply out the bracket(s) in the expression. E.g. $3(5x + 7) = 15x + 21$	**2. Factorise**	Identify the HCF and rewrite the expression with brackets. E.g. $6x^2 + 9x = 3x(2x+3)$.
3. Expanding double brackets	Writing two brackets next to each other means the brackets need to be multiplied together. $(x + 1)(x +2)=(x + 1)\times(x + 2)= x2 + 3x + 2$ Note: $(x + a)^2=(x + a)(x + a)$		
4. Factorising quadratics	To factorise a quadratic, put it back into a pair of brackets. To find the terms that go in each bracket, look for a pair of numbers which multiply to give the constant and add together to give the coefficient of x		
5. Difference of two squares (DOTS)	$a^2 - b^2 = (a + b)(a - b)$	E.g. $x^2 - 16 = (x + 4)(x - 4)$	

x	x	+1
x	x^2	$+x$
+2	$+2x$	+2

9.10 Forming Expressions and Substitution

1. Substitution	Replace a variable with a given value.	**2. Function machine**	Shows the relationship between two variables, the input and the output.
3. Formula	A mathematical relationship or rule expressed in symbols.		
4. Expression	A mathematical statement which contains one or more terms combined with addition and/or subtraction signs.		

9.11 Direct and inverse proportion

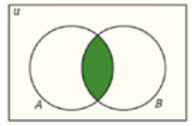
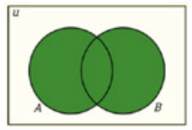
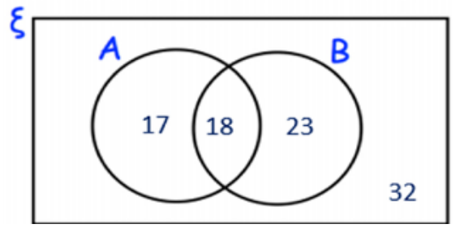
1. Direct proportion	A relationship between two variables where, as one increases, the other also increases.
2. Inverse Proportion	A relationship between two variables where, as one increases, the other decreases.
3. Unitary method	To find the value of one unit first.
4. Exchange rate	Tells us how much of one currency you can exchange for another currency e.g. £1 = $1.39

9.12 Probability 1

1. Probabiility	How likely something is going to happen. All probabilities must be given as a fraction, decimal or a percentage (NOT a ratio).
2. Probability scale words	Impossible, Unlikely, Even chance, Likely, Certain
3. Probability scale	All probabilities exist between 0 and 1. Impossible = 0, Even chance = ½ and certain = 1
4. Systematic listing	The outcomes for an event can be listed in an organised or systematic way to make sure that none of the possible outcomes are missed out.
5. Single event probability	The sum of the probabilities of a set of outcomes must equal one.
6. Probability notation	In probability we use the notation P(___) to represent the probability of something happening.
7. Probability of an event happening	$P(of\ an\ outcome\ happening) = \frac{number\ of\ the\ desired\ outcome}{total\ number\ of\ outcomes\ of\ the\ event}$
8. Mutually exclusive	Are events that cannot happen at the same time.
9. Expected outcomes	You need to multiply the probability by the total number of trials.
10. Frequency trees	Is used to record and organise information given as frequencies. This can then be used to calculate probabilities.
11. Sample space	Listing all of the possible outcomes from two events in a table. E.g. Displaying all of the scores for the sum of two spinners. Spinner A (1,2,3,4) and Spinner B (2,3,4)
12. Relative frequency	Relative frequency is used when probability is being estimated using the outcomes of an experiment or trial, when theoretical probability cannot be used. Relative frequency or experimental probability is calculated from the number of times an event happens, divided by the total number of trials in an actual experiment. $Relative\ Frequency = \frac{No.\ of\ Successful\ Outcomes}{No.\ of\ Trials}$

+		Spinner A			
		1	2	3	4
Spinner B	2	3	4	5	6
	3	4	5	6	7
	4	5	6	7	8

9.12 Probability 1

13. Venn Diagrams	A Venn diagram shows the relationship between groups of different outcomes.
14. Element	A list of numbers, objects or outcomes.
15. Universal set	Contains all of the elements for our question.
16. Set Notation	**A** – all elements in A **A'** – all elements NOT in A **B** – all elements in B **B'** – all elements NOT in B
17. Intersection	**A∩B** – all the elements in both A and B 
18. Union	**A∪B** – all the elements in A or B or both 
19. Finding probabilities from a Venn diagram	Venn diagrams can be useful for organising information about frequencies and probabilities. We can then use them to solve conditional probability problems. E.g. The following Venn diagram shows information about the number of members of a local sport club who take part in the Archery and Badminton classes. A person is chosen at random. Find P(B only) $= \frac{18 + 23}{17 + 18 + 23 + 32} = \frac{41}{90}$ 

9.13 Solving Equations 2

1. Solve	Use inverse operations to find the solution of an equation.
2. Linear equation	Contains an equals sign (=) and has one unknown. E.g. 5x – 2 = 2x + 7
3. Equation	An equation is a statement with an equal sign, starting that two expressions are equal in value.

9.09 Expanding and Factorising 2

1. Expand	Multiply out the bracket(s) in the _____. E.g. $3(5x + 7) = 15x + 21$	**2. Factorise**	Identify the___ and rewrite the_____ with brackets. E.g. $6x^2 + 9x =$_____
3. Expanding double brackets	Writing two brackets next to each other means the brackets need to be _____ together. $(x + 1)(x + 2) = (x + 1) \times (x + 2) =$_____ Note: $(x + a)^2 = (x + a)(x + a)$		
4. Factorising quadratics	To factorise a quadratic, put it back into a pair of _____. To find the terms that go in each bracket, look for a pair of numbers which _____ to give the _____ and _____ together to give the_____ of x		
5. Difference of two squares (DOTS)	$a^2 - b^2 = (a + b)(a - b)$	E.g. $x^2 - 16 =$ _____	

x	x	+1
x	x^2	$+x$
+2	$+2x$	+2

9.10 Forming Expressions and Substitution

1. Substitution	_____ a_____ with a given value.	**2. Function machine**	Shows the relationship between two variables, the____ and the _____ .
3. Formula	A mathematical relationship or rule expressed in symbols.		
4. Expression	A mathematical statement which contains one or more_____ combined with _____ and/or_____ signs.		

9.11 Direct and inverse proportion

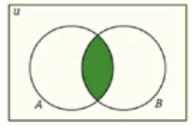
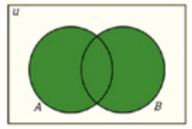
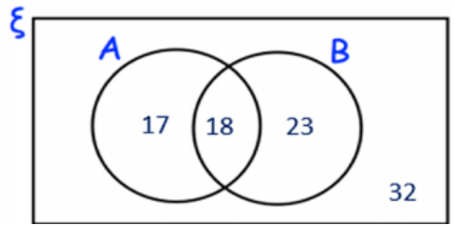
1. Direct proportion	A relationship between two _____ where, as one_____ , the other also _____ .
2. Inverse Proportion	A relationship between two _____ where, as one_____ , the other _____ .
3. Unitary method	To find the value of one____ first.
4. Exchange rate	Tells us how much of one_____ you can exchange for another currency e.g. £1 = $1.39

9.12 Probability 1

1. Probabiility	How _____something is going to happen. All probabilities must be given as a _____, _____or a _____ (NOT a ratio).
2. Probability scale words	
3. Probability scale	All probabilities exist between___ and___. Impossible =___, Even chance =___ and certain =___
4. Systematic listing	The _____ for an event can be listed in an organised or_____way to make sure that none of the possible outcomes are missed out.
5. Single event probability	The____ of the probabilities of a set of outcomes must equal one.
6. Probability notation	In probability we use the notation _____ to represent the probability of something happening.
7. Probability of an event happening	$P(of\ an\ outcome\ happening) = \frac{number\ of\ the\ desired\ outcome}{total\ number\ of\ outcomes\ of\ the\ event}$
8. Mutually exclusive	Are events that cannot happen _____ .
9. Expected outcomes	You need to _____ the probability by the total number of _____ .
10. Frequency trees	Is used to _____and_____ information given as _____ . This can then be used to calculate_____ .
11. Sample space	Listing all of the possible _____ from _____ _____ in a table. E.g. Displaying all of the scores for the sum of two spinners. Spinner A (1,2,3,4) and Spinner B (2,3,4)
12. Relative frequency	Relative frequency is used when probability is being _____using the outcomes of an _____ or trial, when theoretical probability cannot be used. Relative frequency or experimental probability is calculated from _____ _____ $Relative\ Frequency = \frac{No.\ of\ Successful\ Outcomes}{No.\ of\ Trials}$

+		Spinner A			
		1	2	3	4
Spinner B	2	3	4	5	6
	3	4	5	6	7
	4	5	6	7	8

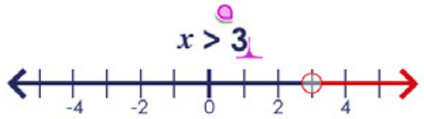
9.12 Probability 1

13. Venn Diagrams	A Venn diagram shows the relationship between groups of _____ _____ .
14. Element	A list of _____, _____ or _____ .
15. Universal set	Contains all of the _____ for our question.
16. Set Notation	**A** – all elements in A **A'** – all elements NOT in A **B** – all elements in B **B'** – all elements NOT in B
17. Intersection	____ – all the elements in both A and B 
18. Union	____ – all the elements in A or B or both 
19. Finding probabilities from a Venn diagram	Venn diagrams can be useful for organising information about frequencies and probabilities. We can then use them to solve conditional probability problems. E.g. The following Venn diagram shows information about the number of members of a local sport club who take part in the Archery and Badminton classes. A person is chosen at random. Find P(B only) $= \frac{18 + 23}{17 + 18 + 23 + 32} = \frac{41}{90}$ 

9.13 Solving Equations 2

1. Solve	Use _____ operations to find the solution of an_____ .
2. Linear equation	Contains an equals sign (=) and has one _____ . E.g. 5x – 2 = 2x + 7
3. Equation	An equation is a statement with an ____ ____, starting that two expressions are ____ in value.

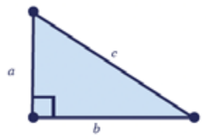
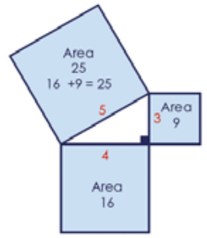
9.14 Inequalities 1

1. Representing an inequality on a number line–closed circle	A closed circle is used to show greater than or equal to (or less than or equal to) the number. 
2. Representing an inequality on a number line – open circle	An open circle is used to show greater than (or less than) the number. 
3. Reversing the Inequality	Multiplying or dividing both sides by a negative number reverses the inequality E.g. $-3x < 6$ $x > -2$

9.15 Sequences

1. Sequence	A pattern of numbers which fit a certain rule.
2. Term	A number in a sequence.
3. Term to term rule	The rule for how to get from one number to the next number in the sequence.
4. Position	Where a term is in a sequence.
5. Position to term rule	The rule for how to work out a number in a sequence if you know its position.
6. Nth term	Used to find a term in a sequence given its position e.g. 5n + 3
7. Linear sequence	The terms increase or decrease by the same amount each time. Also known as an arithmetic sequence. Nth term is written in the form, an + b.
8. Geometric sequence	A geometric sequence goes from one term to the next by always multiplying or dividing by the same value.
9. Fibonacci sequence	The Fibonacci sequence is unique because the next term is found by adding up the two previous terms. 1, 1, 2, 3, 5, 8, 13, 21…

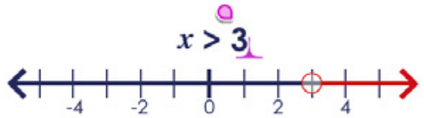
9.16 Pythagoras

1. Right-angled triangle	A triangle that contains a right-angle (90 degrees).
2. Hypotenuse	The longest side – opposite the right-angle.
3. 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.  $c^2 = a^2 + b^2$ $a^2 = c^2 - b^2$ $b^2 = c^2 - a^2$ 

9.17 Interior and Exterior Angles

1. Polygon	A polygon is a two-dimensional shape with 3 or more straight sides. A polygon is either regular or irregular: Regular – side lengths are equal, and all angles are equal. Irregular – side lengths are unequal, and angles are unequal.
2. 3 sides	Triangle
3. 4 sides	Quadrilateral
4. 5 sides	Pentagon
5. 6 sides	Hexagon
6. 7 sides	Heptagon
7. 8 sides	Octagon
8. 9 sides	Nonagon
9. 10 sides	Decagon
10. 11 sides	Hendecagon
11. 12 sides	Dodecagon
12. Exterior Angles	Exterior angles of polygons sum to 360°. An exterior angle of a regular polygon is found by calculating $\frac{360}{n}$ is the number of sides.
13. Interior Angles	In a regular polygon. Interior Angle + Exterior Angle = 180°
14. Tessellation	A pattern created with identical shapes that fit together with no gaps.

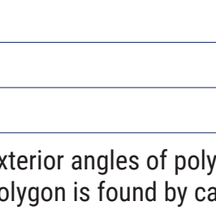
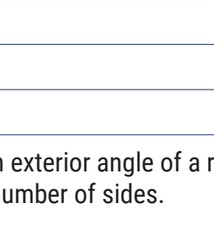
9.14 Inequalities 1

1. Representing an inequality on a number line–closed circle	A closed circle is used to show greater than or equal to (or less than or equal to) the number. 
2. Representing an inequality on a number line – open circle	An open circle is used to show greater than (or less than) the number. 
3. Reversing the Inequality	Multiplying or dividing both sides by a negative number reverses the inequality E.g. $-3x < 6$ $x > -2$

9.15 Sequences

1. Sequence	A _____ of numbers which fit a certain rule.
2. Term	A _____.
3. Term to term rule	The ____for how to get from one number to the ____ number in the sequence.
4. Position	Where a____is in a sequence.
5. Position to term rule	The rule for how to work out a number in a sequence if you know its _____.
6. Nth term	Used to find a term in a sequence given its position e.g. 5n + 3
7. Linear sequence	The terms _____ or_____ by the _____amount each time. Also known as an arithmetic sequence. Nth term is written in the form,_____ .
8. Geometric sequence	A geometric sequence goes from one term to the next by always _____ or _____by the same value.
9. Fibonacci sequence	The Fibonacci sequence is unique because the next term is found by _____ 1, 1, 2, 3, 5, 8, 13, 21…

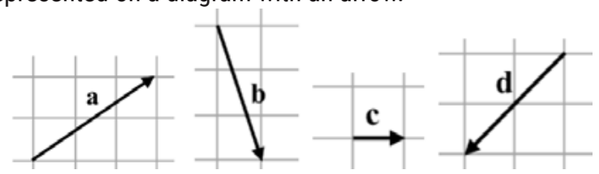
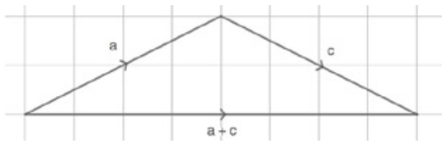
9.16 Pythagoras

1. Right-angled triangle	A triangle that contains a _____ (__degrees).
2. Hypotenuse	The _____ side – opposite the right-angle.
3. 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_____ together.  $c^2 = a^2 + b^2$ $a^2 = c^2 - b^2$ $b^2 = c^2 - a^2$ 

9.17 Interior and Exterior Angles

1. Polygon	A polygon is a two-dimensional shape with 3 or more straight sides. A polygon is either regular or irregular: Regular – side _____ are _____, and all_____ are_____ . Irregular – side _____ are _____, and_____ are_____.
2. 3 sides	
3. 4 sides	
4. 5 sides	
5. 6 sides	
6. 7 sides	
7. 8 sides	
8. 9 sides	
9. 10 sides	
10. 11 sides	
11. 12 sides	
12. Exterior Angles	Exterior angles of polygons sum to ____. An exterior angle of a regular polygon is found by calculating ____ is the number of sides. ____
13. Interior Angles	In a regular polygon. Interior Angle + Exterior Angle =____
14. Tessellation	A pattern created with _____shapes that fit together with _____ .

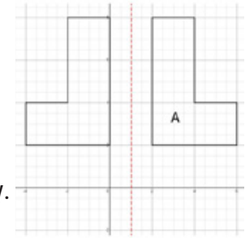
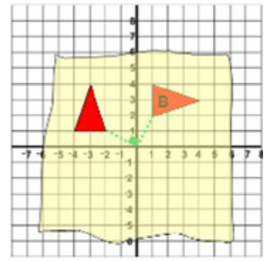
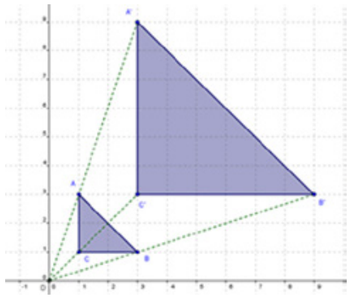
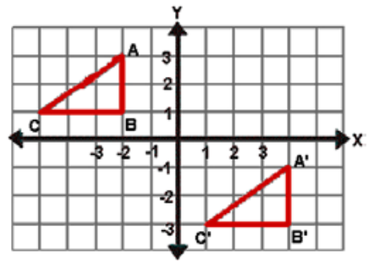
9.18 Vectors 1

1. Vector	Vectors represent movement of a certain size in a certain direction, they are represented on a diagram with an arrow. 
2. Magnitude	Magnitude is defined as the length of a vector.
3. Scalar	A scalar is the number we multiply a vector by.
4. Column vector	$\begin{pmatrix} a \\ b \end{pmatrix}$ a: movement along the x-axis (left/right) b: movement along the y-axis (up/down)
5. Adding and subtracting column vectors	$\begin{pmatrix} a \\ b \end{pmatrix} + \begin{pmatrix} c \\ d \end{pmatrix} = \begin{pmatrix} a+c \\ b+d \end{pmatrix}$
6. Multiplying vectors	To multiply a column vector by a number, we multiply both values in the vector by that number.
7. Resultant vectors	The resultant vector is the vector that results from adding two or more vectors together. 
8. Parallel vectors	Travel in the same or opposite direction. Can be of varying lengths. Must be scalar multiples of one another The vectors $\begin{pmatrix} 8 \\ 12 \end{pmatrix}$ and $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ are parallel because $\begin{pmatrix} 8 \\ 12 \end{pmatrix} = 4\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

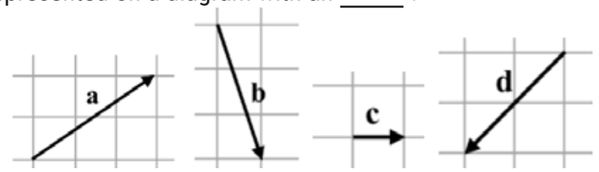
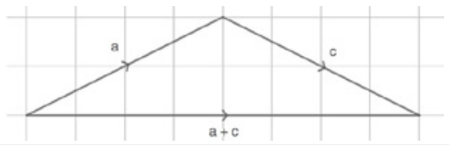
9.19 Transformations 1

1. Transformations	There are four types of transformations: Reflection Rotation Enlargement Translation
2. Object	This is the original shape used to perform the transformation on
3. Image	This is the new shape created as the result of the transformation.

9.19 Transformations 1

4. Congruent	Two (or more) shapes that are the same size and the same shape.
5. Reflection	A shape is reflected in a line of symmetry. When a shape is reflected the image is always congruent to the object. The line of symmetry used must be given or found using an equation. An object and its image are always the same perpendicular distance from the line of symmetry. E.g. Reflect shape A in the line x=1 
6. Rotation	When rotating a shape we must have 3 pieces of information. Centre of rotation given as a coordinate (x,y) Angle of rotation (usually 90°,180°,270°) Direction (clockwise or anticlockwise) 
7. Enlargement	When enlarging a shape we must have two pieces of information. Centre of enlargement given as a coordinate (x,y) Scale factor 
8. Translation	A translation is a movement of an object. When a shape in translated the image is congruent to the object. Translations are described using column vectors (a¦b) a: movement along the x-axis (left or right) b: movement along the y-axis (up or down) E.g. Translate the original triangle ABC by the vector (6¦(– 4)) 

9.18 Vectors 1

1. Vector	Vectors represent _____ of a certain size in a certain _____, they are represented on a diagram with an _____ . 
2. Magnitude	Magnitude is defined as the _____ of a vector.
3. Scalar	A scalar is the number we _____ a vector by.
4. Column vector	$\begin{pmatrix} a \\ b \end{pmatrix}$ a: movement along the _____ b: movement along the _____
5. Adding and subtracting column vectors	$\begin{pmatrix} a \end{pmatrix} + \begin{pmatrix} c \end{pmatrix} = \begin{pmatrix} a + c \end{pmatrix}$
6. Multiplying vectors	To multiply a column vector by a number, we multiply both values in the vector by that number.
7. Resultant vectors	The resultant vector is the vector that results from _____ _____ 
8. Parallel vectors	Travel in the _____ or _____ direction. Can be of _____ lengths. Must be _____ multiples of one another The vectors $\begin{pmatrix} 8 \\ 12 \end{pmatrix}$ and $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ are parallel because $\begin{pmatrix} 8 \\ 12 \end{pmatrix} = 4\begin{pmatrix} 2 \\ 3 \end{pmatrix}$

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2. Object	This is the _____ shape used to perform the transformation on
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9.19 Transformations 1

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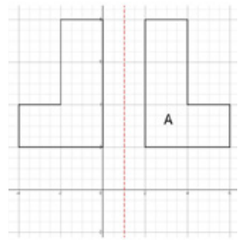
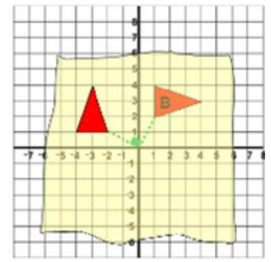
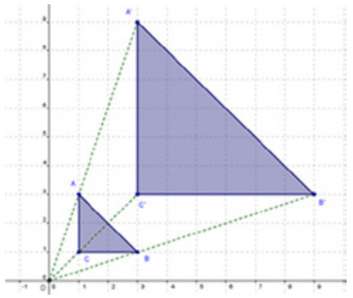
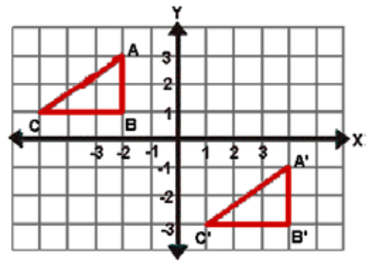
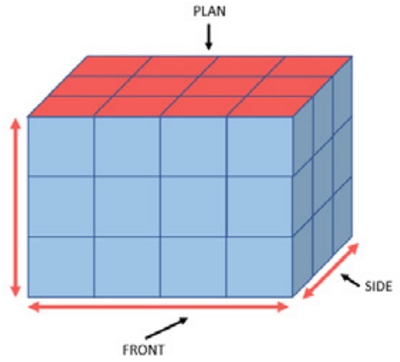
5. Reflection	A shape is reflected in a _____. When a shape is reflected the image is always _____ to the object. The line of symmetry used must be given or found using an _____. An object and its image are always the same _____ _____ from the line of symmetry. E.g. Reflect shape A in the line x=1 
6. Rotation	When rotating a shape we must have 3 pieces of information. 1. _____ 2. _____ 3. _____ 
7. Enlargement	When enlarging a shape we must have two pieces of information. 1. _____ 2. _____ 
8. Translation	A translation is a movement of an object. When a shape in translated the image is _____ to the object. Translations are described using _____ (a¦b) a: movement along the x-axis (left or right) b: movement along the y-axis (up or down) E.g. Translate the original triangle ABC by the vector (6¦(– 4)) 

9.20 Plans and Elevations

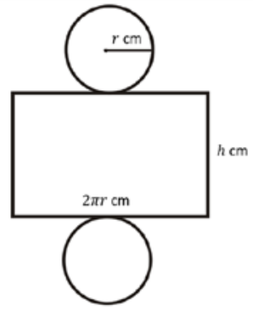
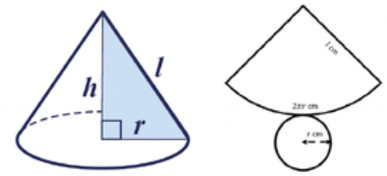
1. Plan	View looking vertically downwards
2. Side elevation	View looking horizontally from the side.
3. Front elevation	View looking horizontally from the front.



9.21 Arcs and Sectors

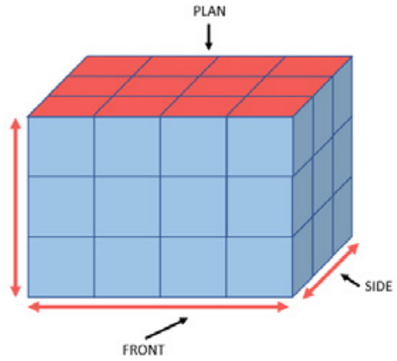
1. Circumference	The perimeter of the circle. $C = \pi d$
2. Perimeter of a semi-circle	$P = \frac{\pi d}{2} + d$
3. Perimeter of a quarter–circle	$P = \frac{\pi d}{4} + 2r$
4. Perimeter of a three-quarter circle	$P = \frac{3}{4}\pi d + 2r$
5. Area of a circle	$A = \pi r^2$
6. Area of a semi-circle	$A = \frac{\pi r^2}{2}$
7. Area of a quarter-circle	$A = \frac{\pi r^2}{4}$
8. Area of a three-quarter circle	$A = \frac{3\pi r^2}{4}$

9.20 Surface Area

1. Surface Area	The total area of the surface of a three-dimensional object. For example, the surface area of a cube is the area of all 6 faces added together. It is measured in square units. E.g. square centimetres (cm²), square metres (m²).
2. Cylinder	Surface Area = $2\pi r^2 + 2\pi rh$ 
3. Cone	Surface Area = $\pi r^2 + \pi rl$ 
4. Sphere	Surface Area = $4\pi r^2$
5. Hemi-sphere	Surface Area of a Hemi-sphere = $3\pi r^2$

9.20 Plans and Elevations

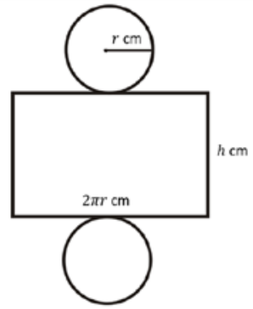
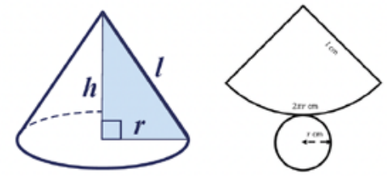
1. Plan	View looking _____
2. Side elevation	View looking _____
3. Front elevation	View looking _____



9.21 Arcs and Sectors

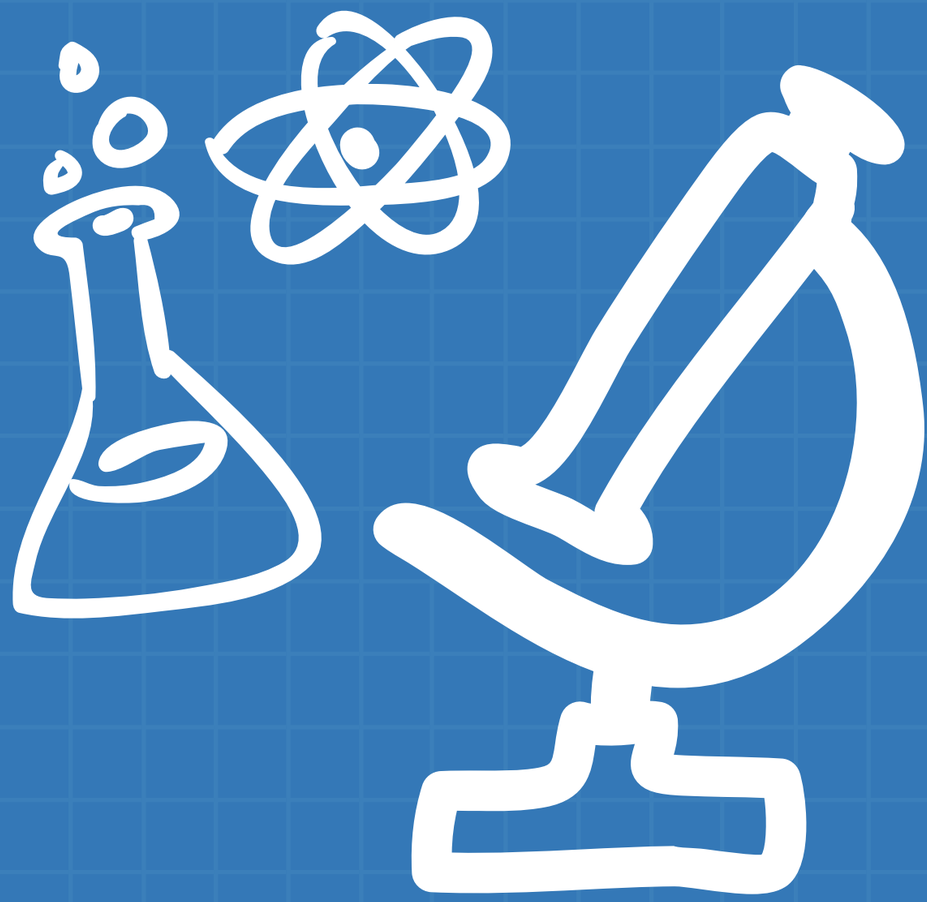
1. Circumference	The perimeter of the circle.
2. Perimeter of a semi-circle	
3. Perimeter of a quarter–circle	
4. Perimeter of a three-quarter circle	
5. Area of a circle	
6. Area of a semi-circle	
7. Area of a quarter-circle	
8. Area of a three-quarter circle	

9.20 Surface Area

1. Surface Area	The _____ area of the _____ of a three-dimensional object. For example, the surface area of a cube is the area of all 6 _____ added together. It is measured in _____ . E.g. square centimetres (cm²), square metres (m²).
2. Cylinder	Surface Area = _____ 
3. Cone	Surface Area = _____ 
4. Sphere	Surface Area = _____
5. Hemi-sphere	Surface Area of a Hemi-sphere = _____

YEAR 9

Science



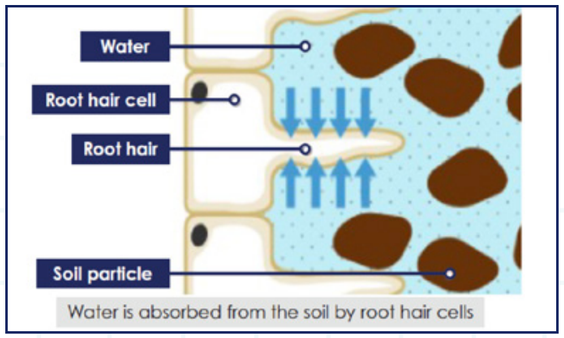
1. Photosynthesis

Plants make their own food (for energy) in a process called **photosynthesis**.
- Photosynthesis helps keep:
  - Levels of oxygen high;
  - Levels of carbon dioxide low.
- Photosynthesis takes place in the chloroplasts.
- Chloroplasts contain chlorophyll which absorbs the energy transferred by light waves for photosynthesis.

The equation for photosynthesis is: Carbon dioxide + water-+ glucose + oxygen

These are the things that plants need for photosynthesis:
- **Carbon dioxide** - absorbed through their leaves;
- **Water** - from the ground through their roots;
- **Light** (a source of energy) - from the Sun.

These are the things that plants make by photosynthesis:
- **Oxygen** - released into the air from the leaves;
- **Glucose:**
  - Turned into starch and plant oils, used as an energy store;
  - This energy is released by respiration;



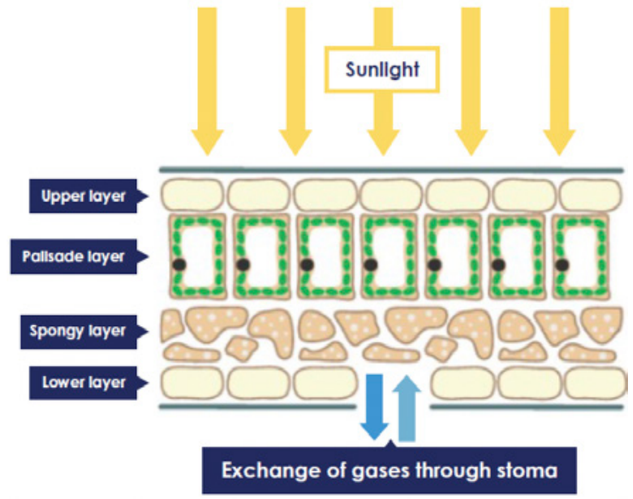
Water is absorbed from the soil by root hair cells

Water is absorbed into the roots by a process called osmosis, which does not use energy.
Minerals are absorbed into the roots by a process called **active transport**, which uses energy.

2. Leaves

Feature Of Plant Leaf	Function
Thin	Short distance for carbon dioxide to diffuse into the leaf
Waxy Layer	Prevents water loss by evaporation
Palisade Cells	Contain a lot of chloroplasts to absorb light
Chloroplasts Contain Chlorophyll	Absorbs light
Stomata	Allows carbon dioxide to diffuse into the leaf (and oxygen to diffuse out)
Guard Cells	Open/close stomata depending on conditions
Network Of Tubes (Xylem & Phloem)	Transports water (xylem) and food (phloem)

3. Cross-Section Of A Leaf



4. Water

- Water is absorbed through the roots, by osmosis;
- It is transported through tubes (xylem) to the leaf;
- The roots contain cells called root hair cells:
  - They increase the surface area.
  - They have thin walls to let water pass into them easily.
  - They do not contain chloroplasts.

5. Carbon Dioxide

- Enters leaf by diffusion through the stomata.
- Guard cells control the size of the stomata.
- Stomata closes in hot, windy or dry conditions.
- Spongy layer has gaps between cells:
  - Allows carbon dioxide to diffuse to other cells in the leaf;
  - Allows oxygen produced in photosynthesis diffuse out of the leaf.

6. Respiration v Photosynthesis

Photosynthesis:
Carbon dioxide + water ⟶ glucose + oxygen
Aerobic respiration is:
Glucose + oxygen ⟶ carbon dioxide + water

The equation for photosynthesis is the **opposite** of the equation for aerobic respiration.
- **Photosynthesis:**
  - **Produces** glucose and oxygen;
  - **Uses** carbon dioxide and water.
- **Respiration:**
  - **Produces** carbon dioxide and water;
  - **Uses** glucose and oxygen.

7. Food Security And Pollination

Pollination is the transfer of pollen from one plant to another;
- Pollen can be transferred by insects or by wind;
- Insects that pollinate plants help us produce our food;
- Our food supply depends on plants:
  - Our food made of, and from plants;
  - The animals we eat feed on plants.

Questions

1. What process allows plants to make their own food?

2. Where does photosynthesis take place in a plant cell?

3. What is the equation for photosynthesis?

4. Which pigment is found in chloroplasts and helps absorb light?

5. How does water enter a plant from the soil?

Questions

6. What do guard cells control in the leaf?

7. Why do stomata close in hot, windy or dry conditions?

8. What is the main function of the xylem in a plant?

9. What are the products of photosynthesis?

10. How does carbon dioxide enter a leaf?

1. Change Of State

Substances can change state, usually when they are heated or cooled;
• State changes are reversible - e.g. ice can be melted and then frozen again;
• No new elements or compounds are formed.

The closeness, arrangement and motion of the particles in a substance change when it changes state:

	Solid	**Liquid**	**Gas**
Closeness	All touching	Mostly touching	Far apart
Arrangement	Ordered	Random	Random
Motion	Vibrate, fixed position	Move freely	Move freely freely (faster than liquids)
Density	Decreasing density ---------->		
Internal Energy	Increasing internal energy ---------->		

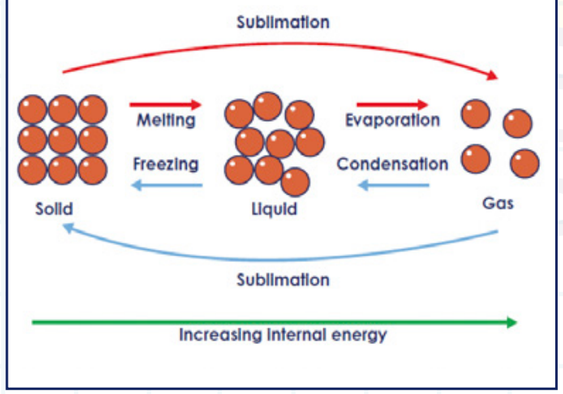
2. Pressure In Fluids

A **fluid** is a liquid or gas;
• All fluids can change shape and flow from place to place;
• Fluids exert pressure at 90° to surfaces - we say that it acts normal to the surface.

3. Atmospheric Pressure

The atmosphere exerts a pressure on you, and everything around you.
Atmospheric pressure changes with altitude.
The higher you go:
• The lower the weight of the air above you;
• The lower the atmospheric pressure.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

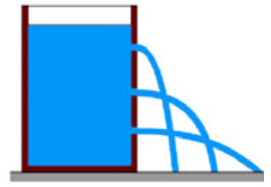


4. Brownian Motion

• Gas particles move very quickly;
• Air particles move at SOO m/s on average at room temperature;
• Particles collide with each other very frequently;
• They change direction randomly when they collide;
• Their random motion because of collisions is called Brownian motion.

5. Pressure In Liquids

Just like the atmosphere, liquids exert pressure on objects.
The pressure in liquids changes with depth. The deeper you go:
The greater the weight of liquid above;
The greater the liquid pressure;
Pressure in a liquid increases with depth;
Jet from the bottom of the bucket travels further.



6. Diffusion

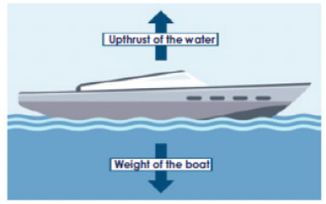
Diffusion is the movement of particles from an area of high concentration to an area of low concentration;
• Diffusion does not happen in solids - only fluids (liquids and gases};
• Particles in a solid can only vibrate and cannot move from place to place;
• Diffusion is driven by differences in concentration;
• No diffusion will take place if there is no difference in concentration from one place to another;
• Diffusion in liquids is slower than diffusion in gases because the particles in a liquid move more slowly.

Explaining diffusion in a smelly gas
• When a perfume is released into in a room, the perfume particles mix with the particles of air;
• The particles of perfume are free to move quickly in all directions;
• They eventually spread through the whole room from an area of high concentration to an area of low concentration;
• This continues until the concentration of the perfume is the same throughout the room;
• The particles will still move, even when the perfume is evenly spread out.

Diffusion and temperature
Diffusion is faster if the fluid (gas or liquid) is hotter.

7. Floating And Sinking

Liquid pressure is exerted on surfaces of objects in liquids;
• This causes upthrust;
• When an object sinks, the pressure increases and so the upthrust increases
• It will continue to sink if weight is greater than maximum upthrust;
When and object floats, the upthrust is equal and opposite to the object's weight.



Questions

1. What is the formula for calculating density?

2. What is sublimation?

3. How does atmospheric pressure change with altitude?

4. What are fluids?

5. In what direction does fluid pressure act?

Questions

6. What is Brownian motion?

7. Where does diffusion occur?

8. What drives diffusion?

9. Why is diffusion slower in liquids than in gases?

10. What happens to internal energy when a substance changes state?

1. Hooke's Law

Hooke's Law says that the extension of an elastic object is directly proportional to the force applied.
In other words:
• The extension doubles, if the force is doubled;
• There is no extension, if no force is applied.

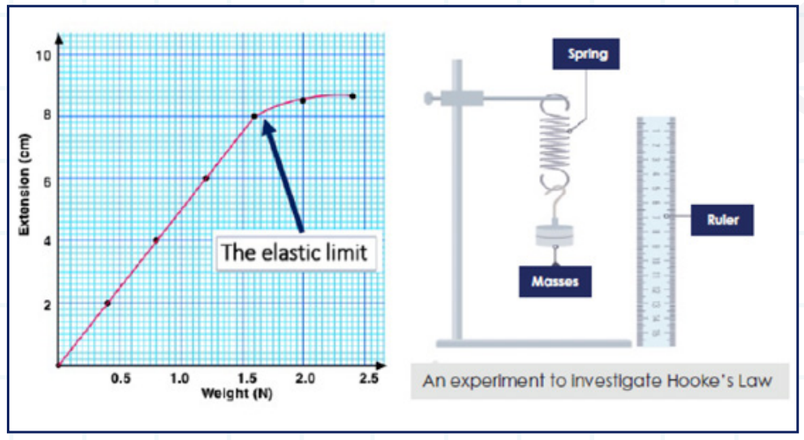
You can investigate Hooke's Law using a spring:
• Hang the spring from a stand and clamp;
• Measure its length with a ruler;
• Hang a mass from the spring and measure the new length of the spring;
• Work out: **extension = new length - original length;**
• Keep adding more masses, measuring the new length each time;
• Work out extension for each mass.

You can then plot a force-extension graph:
• Plot force on the vertical (y} axis;
• Plot extension on the horizontal (x} axis.

Force Applied (N) = Spring Constant (N/m) x Extension (m)

Using Hooke's Law

In a force-extension graph:
• The steeper the line, the stiffer the spring;
• The area under the line is the work done (energy needed) to stretch the spring.



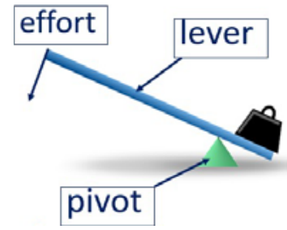
An experiment to investigate Hooke's Law

2. Moments

• A moment is a turning effect of a force.
• Forces can make objects turn if there is a pivot.
• When the turning forces are balanced - the moments are equal and opposite.

Calculating moments
To calculate a moment, you need to know:
• The distance of the force from the pivot;
• The size of the force.

Moment	=	Force	x	Perpendicular Distance
(Nm)		(N)		(m)
(Ncm)				(cm)

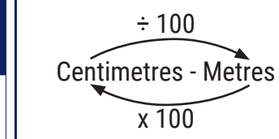


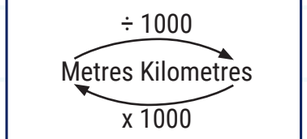
Force multipliers
Increasing the distance will increase the moment for the same force;
• This is why a longer spanner will loosen a tight nut;
• And a crowbar or long lever can be used to lift heavy objects.

3. Simple Machines

Example of simple machines are **see-saws, wheelbarrows** and forceps. **Simple machines give a bigger force but with a smaller movement.**
See-saw
A force is exerted in one place, causing movement and a force at another place in the see-saw. A see-saw will balance when:
Clockwise Moment= Anticlockwise Moment
Force (N) x Distance (cm) = Force (N) x Distance (cm)
Wheelbarrows
Wheelbarrows are a simple machine with the load near the pivot (the wheel} and the effort on the handles far from the pivot.
Forceps
With forceps, fingers provide the effort force, and this is nearer to the pivot than the load (the object you are picking up):

Some machines give a smaller force but with a bigger movement.
This is the opposite to the see-saw and wheelbarrow, but again if you multiply the force by the distance travelled, you get the same value for the effort and for the load.





Work Done (J) = Force (N) x Distance (m)

4. Deformation

Elastic materials:
• **Change** shape when a force is exerted on them;
• **Return** to their original shape/size when the force is removed.
Deformation is a change in shape. There are two types of deformation:
• **Stretching** is when the object/material is pulled;
• **Compression** is when the object/material is squashed.

The greater the force exerted, the greater the amount of deformation. If the force is large enough, the object/material may no longer return to its original size. Until you reach this point, a special case called **Hooke's Law applies.**

Questions

1. What causes upthrust in liquids?

2. What happens to liquid pressure as depth increases?

3. What is a moment in physics?

4. What is the formula for moment?

5. What happens when clockwise and anticlockwise moments are equal?

Questions

6. How do you increase a moment without increasing the force?

7. What law explains how springs extend under force?

8. What is the relationship between force and extension in Hooke's Law?

9. How do you measure extension in a spring?

10. What graph is used to show Hooke's Law?

1. Word Equations To Symbol Equations

- Replace names of each substance symbols or formula;
- Use numbers to balance the equation;

Example: copper + oxygen ⟶ copper oxide

2Cu + 0_2 -+ 2Cu0

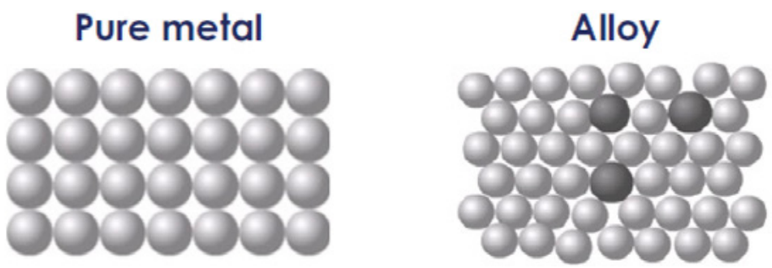
Two copper atoms (2Cu) react with one oxygen molecule (0_2) to produce two units of copper oxide (2Cu0).

2. Typical Properties Of Metals

Appearance	Shiny
State At Room Temperature liquid)	Solid (except mercury, a liquid)
Density	High
Strength	Strong
Malleable Or Brittle	Malleable
Conduct Heat?	Good
Conduct Electricity?	Good
Magnetic Material	Only iron, cobalt & nickel
Sound When Hit	Make a ringing sound (sonorous)

3. Pure Metals V Alloy

The rows of atoms in a pure metal can slide over each other easily.
In an alloy, the different sized atoms disrupt the layers so the atoms can't slide.
This makes alloys more useful than pure metals.



4. Bases V Alkalis

A **base** is a substance that can react with acids and **neutralise** them. Many bases are insoluble in water. If a base does dissolve in water it is called an **alkali**.

Bases are usually:
- **Metal oxides**, such as copper oxide
- **Metal hydroxides**, such as sodium hydroxide, or
  Metal carbonates, such as calcium carbonate

General word equations for neutralisation reactions:

Metal oxide + acid ⟶ salt + water
Metal hydroxide + acid ⟶ salt + water
Metal carbonate + acid ⟶ salt + carbon dioxide + water

The lab test for carbon dioxide
Bubble the gas through lime water and watch for it to turn from colourless to a cloudy milky colour.

5. Acids And Metals

Acids react with most metals to produce a salt and hydrogen. This is the general word equation:

metal + acid ⟶ salt + hydrogen

The lab test for hydrogen
Place **lighted splint** in the test tube and listen for the gas to burn with a squeaky pop.

6. Naming Salts

Hydrochloric acid ⟶ metal **chlorides**
Sulfuric acid ⟶ metal **sulfates**
Nitric acid ⟶ metal **nitrates**

7. Calculating Relative Formula M

Formula mass is calculated by adding together the mass number of each atom in a compound's chemical formula.

E.g. $MgCl_2$ Ar Mg= 24 Ar Cl= 35.5

Formula mass = 24 + (2 X 35.5) = 95

There are 2 chlorines in the chemical formula

Questions

1. What is a symbol equation?

2. What makes alloys stronger than pure metals?

3. What is a base?

4. What is an alkali?

5. What is the general reaction between metal and acid?

Questions

6. How is hydrogen tested for in the lab?

7. What is the lab test for carbon dioxide?

8. What do metal oxides react with acids to form?

9. What is formula mass?

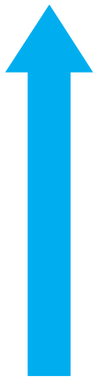
10. What does hydrochloric acid produce in a salt?

8. Reactivity Series

The reactivity series is a list of elements in order of their reactivity:

Potassium
Sodium
Calcium
Magnesium
Aluminium
Carbon
Zinc
Iron
Tin
Lead
Hydrogen
Copper
Silver
Gold
Platinum

Most reactive



Least reactive

If a metal loses its outer electrons more easily, it will be more reactive.

9. Extracting Copper From Copper Oxide

Copper is so unreactive, it does not react with cold or hot water, so it is used for water pipes.
To extract copper:
- Mix **copper oxide** powder with **carbon powder**;
- Heat the mixture strongly in a **crucible**;
- Keep the lid on the crucible, to stop carbon reacting with oxygen in the air;
- The **carbon dioxide** formed in the reaction escapes into the air;
- Let the crucible cool down, you tip the mixture into cold water;
- Brown copper sinks to the bottom, leaving unreacted powder suspended in the water.

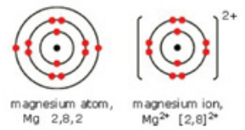
These equations represent the reaction:

Copper oxide + carbon ⟶ copper + carbon dioxide

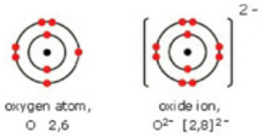
$2CuO + C \longrightarrow 2Cu + Co_2$

10. Why Do Metals React?

Metals react because they want to gain a full outer shell and become stable.
They do this by **losing their outer electron(s)** to become **positively charged ions.**
For example: Magnesium loses its 2 outer electrons to become a +2 ion



Why do non-metals react?
Non-metals react because they want to gain a full outer shell and become stable. They do this by gaining electrons into their outer shell to become negatively charged ion. For example: Oxygen gains 2 electrons into its outer shell to become a -2 ion



11. Displacement Reactions

This is when a more reactive metal displaces a less reactive metal from its compound. For example:

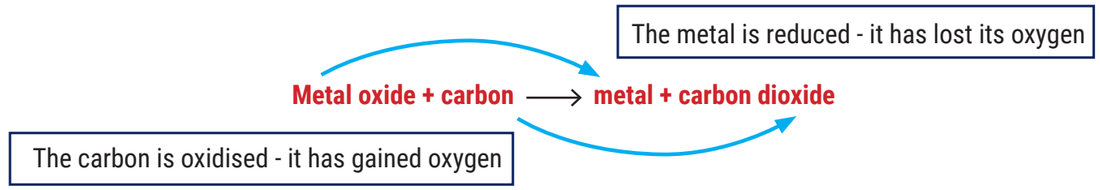
Magnesium + copper sulfate ⟶ magnesium sulfate + copper

If the more reactive metal is already in the metal compound, nothing happens. For example:

Magnesium sulfate + copper ⟶ no reaction

12. Carbon And Metal Extraction

Some metals can be extracted from their metal oxides using carbon if the metal is less reactive than carbon.



This works for zinc, iron, tin, lead and copper because they are all less reactive than carbon.

Questions

1. What is the general rule for extracting metals using carbon?

2. What is the word equation for metal extraction with carbon?

3. Name one metal that can be extracted using carbon.

4. Why is copper used in water pipes?

5. What happens in a displacement reaction?

Questions

6. What does reactivity determine in metal reactions?

7. What is the most reactive metal listed?

8. Which metal does not react with acid or water?

9. Why is gold found naturally in its pure form?

10. What is the main factor determining a metal's use in real life?

1. Rate Of Reaction

Reacting particles must **collide** with a minimum amount of energy (activation energy) for a chemical reaction to happen.

How quickly a reaction happens is called the **rate of reaction**, and always involves a **time measurement**.
We can **increase reaction rate** by:
1. **Increasing the concentration of liquid reactants** as it **increases the frequency of collisions**;
2. I**ncreasing the surface area of solid reactants** as it **increases the frequency of collisions**;
3. Using a **catalyst** as it **decreases the energy that particles need to collide with for a successful reaction.**

2. Some Ways To Measure The Rate Of A Reaction

- Time taken for a reactant to disappear;
- Time taken for the reaction mixture to change colour;
- Measure the number of bubbles produced in a certain time;
- Measure the volume of gas produced in a certain time;
- Measure the change in mass in a certain time.

3. Exothermic And Endothermic Reactions

- Exothermic reaction - releases energy to the surroundings;
- Causes a rise in temperature (positive temperature change);
- Endothermic reaction - take in energy from the surroundings;
- Causes a drop in temperature (negative temperature change).

4. Catalysts

- Speed up reactions;
- Are not used up during reactions;
- Are chemically unchanged after the reaction completes;
- Work by reducing the energy needed to start a reaction **(activation energy)**.

In industry, using catalysts often results in **lower** temperature being used in industry, **saving money** and **cutting** the **use of fossil fuels** and their subsequent **emissions**.

Car exhausts have **catalytic converters**.
- They reduce amount of toxic gases released;
- They contain platinum and rhodium as catalysts.

5. Oxidation

In oxidation reactions, a substance gains oxygen.
Metals and non-metals can take part in oxidation reactions (be oxidised).
Examples:
- Magnesium reacts with oxygen to produce magnesium oxide:

Magnesium+ oxygen $\longrightarrow$ **magnesium oxide**

$2Mg + 0_2 \longrightarrow 2Mg0$

- Carbon reacts with oxygen to form carbon dioxide:

Carbon + oxygen $\longrightarrow$ **carbon dioxide**

$c + 0_2 \longrightarrow co_2$

Questions

1. What is the range of human hearing?

2. What is ultrasound?

3. Can humans hear ultrasound?

4. Which animals can hear ultrasound?

5. What are common uses of ultrasound?

Questions

6. What does amplitude represent in a wave?

7. What is frequency measured in?

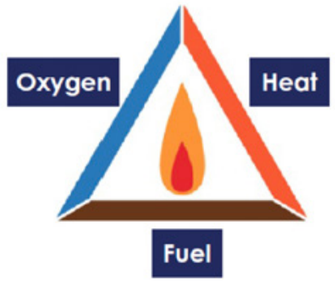
8. What determines the pitch of a sound?

9. What does wavelength measure?

10. What happens to waves in constructive interference?

7. Combustion

- **Combustion** is another name for burning fuels.
- It is an **exothermic** reaction.
- It is an example of an **oxidation** reaction.



8. Complete Combustion

- **Fuels** contain **hydrocarbons** which react with oxygen when they **burn**;
- With enough oxygen, **complete combustion** happens:
  - The hydrogen atoms combine with oxygen to make water vapour, H_2o
  - The carbon atoms combine with oxygen to make carbon dioxide, Co_2
  - The **maximum amount of energy** is released.

The equations for the complete combustion of methane.

Methane + oxygen ⟶ water+ carbon dioxide

$CH_4 + 2O_2 \longrightarrow 2H_2 + CO_2$

9. Incomplete Combustion

- Happens when there is **not enough oxygen**;
- Water vapour and carbon dioxide are still produced;
- Two other products are also produced:
  - **Carbon monoxide**, CO; colourless toxic gas.
  - Particles of **carbon** (soot/smoke); causes breathing problems.
- The **maximum amount of energy** is **NOT released**.

10. Thermal Decomposition

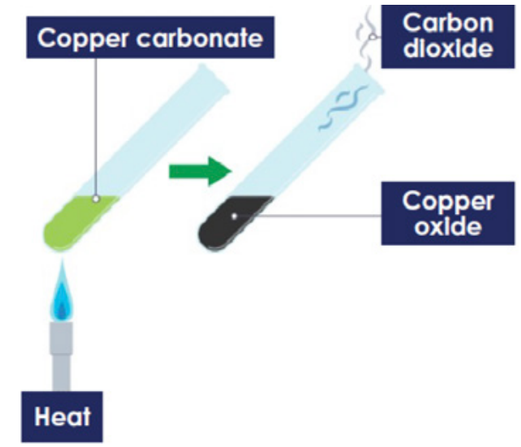
This is the breaking down of a substance using heat, to form two or more products.

Many metal carbonates take part in thermal decomposition reactions.

For example, copper carbonate:
copper carbonate is green; copper oxide is black.
Copper carbonate ⟶ copper oxide + carbon dioxide
$CuCO_3 \longrightarrow CuO + CO_2$

Other metal carbonates decompose in the same way.
When they do, they follow this equation:
metal carbonate ⟶ metal oxide + carbon dioxide

For example, calcium carbonate:
calcium carbonate-+ calcium oxide + carbon dioxide
$CaCO_3$-+ CaO + CO_2
Thermal decomposition is an example of an **endothermic** reaction. Energy must be supplied **constantly** for the reaction to keep going.



11. Conservation Of Mass

Atoms are not destroyed nor created during chemical reactions, so in any reaction:

Total mass of reactants = total mass of products

11 . Role Of Bacteria

Bacteria in the digestive system are important because they:
- Can digest certain substances humans cannot digest;
- Reduce chance of harmful bacteria multiplying, causing disease;
- Produce vitamins that humans need e.g. vitamins B & K.

Questions

1. What is combustion?

2. What type of reaction is combustion?

3. What are the products of complete combustion of hydrocarbons?

4. What are the products of incomplete combustion?

5. What toxic gas is produced during incomplete combustion?

Questions

6. What happens in thermal decomposition?

7. What is the word equation for thermal decomposition of copper carbonate?

8. What colour change happens during decomposition of copper carbonate?

9. What is the law of conservation of mass?

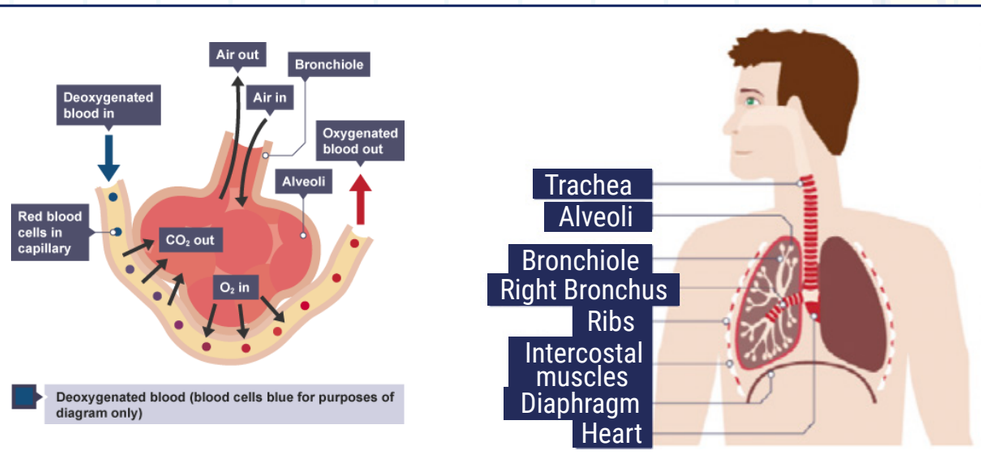
10. What is the equation for complete combustion of methane?

1. The Human Gas Exchange System

• Oxygen is needed for respiration;
• Carbon dioxide produced in respiration needs to be removed;

Gas exchange is moving oxygen from the air into the blood, and removing waste carbon dioxide from the blood into the air.

The respiratory system contains the organs that allow us to get the oxygen we need and to remove the waste carbon dioxide we do not need:
• Air passes from the mouth into the **trachea** (windpipe);
• The trachea divides into two **bronchi** - one for each lung;
• Each bronchus divides into smaller tubes called **bronchioles**;
• At the end of each bronchiole, there are air sacs (**alveoli**);
• The alveoli increase the **surface** of the lungs.



2. Aerobic Respiration

Energy is needed for:
• Growth and repair;
• Movement;
• Control of body temperature in mammals/birds.

The equation for aerobic respiration is:

glucose + oxygen ⟶ carbon dioxide + water

• Glucose and oxygen react to produce carbon dioxide and water and release energy;
• It is **aerobic** respiration because oxygen is used;
• Respiration happens in all living cells, including plant and animal cells;
• Takes place in the **mitochondria** of the cell;
• Energy is released from glucose;
• **Do not** confuse respiration with breathing (which is called **ventilation**).

3. Ventilation

• Ventilation is another word for breathing;
• It involves movements of the **ribs, Intercostal muscles** and **diaphragm** to move air in and out of the lungs
• **Inhale** - breathing in; **exhale** - breathing out .

	Inhaling	**Exhaling**
Diaphragm	Contracts and moves downwards	Relaxes and moves upwards
Intercostal Muscles	Contract, moving the ribs upwards and outwards	Relax, letting the ribs move downwards and inwards
Volume Of Ribcage	Increases	Decreases
Pressure Inside The Chest	Decreases below atmospheric pressure	Increases above atmospheric pressure
Movement Of Air	Moves into the lungs	Moves out of the lungs

4. Features Of The Alveoli

• Increase surface area of lungs;
• Moist, thin walls (just one cell thick);
• A lot of tiny blood vessels called capillaries.
The gases move by diffusion (from a high concentration to a low concentration):
• Oxygen diffuses from the air into the blood;
• Carbon dioxide diffuses from the blood into the air.

5. Anaerobic Respiration

In humans: The equation for anaerobic respiration in humans is:

glucose ⟶ lactic acid

• Lactic acid builds up in the muscles;
• Causing pain and tiredness (fatigue);
• Can lead to cramp;
• Lactic acid is broken down when you start aerobic respiration again.

6. Fermentation

The equation for anaerobic respiration in yeast is:

Glucose ⟶ ethanol + carbon dioxide

- Anaerobic respiration happens in microbes (e.g. bacteria);
- They need to release energy from glucose;
- Yeast (unicellular fungi) can carry out an anaerobic process called **fermentation**;
- Ethanol (alcohol) is produced;
- The ethanol is used to make beer and wine;
- The carbon dioxide helps bread rise.

7. Comparing Aerobic & Anaerobic

	Aerobic	**Anaerobic**
Needs Oxygen?	Yes	No
Needs Glucose?	Yes	Yes
Product(s) Formed	Increases	Decreases
Energy Released	Carbon dioxide and water	Lactic acid

8. Impact Of Exercise

Exercise causes an increase in:
- Breathing rate;
- Tidal volume (volume of air breathed in/out in one breath);

Regular exercise can increase the:
- Strength of the **diaphragm** and **Intercostal muscles**;
- Vital capacity (volume of air that can be forcibly exhaled after inhaling fully).

Questions

1. What is the main function of the alveoli?

2. What process moves gases in and out of the alveoli?

3. What is the equation for aerobic respiration?

4. Where does aerobic respiration take place in cells?

5. What is the purpose of ventilation?

6. What happens to the diaphragm during inhalation?

7. What happens to the pressure inside the chest during exhalation?

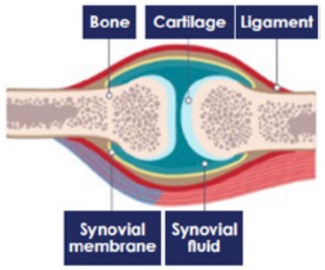
8. What gas do cells use to release energy?

9. What is the equation for anaerobic respiration in humans?

10. Why do muscles ache after anaerobic respiration?

1. Joints

• Most joints allow parts of the skeleton to move:
• The human skeleton has joints called synovial joints



The synovial joint
• The ends of the bones in a joint are covered with a tough, smooth substance called **cartilage**:
• This is kept slippery by a liquid called **synovial fluid;**
• Tough **ligaments** join the two bones in the joint:
• If two bones moved against each other, without cartilage they would eventually wear away;
• This is called **arthritis**

Type or Joint	Examples	Movement allowed
Hinge Joint	Knee, elbow	The same as opening and closing a door, with no rotation (turning)
Ball and socket	Hip, shoulder	Back and forth in all directions, and rotation

2. The Skeleton

• Bone is a living **tissue** with a blood supply;
• It is constantly being dissolved and formed;
• It can repair itself if a bone is broken;
• Calcium and other minerals make bone strong but slightly flexible.

Four functions of the skeleton:
1) Support the body
• The skeleton supports the body. For example, without a backbone we would not be able to stay upright.
2) Protection of vital organs
• The skull protects the brain;
• The ribcage protects the heart and lungs;
• The backbone protects the spinal cord.
3) Movement
• Bones are linked together by joints;
• Some are fixed joints - e.g. in the skull;
• Some are flexible joints - e.g. the knee;
• Muscles move bones attached by joints.
4) Making blood cells
Two main types of blood cell:
• Red blood cells, which carry oxygen;
• White blood cells, which destroy harmful microbes (pathogens);
• Both are made in the bone marrow - soft tissue inside large bones protected by the hard part of the bone around it.

3. Muscles And Movement

• Muscles work by getting shorter - they contract;
• Muscles are attached to bones by strong tendons;
• During muscle contraction, it pulls on the bone, moving it.

Antagonistic muscles
• Muscles can only pull, they cannot push;
• Muscles work in pairs, called antagonistic muscles.
Your elbow joint has two muscles that move your forearm up or down. These are the biceps and the triceps:
• To raise the forearm, the **biceps** contracts and the **triceps** relaxes;
• To lower the forearm again, the triceps contracts and the biceps relaxes.
• Muscles exert a force on bones when they contract;
• You could work out the force exerted by the biceps muscle using the idea of moments;
• The way in which muscles and bones work together to exert forces is called biomechanics.

4. Drugs

Drugs are a substance that has an effect on the body.
They can be:
• **Medicines** are drugs that treat pain or disease;
• **Recreational drugs** are taken because people like the effects they have on their bodies:
• Some recreational drugs are legal, eg **caffeine, tobacco & alcohol**;
• Most recreational drugs are illegal, eg **cannabis, ecstasy and heroin**;
• Recreational drugs can be classified as a **depressant** or a **stimulant**;
• Most recreational drugs can be **addictive**.

5. Asthma

• Asthma affects the bronchioles;
• Airways can become inflamed, swollen and constricted (narrowed);
• Excess mucus is produced.

During an asthma attack:
• The lining of airways becomes **inflamed**;
• Fluid builds up in the airways;
• Muscles around bronchioles contract, which constricts airways.

Symptoms are:
• **Wheezing, tight chest and difficulty breathing**.

6. Smoking And Pregnancy

Smoking can damage the foetus during gestation. For example, it can:
- Increase the risk of complications in pregnancy and birth;
- Make it less likely to have a healthier pregnancy and a healthier baby;
- Increase the risk of stillbirth;
- Make it more likely to be born too early;
- Be more likely to be born underweight.

7. Smoking

Smoking is very harmful to health. Smoke contains harmful substances.

Tar
- Causes cancer of the lungs, mouth and throat;
- Coats the inside of the lungs causing coughing;
- Damages the alveoli, making gas exchange difficult.

Smoke
- Cells in the trachea, bronchi and bronchioles produce mucus;
- Mucus traps dirt and microbes;
- Cells with cilia move the mucus out of the lungs;
- Smoke and tar damages the cilia;
- Smokers cough to move the mucus and are more likely to get bronchitis.

Nicotine
- Nicotine is addictive;
- Nicotine increases heart rate and blood pressure, and makes blood vessels narrower;
- This can lead to heart disease.

Carbon monoxide
- Carbon monoxide takes the place of oxygen in red blood cells;
- This reduces amount of oxygen that the blood can carry;
- It means the circulatory system has to work harder, causing heart disease.

Questions

1. What type of joint allows movement like a door hinge?

2. What fluid lubricates synovial joints?

3. What attaches bones to muscles?

4. What attaches bones to bones?

5. What are antagonistic muscles?

6. Which muscle contracts to bend the elbow?

7. Which muscle contracts to straighten the arm?

8. What is the role of cartilage in joints?

9. What type of joint is the shoulder?

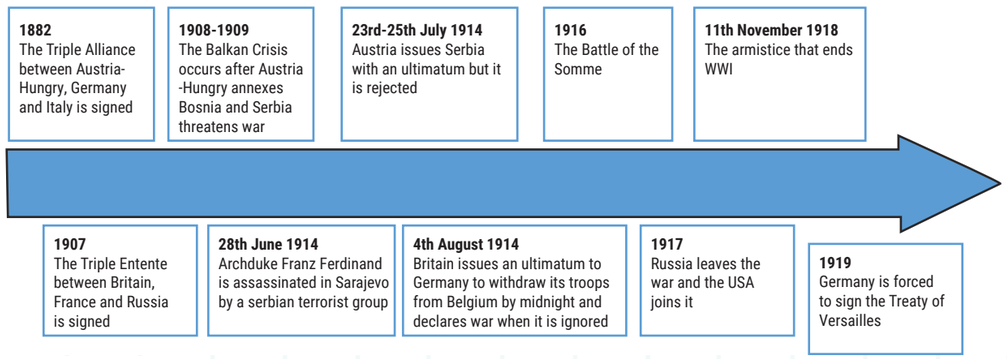
10. What part of the skeleton makes red and white blood cells?

YEAR 9
History

THE FIRST WORLD WAR
SUFFRAGE
THE HOLOCAUST
UK AND USA CIVIL RIGHTS

Keywords

Alliance An agreement between countries that benefits each of them.	**Imperialism** Extending a nation's power and influence by colonizing other countries.
Annex To seize an area of land, normally by force, and make it part of your country.	**Militarism** A belief that it is necessary to have strong armed forces and that this force should be used as a solution to any threat.
Armistice A ceasefire between the Allies and the Germans. It signaled the end of war.	**Nationalism** An intense form of patriotism where the value and importance of your country is exaggerated.
Arms Race A competition between countries over the development and production of weapons.	**Naval blockade** Allied efforts to restrict the supply of essential goods back to Germany, resulting in a starving German population.
Artillery Heavy guns and mechanized cannons firing shells.	**Reparations** Financial compensation for war damage paid by a defeated state.
Balance of Power A belief in that the size and power of the alliances of the Great Powers would prevent either side starting a war.	**Schlieffen Plan** The German war plan to invade France quickly and encircle Paris.
Brinkmanship To pursue a dangerous policy to the limits of safety especially in politics.	**Stalemate** A situation where neither side fighting in a war can make progress .
Conscription Forcing ordinary citizens to fight as soldiers in a war.	**Trench system** Connection of long narrow ditches for soldiers to take shelter from enemy fire and a supply of ammunition and medical support.
Encirclement When something is surrounded, such as Germany by the Triple Entente.	**Treaty** A formal agreement between states. E.g. The Treaty of Versailles,
Gas A poisonous agent used in warfare. It was used for one of the first times in WWI and had a damaging psychological impact, leading to shellshock.	**Trigger** An event or action which has immediate significant consequences, e.g. the assassination at Sarajevo.
Great Powers Countries that have international influence and military strength.	**Ultimatum** A final demand, the rejection of which will result in a breakdown of relations. E.g. What Austria-Hungary presented to Serbia in July 1914.



Long term causes: Who were the Great Powers in 1900 and what were their concerns?

The European 'Great Powers' at the turn of the 20th century were held in a delicate 'balance of power' that was disrupted in the 1900s due to many factors, such as nationalism and imperialism, which led to war in 1914. All the nations were monarchies, except for France that had undergone a revolution in 1789.

Great Britain They were seen as the strongest country in Europe, they were heavily reliant on trade with their overseas Empire that stretched from Australia, India, African nations to The Americas. They had the largest navy and felt vulnerable to other nations who sought to develop their navies. When Germany began to build their navy they saw this a direct challenge and began to consider an alliance with France. They had a small army.

France They were a very strong imperial power that had a large army. They sought revenge with Germany after they lost the Franco-Prussian war and had been humiliated. Bismarck's policy was to isolate France and not allow her any European allies. Britain were not interested in becoming allied with the French as they has no interest in Europe at this point, and previously had a strong rivalry with France.

Germany They were a newly unified country in 1870, it had previously been lots of states, but it was unified by Otto von Bismarck who was the new diplomatic Chancellor. The King of Prussia became the Kaiser (king) of Germany. Kaiser Wilhelm II began to demand more status in the 1900s and desired more land, Germany's 'place in the sun'. They had won a war against France in 1870 and made the French pay them money for compensation and demanded the border territories of Alsace and Lorraine. Therefore, the French and Germany were bitter enemies in 1900 and Germany feared revenge, something Bismarck worked hard to avoid.

Austria-Hungary (Habsburg) Their empire extended across central Europe and into South Eastern Europe, known as the Balkans. Their empire was weakening as nationalist threats broke out, encouraged by the demise of the Ottoman Empire (Turkey). They saw their biggest threat as Russia, who were looking to expand in the region, to get a warm water port in Europe.

Russia They were the largest country by far and had huge numbers of people in their nation, however it was seen as 'backward' and feudal by the other European nations. They had no over seas empire, but had expanded into Asia. Their military potential was vast but limited due to its lack of industrialisation of weapon supplies. They exited WWI in 1917 due to a communist revolution, which replaced their monarchy.

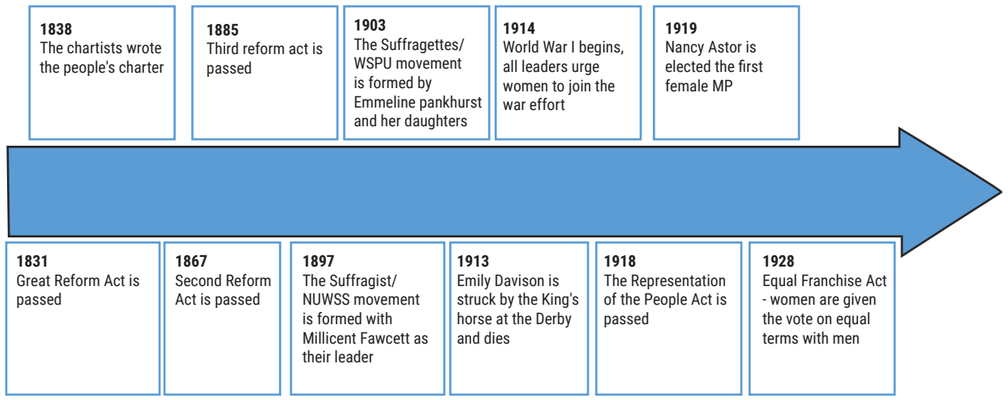
Italy Like Germany, they had also been unified from small states in 1871 to form the new nation, Italy. It was relatively weak compared to the other nations, but had ambitions of an empire and to have a place with the other European nations should their be spoils from war.

Questions
1. What is an agreement between countries called?
2. What term means extending a nation's power through colonisation?
3. What word means to seize land by force?
4. What is the belief in strong armed forces called?
5. What ended the fighting in World War I?
6. What is extreme patriotism called?
7. What is a competition to build weapons called?
8. What restricted German supplies during the war?
9. What are heavy guns and cannons called?
10. What is financial compensation for war damage?

Questions
1. What was the German plan to invade France?
2. What is a situation where neither side can win?
3. What is forcing citizens to join the army called?
4. What is a system of connected ditches called?
5. What is surrounding a country or army called?
6. What is a formal agreement between states?
7. What weapon caused psychological trauma in WWI?
8. What is an event that causes immediate consequences?
9. What term refers to powerful countries in 1900?
10. What is a final demand before conflict called?

Keywords

Act a written law passed by Parliament	**Propaganda** information used to promote a political point that can be misleading or untrue
Ballot a system of voting on a particular issue	**Reform** make changes in order to improve something
Charter a written statement of the rights of a specified group of people	**Representation** Speaking or acting on behalf of someone
Democracy system of government by the whole population typically through elected representatives.	**Rotten** boroughs a borough that was able to elect an MP despite having very few voters, the choice of MP typically being in the hands of one person or family.
Enfranchisement To be given the right to vote	**Strike** an organised refusal to do something expected or required typically to gain a concession
Manifesto A public set of political aims written down	**Suffrage** the right to vote
Parliament a group of people who make the laws for their country	**Tactics** An action or strategy carefully planned to achieve a specific end
P**etition** a formal written request, typically one signed by many people, appealing to authority in respect of a particular cause	



Key People

Nancy Astor	The first women elected as a Member of Parliament (MP)
Emily Davison	Joined the WSPU in 1906. Was struck by the King's horse at the Epsom Derby and killed in 1913.
Benjamin Disraeli	A Conservative Prime Minister (1868, 1874-80) who introduced the Second Reform Act
Millicent Fawcett	Founded the Suffragists/NUWSS in 1897
William Gladstone	A Liberal politician who served in Parliament for over 60 years and four times as Prime Minister. He passed the Third Reform Act, extending the vote to all male homeowners.
Earl Grey	A Whig Prime Minister who proposed the Great Reform Act in 1831 and resigned when the House of Lords rejected it.
Annie Kenney	A working-class socialist feminist who was active in the WSPU as a militant member and was arrested.
William Lovett	The leader of the Chartist movement and wrote the People's Charter in 1838
Christabel Pankhurst	Speaker for the WSPU in 1905. She trained as a lawyer but could not practice as a woman. She fled the country in 1912 for fear of rearrest, and unsuccessfully ran for parliament in 1918.
Emmeline Pankhurst	Founded the WSPU in October 1903 and encouraged militant action as a form of protest. Was arrested many time, she went on hunger strike and was force-fed. Mother of Christabel.

Questions
1. What is a written law passed by Parliament?
2. What is information used to promote a political view?
3. What is a system of voting called?
4. What means to make changes for improvement?
5. What is a written statement of rights?
6. What is speaking or acting on behalf of someone?
7. What is a system of government by elected representatives?
8. What were boroughs with very few voters called?
9. What is the right to vote called?
10. What is a refusal to work called?

Questions
1. What is a public set of political aims?
2. What is a group that makes laws in the UK?
3. What is a carefully planned strategy?
4. What is a formal written request called?
5. Who was the first woman elected as an MP?
6. Who died at the Epsom Derby in 1913?
7. Who introduced the Second Reform Act?
8. Who founded the NUWSS in 1897?
9. Who proposed the Great Reform Act in 1831?
10. Who founded the WSPU in 1903?

1. How did Europe fall under the control of dictators?

Key concepts:
- The political spectrum
- Left wing
- Right wing
- Dictatorship
- Totalitarianism

Keywords

1. Communism An economic and political system in which all property is state-owned
2. Democracy A political system that allows the people to vote on how the country is run
3. Dictator A single strong leader who can do what they want and has complete power
4. Fascism A political system that puts the strength of the nation above the individual
5. Totalitarian A form of rule in which the government or leader has unlimited power over all aspects of society
6. Autocracy A system of government by one person with absolute power
7. Bolsheviks The radical left-wing political group which seized control of the Russian government in 1917
8. Proletariat Used by communists to describe the working class
9. Tsar The Russian emperor
10. Collectivisation The grouping together of farms to be owned by the state
11. Industrialisation The widescale development of industries in a country
12. Purge To remove a group of people from an organisation
13. Soviet Union Or USSR, the new name for Russia under Communist control
14. Fuhrer Hitler's title from 1934, when he became the absolute ruler of Germany
15. Police state A country where the government uses the police to spy on the people and stamp out opposition
16. Weimar Republic The German democratic government established after WWI

Key Dates

1917 The Bolsheviks seize control of Russia
1919 Germany forced to sign Treaty of Versailles
1924 Stalin becomes leader of the Soviet Union
1929 The Great Depression
1933 Hitler becomes Chancellor of Germany
1934 Purges begin in the Soviet Union and Hitler becomes Fuhrer

2. Why was Nazism defeated?

Key people:
- Winston Churchill
- Dwight Eisenhower
- Franklin Roosevelt
- Stalin

Keywords

1. Allies The alliance between Britain, the USA, the USSR and France
2. BEF British Expeditionary Force
3. Blitzkrieg Tactic used by Hitler meaning lightening war
4. Axis The alliance that stood opposed to the allies made up of Germany, Japan and Italy
5. Encircle To surround an enemy army
6. Red Army Army of the Soviet Union
7. Pincer movement A movement by two separate groups of troops to close in on an enemy from two different directions
8. Isolationist The American policy of isolating itself from European and world affairs
9. Lend-Lease A scheme under which the USA lent or leased vital supplies to Britain during the war
10. Tariff A tax paid on certain imports or exports
11. Luftwaffe The Nazi air forces
12. Operation Overlord The allied military operation to liberate France from Nazi occupation

Key Dates

1 September 1939 Hitler invades Poland
26 May – 4 June 1940 Dunkirk evacuation
14 June 1940 Paris falls to the Nazis
22 June 1941 Hitler launches Operation Barbarossa
7 December 1941 Attack on Pearl Harbor
11 December 1941 Hitler declares war on the USA
September 1942-January 1943 The Battle of Stalingrad
6 June 1944 D-day
8 May 1945 End of the war in Europe

3. Shifting World Orders in the Modern World

Key people:
- 'The Big Three' – Winston Churchill, Roosevelt, Stalin
- Harry Truman

Keywords

1. Capitalism Where trade and industry are run by private individuals for profit
2. Cold War A state of political hostility between countries that doesn't go quite as far as open warfare
3. Sphere of influence Region of the world in which one Superpower is dominant
4. Superpower An unusually strong country
5. Containment The US policy of stopping Communism from spreading
6. Satellite state Countries that came under direct control of the Soviet Union after WWII
7. Arms race When countries compete against each other to make more and more powerful weapons
8. Deterrent Something that prevents one country from attacking another
9. Mutually Assured Destruction The existence of massive nuclear weapons meant that a future World War could end life on earth

Key Dates

February 1945 Yalta Conference
May 1945 Germany defeated
July 1945 Potsdam Conference
6-9 August 1945 USA drops atomic bombs
March 1947 Truman Doctrine announced
March 1948 Marshall Aid introduced
June 1948 Berlin Blockade

Questions
1. What is a political system where all property is state-owned?
2. What system allows people to vote on how the country is run?
3. What is a single strong leader with total power called?
4. What political system puts the nation above the individual?
5. What is unlimited government control over society called?
6. What is rule by one person with absolute power?
7. What radical group seized power in Russia in 1917?
8. What term describes the working class in communist theory?
9. What was the title of the Russian emperor?
10. What is grouping farms under state ownership called?

Questions
1. What is the large-scale development of industry?
2. What is the removal of people from an organisation called?
3. What was the new name for Russia under communism?
4. What was Hitler's title from 1934?
5. What is a country where the police suppress opposition?
6. What was Germany's democratic government after WWI?
7. What alliance included Britain, USA, USSR, and France?
8. What was the Nazi tactic of "lightning war"?
9. What was the Soviet Union's army called?
10. What was the Allied operation to liberate France?

Theme & Details

Nazi Ideology	Belief in racial superiority of Aryans and antisemitism.
Persecution Begins	Boycotts, Nuremberg Laws, Kristallnacht.
Ghettos	Jews were forced into overcrowded, enclosed areas.
Concentration Camps	Used for forced labour, imprisonment, and extermination.
Final Solution	Nazi plan to exterminate all Jews in Europe.
Resistance	Uprisings in ghettos and camps, hiding, and escape.

Key People & Events

Adolf Hitler Leader of Nazi Germany and architect of the Holocaust.
Heinrich Himmler Head of the SS and key organiser of the Final Solution.
Anne Frank Jewish girl whose diary became a symbol of Holocaust victims.
FactWarsaw Ghetto Uprising 1943 Jewish resistance against Nazi deportations.
Liberation of Auschwitz January 1945 by Soviet troops.
Nuremberg Trials Trials of Nazi leaders for war crimes after WWII.

Keywords

Antisemitism	Hatred or discrimination against Jews.
Genocide	The deliberate killing of a large group of people, especially those of a particular nation or ethnic group.
Ghetto	A section of a city where Jews were forced to live.
Concentration Camp	A place where large numbers of people were imprisoned and often killed.
Extermination Camp	A camp built by Nazis for mass murder.
Final Solution	The Nazi plan to exterminate the Jewish people.
Kristallnacht	A violent attack on Jewish people and property in 1938.
Liberation	The freeing of prisoners from camps by Allied forces.
Nuremberg Laws	Laws that stripped Jews of their rights in Nazi Germany.
Holocaust	The mass murder of Jews and other groups by the Nazis.

Questions
1. What ideology believed in Aryan racial superiority?
2. What 1935 laws stripped Jews of their rights?
3. What 1938 event involved attacks on Jewish property?
4. What were overcrowded areas Jews were forced into?
5. What were Nazi camps for forced labour and death?
6. What was the Nazi plan to exterminate Jews?
7. What term means hatred of Jews?
8. What is the deliberate killing of a group called?
9. What was the most infamous extermination camp?
10. What is the term for freeing prisoners from camps?

Questions
1. Who was the Nazi leader responsible for the Holocaust?
2. Who led the SS and organised the Final Solution?
3. Whose diary became a symbol of Holocaust victims?
4. What 1943 event was a Jewish uprising in Poland?
5. What trials prosecuted Nazi leaders after WWII?
6. What term describes camps built for mass murder?
7. What is the name of the Nazi plan to kill Jews?
8. What is the name of the German government before Hitler?
9. What is the term for resistance within camps or ghettos?
10. What is the term for the mass murder of Jews by Nazis?

Key Vocabulary

Segregation	Separation of people based on race.
Discrimination	Unfair treatment based on race, gender, or other factors.
Boycott	Refusal to use or buy something as a form of protest.
Protest	An action expressing disapproval of something.
Legislation	Laws passed by a government.
Activist	A person who campaigns for social change.
Equality	The state of being equal, especially in rights and opportunities.
Integration	Bringing different racial or ethnic groups into equal association.
Racism	Prejudice or discrimination based on race.
Civil Rights	The rights of citizens to political and social freedom and equality.

Theme & Details

Jim Crow Laws	Laws enforcing racial segregation in the Southern USA.
Civil Rights Act 1964	US law that outlawed discrimination based on race, colour, religion, sex, or national origin.
Voting Rights Act 1965	US law that banned racial discrimination in voting.
Race Relations Acts	UK laws passed in 1965, 1968, and 1976 to prevent racial discrimination.
Peaceful Protest	Non-violent methods used to demand civil rights, such as marches and sit-ins.
Black Power	A movement advocating racial pride and self-sufficiency for Black people.
Windrush Generation	Caribbean immigrants who faced racism and helped shape civil rights in the UK.

Key People & Events

Martin Luther King Jr Leader of the US civil rights movement, known for non-violent protest.
Rosa Parks Sparked the Montgomery Bus Boycott by refusing to give up her seat.
Malcolm X US activist who advocated for Black empowerment and self-defense.
Barack Obama First African-American President of the USA.
Paul Stephenson British civil rights campaigner who led the Bristol Bus Boycott.
Claudia Jones Activist and founder of the Notting Hill Carnival.
1963 March on Washington Major US protest where MLK delivered his 'I Have a Dream' speech.
1965 Selma Marches Highlighted the need for voting rights legislation in the USA.

Questions
1. What is the separation of people based on race?
2. What is unfair treatment based on race or gender?
3. What is refusing to use something as protest?
4. What is an action showing disapproval?
5. What is a law passed by a government?
6. What do we call someone who campaigns for change?
7. What is the state of being equal in rights?
8. What is bringing racial groups together called?
9. What is prejudice based on race?
10. What are the rights to freedom and equality?

Questions
1. What laws enforced segregation in the USA?
2. What 1964 law banned racial discrimination?
3. What 1965 law protected voting rights?
4. What UK laws aimed to stop racial discrimination?
5. What type of protest involves no violence?
6. What movement promoted Black pride and power?
7. What generation came from the Caribbean to the UK?
8. Who led the US civil rights movement?
9. Who refused to give up her bus seat in 1955?
10. Who led the Bristol Bus Boycott in the UK?

YEAR 9
Geography

CLIMATE CHANGE
LIFE IN AN EMERGING COUNTRY
ENERGY
ECOSYSTEMS
ISSUES OF URBANISATION

Background

1. Since the 1860s the global climate has been recorded.
2. Since then, the climate globally has increased by 0.8° Celsius.
3. Climate scientists can use methods to find out about the global climate before we started recording it. **(B)**
4. From this evidence we can see that the planet hos always gone through periods of warming and cooling. **(A)**
5. However, the rapid increase of CO_2 in the atmosphere from burning fossil fuels, is causing the enhanced greenhouse effect. **(D)**
6. The enhanced greenhouse effect is causing changes to the planet, such as the melting of Arctic sea ice, rising temperatures, and an increase in extreme weather events such as tropical storms. **(E, F)**
7. Countries are trying to resolve the issues related to climate change by limiting the amount of CO_2 released into the atmosphere, this is known as mitigation. **(G, H)**
8. Some countries are trying to adopt to climate change by building flood barriers and growing drought resistant crops. **(G, H)**

A - Changes In Climate (3)

Climate Change	The process of the Earth's climate changing over time.
Glacial Periods	Cold periods.
Inter-Glacial Periods	Warm periods.

B - Measuring Climate Change (3)

Ice Cores	Each layer of ice in a core represents a different year. CO_2 can be measured in each layer, and therefore the temperature.
Tree Rings	Each ring represents a different year. Thicker rings show a warmer climate.
Historical Evidence	Paintings and diaries e.g. paintings of ice fairs on the frozen Thames 500 years ago.

C - Natural Climate Change (3)

Volcanic Eruptions	Ash from volcanic eruptions con block sunlight, making it colder.
Sun Spots	The sun can give out more energy due to on increase in sun spots.
Orbital Change	The orbit of the sun changes from oval (ellipse) to circular approx. 98,000 years.

D - Human-Induced Climate Change (5)

Greenhouse Effect	The way that gases in the atmosphere trap heat from the sun. Like gloss in a greenhouse they let heat in, but prevent most from escaping.
Greenhouse Gases	Gases like CO_2 and methane that trap heat around the Earth, leading to climate change.

D - Human-Induced Climate Change (Cont.)

Transport	More cars, so more CO_2 causing the enhanced greenhouse effect.
Farming	Farming livestock produces methane, this is a greenhouse gas.
Energy	More energy required, meaning more fossil fuels burnt, so more CO_2.

E - Effects On People (6)

Tropical Storms	Increase in frequency and intensity so more damage.
Sea-Level Rise	Increased risk of floods, damaging property and businesses.
Melting Arctic Ice	Affects trading routes in the Arctic Circle.
More Droughts / Floods	Crop failure, could lead to starvation and famine.
Cost Of Defence	Governments have to spend more money on disasters instead of developing.
Environmental Refugees	Pressure on countries to accept refugees.

F - Effects On The Environment (4)

Sea Temperature Rises	Coral bleaching and destruction of marine ecosystems.
More Droughts	Migration/ death of species which can not survive drought conditions.
Melting Glaciers (Ice Rivers)	Will send more fresh water into the sea, causing the sea level to rise.
Melting Arctic Ice	Loss of habitats for animals, such as polar bears.

G - Strategies To Resolve Climate Change (4)

Adaptation	Adopting to climate change to make life easier.
Adaptation Examples	1. Building flood defences. 2. Growing new crops to suit the new climate. 3. Irrigation channels, sending water from areas of surplus to deficit.
Mitigation	Trying to stop climate change from happening by reducing greenhouse gases.
Mitigation Examples	1. International agreements. 2. Alternative energies. 3. Carbon capture.

H - Place Specific Examples (2)

Adaptation	**The Thames Barrier** Positive: Stops flooding due to rising sea levels. Negative: Expensive
Mitigation	**The Paris Agreement** Positive: Countries ore trying to lower Mitigation CO_2 emissions. Negative: The USA pulled out and Chino did not sign up.

Introduction - Questions

1. What is climate change?

2. What are glacial periods?

3. What are inter-glacial periods?

Managing climate change - Questions

4. How do ice cores help measure climate change?

5. What do tree rings indicate about climate?

6. What is an example of historical evidence for climate change

Natural causes of climate change - Questions

7. How do volcanic eruptions affect climate?

8. What are sun spots?

9. What is orbital change?

Human causes of climate change - Questions

10. What is the greenhouse effect?

11. Name two greenhouse gases.

12. How does transport contribute to climate change?

13. How does farming contribute to climate change?

14. How does energy use contribute to climate change?

Effects on people

15. How does climate change affect tropical storms?

16. What is a consequence of sea-level rise?

17. How does melting Arctic ice affect trade?

18. What is a consequence of more droughts and floods?

19. How does climate change affect government spending?

20. What are environmental refugees?

Effects on the environment - Questions

21. What happens when sea temperatures rise?

22. What happens to species during droughts?

23. What is the impact of melting glaciers?

24. What is the impact of melting Arctic ice on wildlife?

Effects on people

25. What is adaptation?

26. Name one adaptation strategy.

27. What is mitigation?

28. Name one mitigation strategy.

29. What is the Thames Barrier used for?

30. What is the Paris Agreement?

Background

1. Development means positive change that makes things better.
2. As a country develops it usually means that the people's standard of living and quality of life improve. **(B)**
3. Different factors can affect development such as economic, social, and political factors. **(A)**
4. Emerging countries have begun to experience higher rates of development, with a rapid growth in secondary industries. **(A, C)**
5. Emerging countries have some of the fastest rates of urbanisation in the world. **(D)**
6. This is causing urban areas (cities) to become highly populated; this process can have both opportunities and challenges. One such challenge is the growth of squatter settlements. **(E)**
7. Emerging countries often host the factories of many transnational companies. They provide wages and taxes and can promote development. However. they can also cause negatives impacts. **(F, G)**

A - Characteristics Of Emerging Countries (7)

Bric Countries	Brazil, Russia, India, China.
Mint Countries	Mexico, Indonesia, Nigeria, Turkey.
Industrialisation	The process of a country moving from mostly agriculture (farming) to manufacturing (making) goods.
Employment Structure	How the workforce is divided up between primary, secondary, tertiary and quaternary employment.
Secondary Industry	An industry which manufactures goods.
Exports	Sending goods to another country for sale.
Urbanisation	The growth in the number/ proportion of people living in towns and cities.

B - Development Indicators (3)

GDP Per Capita	The total value of goods and services sold by a country in a year divided by the population.
Human Development Index (HDI)	A development measure which combines GDP per capita, life expectancy and education.
Life Expectancy	The average age you are expected to live to in a country.

C - Encouraging Development (4)

Subsidy	Money given by a government to help an industry keep down the cost of exports.
Tax Breaks	This reduces the amount of tax a company must pay (normally for a fixed period), therefore increasing profit.
Minimum Wage	The lowest wage permitted by law in a country.
Trade Unions	An organisation of workers who work to protect the rights of those employed.

D - Rural To Urban Migration (4)

Rural To Urban Migration	The movement of people from rural areas (countryside) to urban areas (cities).
Push Factor	Things that make people want to leave an area e.g. a lack of jobs.
Pull Factor	Things that attract people to live in an area e.g. good health care.
Mechanisation	When machines begin to do the work which humans once completed.

E - Squatter Settlements (5)

Squatter/ Shanty Settlement	An area (often illegal) of poor quality housing, lacking basic services e.g. water.
Inequality	Differences in wealth, and wellbeing.
Sanitation	Measures to protect public health e.g. clean water and disposing of sewage.
Informal Economy	Jobs which are not taxed, workers do not have contracts or rights.
Quality Of Life	A measure of how 'wealthy' people are, but measured using housing, employment and environment, rather than income.

F - Transnational Corporations (TNCs) (5)

Transnational Corporation	Those that operate across more than one country.
Footloose	Industries which are not tied to a location due to natural resources or transport links.
Globalisation	The increased connectivity of countries around the world e.g. through trade.
Host Country	The country where the TNC places its factories e.g. in an emerging or developing country
Source Country	The country where the headquarters for the TNC is located e.g. a developed country.

G - Impact Of TNCs

Positive: (5)	1 . More jobs. 2. More taxes. 3. Invest in infrastructure projects. 4. GDP increases. 5. Develop workers skills.
Negative: (3)	1. Can exploit workers e.g. long hours. 2. Most of the profits from TNCs leave the country where production takes place. 3. Increased levels of pollution e.g. air and water (from industrial waste).

Characteristics and features - Questions

1. What does BRIC stand for?

2. What does MINT stand for?

3. What is industrialisation?

4. What is employment structure?

5. What is secondary industry?

6. What are exports?

7. What is urbanisation?

Development Indicators - Questions

8. What is GDP per capita?

9. What does HDI stand for?

10. What three factors make up HDI?

11. What is life expectancy?

Encouraging Development - Questions

12. What is a subsidy?

13. What are tax breaks?

14. What is the minimum wage?

15. What is a trade union?

Rural – urban migration - Questions

16. What is rural to urban migration?

17. What is a push factor?

18. What is a pull factor?

19. What is mechanisation?

Squatter settlements - Questions

20. What is a squatter or shanty settlement?

21. What is inequality?

22. What is sanitation?

23. What is the informal economy?

24. What is quality of life?

Trans National Corporations (TNCs) - Questions

25. What is a transnational corporation?

26. What does footloose mean in industry?

27. What is globalisation?

28. What is a host country?

29. What is a source country?

30. Name one positive and one negative impact of TNCs.

Background

1. The consumption and production of energy is not evenly distributed. **(A)**
2. Many factors can influence energy use, including the wealth of the country and availability. **(A)**
3. Energy consumption impacts quality of life. **(B)**
4. There are two main sources of energy, these can be classified as non-renewable and renewable. **(C, E)**
5. The energy mix worldwide has shifted in recent years, with a decline in coal and oil, and a growth in renewables and nuclear. **(D, E)**
6. Frocking for gas is also growing worldwide. **(H)**

A - Factors Affecting The Energy Mix (6)

Population	More people means more energy needed.
Wealth	Greater wealth leads to a greater energy demand.
Availability	If a country has its own natural resources e.g. coal, oil, wind etc.
Consumption	The amount of energy or power used.
Emissions	The by-product given off by burning an energy source e.g. carbon dioxide.
NIMBYism	Abbreviation for 'not in my backyard.'

B - Importance Of Energy (4)

Social Well Being	Normally refers to quality of life, e.g. happiness.
Economic Well Being	Having present and future financial security.
Energy Dependence	To rely on other countries for your energy supply e.g. to import oil.
Energy Security	To be relatively self-sufficient regarding to your energy supply.

C - Types Of Energy (3)

Renewable	Energy, which is infinite, sustainable and is easily replenished.
Non-renewable	Energy, which is finite, is not sustainable and takes a long time to replenish.
Finite	Something which will run out, come to an end.

D - Nuclear Energy (3)

What it is	This is non-renewable and comes from uranium.
Positive	Small amounts of uranium produces lots of energy.
Negative (2)	1. Nuclear waste is toxic and must be stored for hundreds of years. 2. Nuclear accidents can occur, which is a risk to human health.

E - The Impacts Of Energy Sources

		Advantages	Disadvantages
Non-renewables (3)	**Coal**	1. Efficient, cheap and reliable.	1. Creates carbon dioxide. 2. Finite
	Oil	1. Easy to transport. 2. Efficient.	1. Oil spills. 2. We must import this from other countries.
	Gas	1. Supplies available in the North Sea and from fracking. 2. Jobs in extraction created.	1. Finite 2. Carbon dioxide produced.
Renewables (3)	**Wind**	1. Sustainable and will not run out. 2. Jobs created in the manufacture and installation of these.	1. Noise and visual pollution. 2. Bird strikes.
	Solar	1. Easy to install on houses. 2. Jobs created in the manufacture and installation of these	1. Unreliable e.g. if it is not sunny. 2. The panels are constructed from toxic materials
	Hydro-Electric	1. One of the most reliable non-renewables. 2. Reservoirs create tourism and also provide clean water.	1. Vegetation / forests cleared for reservoir creation. 2. Farmland and settlements flooded to create reservoirs.

F - Fracking

Frocking	Gas trapped in shale rock is released by pumping water and sand into the ground, which widens cracks in the ground, allowing the gas to escape.

Positive	**Negative**
1. Blackpool council could make£ 1.7m per year. 2. Many jobs would be created in the north-west. 3. The UK would become less dependent on importing energy from other countries	1. Small earthquakes could damage homes. 2. Huge areas of countryside destroyed. 3. Noise and air pollution would be created from the heavy machinery. 4. Underground water could become contaminated.

Introduction - Questions

1. What is meant by the term "energy mix"?

2. Name two main types of energy sources.

3. What is a renewable energy source?

4. What is a non-renewable energy source?

5. Give an example of a renewable energy source.

6. Give an example of a non-renewable energy source

Factors affecting energy use - Questions

7. How does population affect energy consumption?

8. Why does wealth influence energy use?

9. What is meant by "availability" in energy terms?

10. What does NIMBYism stand for?

Importance of energy use - Questions

11. What is energy security?

12. What is energy dependence?

13. How does energy affect social well-being?

14. How does energy affect economic well-being?

Advantages and disadvant - Questions

15. Name one advantage of coal.

16. Name one disadvantage of coal.

17. What is a benefit of using wind energy?

18. What is a drawback of wind energy?

19. Why is solar energy considered renewable?

20. What is a disadvantage of solar panels?

21. What is hydro-electric power?

22. Give one environmental disadvantage of hydro-electric power.

Nuclear and fracking - Questions

23. What is nuclear energy made from?

24. Name one advantage of nuclear energy.

25. Name one disadvantage of nuclear energy.

26. What is fracking?

27. Give one economic benefit of fracking.

28. Give one environmental risk of fracking.

Trends and changes - Questions

29. What recent trend has occurred in the global energy mix?

30. Why is the shift to renewable energy important?

Background

1. An ecosystem is a community of things that are linked together to make up a type of environment. **(A, B)**
2. An ecosystem contains biotic (living) and abiotic (non-living) parts. **(B)**
3. The climate of an ecosystem is very important as it influences what you will find there. **(C)**
4. The main world biomes can be found in specific parts of the world, they have very different climatic conditions & features. **(C, D)**
5. The rainforest biome has some distinctive features. **(F)**
6. However, deforestation is a major challenge facing rainforests worldwide. **(E)**
7. The deserts worldwide also have some key characteristics. **(G)**
8. The Sahara Desert is a place with opportunities for people, but there are also challenges which need to be overcome. **(H)**

A - Classification Of Ecosystem (4)

Ecosystem	A community of things linked together in an environment.
Biome	An ecosystem on a large scale that covers parts of continents and whole countries.
Habitat	A place where plants and animals live. Example: a pond, or hedgerow.
Biodiversity	The amount of variety of life there is in a place.

B - Features Of An Ecosystem (3)

Biotic	The living parts of an ecosystem. Examples: plants, animals, humans.
Abiotic	The non-living parts of an ecosystem. Examples: soil, climate, river.
Food Chain	A diagram that shows what is eating what in an ecosystem.

C - Climatic Features (4)

Climate Graph	A graph showing rainfall and temperature in a place over a whole year.
Precipitation	Any form of water falling from the sky.
Convectional Rainfall	Rain that is produced when warm air rises, cools and condenses, forming clouds and then rainfall.
High Pressure	Areas where air is sinking, this air has little High Pressure moisture, thus condensation can not happen.

D - Major Global Biomes (4)

Tundra	1. Found at the far north and south of the planet. 2. A cold ecosystem, little rainfall.
Hot Desert	1. Found along the Tropic of Cancer and the Tropic of (2) Capricorn. 2. Hot environments with little rain.

D - Major Global Biomes (4)

Tropical Rainforest	1. Found in places along the Equator. 2. Hot and humid environments with huge amounts of rainfall.
Temperate Forest	1. The main biome of the UK and other places along the same lines of latitude. 2. Warm summers, mild winters. No extremes of temperature, rainfall.

E - Deforestation In The Rainforest (6)

Deforestation	The cutting down and removal of forest. This happens due to many factors.
Logging	Cutting down trees to sell the wood for a profit, sometimes this is done illegally.
Cattle Ranching	Removing trees from a large part of the rainforest and keeping cows on the land. These are sold for meat.
Slash and Burn	A type of farming where you cut down a small area of trees, burn the vegetation and then grow crops on this land.
Soil Erosion	When the soil in an area loses its minerals (water or wind erosion) so that it becomes difficult to grow crops there.
Indigenous Tribes	A group of people who live traditional lives in places (like the rainforest).

F - Rainforest Features (3)

Rainforest Layers	Forest floor, understorey, canopy, emergent layer
Nutrient Cycle	Nutrients move from living things to litter and the soil in a continuous cycle, keeping both plants and soil healthy.
Drip Tip Leaves	A plant adaptation that lets excess water drip off leaves quickly.

G - Desert Characteristics (4)

Diurnal Range	Differences between the highest day and lowest night time temperature.
Nocturnal	Animals only come out at night.
Cactus	Long root systems to get as much water as possible from dry ground.
Camel	A plant adaptation that lets excess water drip off leaves quickly.

H - Opportunities And Challenges For Development In The Sahara Desert

Where	The Sahara is found in Northern Africa.

Opportunities (2)	**Challenges (2)**
1. In Algeria, oil extraction accounts for 60% of the GDP. 2. Farming in Egypt happens because the Aswan Dam provides water all year round to grow crops, providing an income to farmers.	1. Extreme temperatures can cause illness or death because of dehydration. 2. Water is scarce and so farming can be unreliable meaning an unreliable income for farmers.

Features of ecosystems - Questions

1. What is an ecosystem?

2. What is a biome?

3. What is a habitat?

4. What does biodiversity mean?

5. What are biotic components?

6. What are abiotic components?

7. What is a food chain?

Global Biomes - Questions

8. Where are tundra biomes found?

9. What are the climatic conditions of tundra biomes?

10. Where are hot deserts located?

11. What are the conditions in hot deserts?

12. Where are tropical rainforests found?

13. What are the conditions in tropical rainforests?

14. What is the main biome of the UK?

15. What are the conditions in temperate forests?

Rainforest features and deforestation - Questions

16. Name the layers of the rainforest.

17. What is the nutrient cycle?

18. What are drip tip leaves?

19. What is deforestation?

20. Why is logging done in rainforests?

21. What is cattle ranching?

22. What is slash and burn farming?

23. What is soil erosion?

24. Who are indigenous tribes?

Desert features and the Sahara Desert Case Study - Questions

25. What is diurnal range?

26. What does nocturnal mean?

27. How are cactus roots adapted?

28. How are camels adapted to deserts?

29. What is one opportunity for development in the Sahara?

30. What is one challenge of living in the Sahara?

Background

1. Urban areas have normally developed and grown due to their physical or human locational advantages. **(A)**
2. When urban areas develop. patterns of land use can often be seen. **(B)**
3. Urban areas go through stages of growth and sprawl. **(C)**
4. In the UK, the government has attempted to protect rural areas from this urban sprawl. **(F)**
5. On occasions urban areas can fall into decline. In the UK, a process of counter-urbanisation has been taking place in recent years. **(D)**
6. In attempts to improve urban living. many strategies have been put in place to improve them.
7. Urban areas are becoming increasingly sustainable and through regeneration schemes. those areas that were once in decline are often growing again. **(E, G)**

A - Factors Influencing The Growth Of Cities (2)

Site	The actual place where a settlement first grew up. This refers mainly to its physical setting e.g. a coastal location. or a flat valley.
Situation	The location of a place relative to other features nearby e.g. accessibility and the availability of natural resources.

B - Urban land use (5)

Central Business District (CBD)	The middle of a town or city where most of the shops and offices are found.
Inner City	An area close to the CBD. Old factories and terraced housing are often located here.
Suburbs	An area of housing estates beyond the inner city. Detached and semi-detached housing is common.
Rural-Urban Fringe	The area where the countryside meets a city or town.
Land Use	What the land is used for e.g. residential, commercial, industrial etc.

C - Urban Growth (4)

Urbanisation	The movement of people from rural areas to urban areas (cities).
Suburbanisation	The movement of people from inner cities to the suburbs.
Urban Sprawl	Unplanned growth of urban areas into surrounding rural areas.
Positive Multiplier Effect	The introduction of a new industry in an area also encourages growth in other industrial sectors, leading to further growth.

D - Urban Decline (4)

Deindustrialisation	The closure of industries, and the resulting impacts e.g. a reduction in jobs
Counter-Urbanisation	The movement of people from urban areas into villages.

D - Urban Decline (Cont.)

Dereliction	Abandoned buildings and waste land.
Negative Multiplier Effect	The closure of an industrial sector, leading to further decline.

E - Sustainable Urban Areas (4)

Urban Greening	Increasing or preserving open space in urban areas e.g. public parks.
Integrated Transport Systems	Different forms of transport are linked together. making it easy lo transfer from one to another.
Waste Recycling	Reusing useful substances found in waste.
Energy Conservation	Reducing energy consumption, by being more efficient.

F - Containing Urban Areas (4)

Greenfield Land	A plot of land which has not been built on before. normally in rural areas or on the rural-urban fringe.
Brownfield Land	Land which has been used, abandoned and now awaits reuse.
Greenbelt	A strip of land, often surrounding urban areas, which can not be built on.
Planning Permission	When permission is required to build.

G - Regeneration Scheme Example: The Queen Elizabeth Olympic Park, Stratford, East London.

Urban regeneration	Reversing urban decline. by modernising or redeveloping a particular area. aiming to improve the local economy and environment.	
	Advantages	**Disadvantages**
Social	9,000 affordable homes created in East Village.	450 home owners were forced to relocate for the construction of the Olympic Park.
Economic	Many new jobs created. 8.000 of which were at Westfield shopping centre.	Many people who lost their jobs when the dockyards closed. have not benefited from the new jobs.
Environmental	25 acres of urban greening has taken place.	Some parts of Carpenters Estate have suffered from vandalism and urban dereliction.

Urban growth and features - Questions

1. What is meant by the "site" of a city?

2. What is the "situation" of a city?

3. What is the Central Business District (CBD)?

4. What is typically found in the inner city?

5. What are suburbs?

6. What is the rural-urban fringe?

7. What does "land use" refer to?

Urbanisation and change - Questions

8. What is urbanisation?

9. What is suburbanisation?

10. What is urban sprawl?

11. What is the positive multiplier effect?

Urban decline - Questions

12. What is deindustrialisation?

13. What is counter-urbanisation?

14. What is dereliction?

15. What is the negative multiplier effect?

Sustainable urban areas - Questions

16. What is urban greening?

17. What is an integrated transport system?

18. What is waste recycling?

19. What is energy conservation?

Managing urban growth - Questions

20. What is greenfield land?

21. What is brownfield land?

22. What is a greenbelt?

23. What is planning permission?

Urban regeneration case study - Questions

24. What is urban regeneration?

25. Where is the Queen Elizabeth Olympic Park located?

26. How many affordable homes were created in East Village?

27. What was a social disadvantage of the Olympic Park regeneration?

28. How many jobs were created at Westfield shopping centre?

29. What environmental benefit came from the regeneration?

30. What is one environmental disadvantage of the regeneration?

YEAR 9
Spanish

SPANISH GRAMMAR
SPANISH VOCABULARY

A – Position

In Spanish, unlike in English, most adjectives come after the noun they are describing.

For example:
- Una **casa** blanca – a white **house** (the adjective blanca comes after the **noun casa**)
- El **pelo** negro – black **hair** (the adjective black comes after the **noun hair**)
- Un **profesor** irritante – an irritating **teacher** (the adjective irritating comes after the **noun teacher**)

B – Agreement

Adjectives describe nouns. Adjective endings change according to whether the noun is masculine or feminine and singular or plural. There are different patterns of agreement, as follows:

	singular		plural	
	masculine	feminine	masculine	feminine
ending in -o	creativo	creativa	creativos	creativas
ending in -e	sociable	sociable	sociables	sociables
ending in a consonant	fácil	fácil	fáciles	fáciles
ending in -dor	trabajador	trabajadora	trabajadores	trabajadoras

Mi hermano es creativ**o** – Masculine, singular
Mi hermana es creativ**a** – Feminine, singular
Mis hermanos son creativ**os** – Masculine, plural
Mis hermanas son creativ**as** – Feminine, plural

Mi Hermano/hermana es sociabl**e** – Masculine/feminine singular
Mis hermanos/hermanas son sociabl**es** – Masculine/feminine plural

El inglés/la informática es fácil – Maculine/feminine singular
Los idiomas/las matemáticas son fácil**es** – Masculine/feminine plural

El camarero es trabajador – Masculine singular
La camarera es trabajador**a** – Feminine singular
Los camareros son trabajador**es** – Masculine plural
Las camareras son trabajador**as** – Feminine plural

A – Position – Self-quizzing

1. Choose the correct word to complete the sentence:
   Most adjectives come **before/after** the noun

2. Correct the errors in these phrases:
   La blanca casa B. El negro pelo C. Un irritante profesor

3. Correct the errors in these phrases:
   A. El negro perro B. Una difícil asignatura C. Mi favorito programa

B – Agreement – Self-quizzing

1. Adjective endings change depending on whether the noun is m_____ or f_____ and s_____ or p_____.

2. Choose the correct adjective:

Mi hermano es alto/alta
Mi prima es bajo/baja
Los gatos son pequeños/pequeñas
Las cobayas son listos/listas

El dibujo es interesanto/interesante
La tecnología es excelente/excelenta
Los museos son grande/grandes
Las piscinas son importante/importantes

La chica es fiel/fiele
Las personas son tristes/tristas
La mujer es habladore/habladora
Los niños son habladoros/habladores

A – Regular verbs

In the present tense, -ar, -er and -ir verbs follow different patterns of endings:

	-ar	-er	-ir
	bail**ar** (to dance)	com**er** (to eat)	escrib**ir** (to write)
yo	bail**o**	com**o**	escrib**o**
tú	bail**as**	com**es**	escrib**es**
él/ella / usted	bail**a**	com**e**	escrib**e**
nosotros/as	bail**amos**	com**emos**	escrib**imos**
vosotros/as	bail**áis**	com**éis**	escrib**ís**
ellos/as / ustedes	bail**an**	com**en**	escrib**en**

To conjugate a verb (change an infinitive verb) in the present tense, you usually remove the AR/ER/IR endings to be left with the stem. You then add on the appropriate ending.

Infinitive	**Stem**	**Present tense**
Cantar	Cant	Canto (I sing)
Comer	Com	Como (I eat)
Describir	Describ	Describo (I describe)

B – Irregular verbs

Some verbs don't follow the usual patterns. Learn each verb by heart.

ir (to go)	**ser** (to be)	**tener** (to have)	**ver** (to see)
voy	soy	tengo	veo
vas	eres	tienes	ves
va	es	tiene	ve
vamos	somos	tenemos	vemos
vais	sois	tenéis	veis
van	son	tienen	ven

Some verbs are irregular in the 'I' form only:
hacer (to do / to make) -+ hago **salir** (to go out) -+ salgo

Irregular verbs don't follow the same pattern, and you just need to learn the differences.

C – Reflexive verbs

Reflexive verbs describe actions you do to yourself. They include a reflexive pronoun, e.g. **me, te, se,** which means 'myself', 'yourself', 'his/herself', etc..

ducha**rse** (to have a shower)
me ducho
te duchas
se ducha
nos duchamos
os ducháis
se duchan

Some reflexive verbs are stem-changing in the present tense:

ac**o**starse (to go to bed) -+ me acuesto (I go to bed)
desp**e**rtarse (to wake up) -+ me despierto (I wake up)
v**e**stirse (to get dressed) -+ me visto (I get dressed)

Reflexive verbs are mostly used to describe daily routine actions or family relationships. You conjugate them in the same way as regular verbs, but you just include the reflexive pronoun.

A – Regular Verbs – Self-quizzing

1. Conjugate the following verbs into first person singular (I form):
   A. Visitar B. Beber C. Vivir

2. Conjugate the following verbs into first person plural (we form):
   A. Hablar B. Leer C. Vivir

3. Translate these phrases into Spanish:
   A. I talk B. We drink C. I write D. We eat E. I read F. We visit

B – Irregular verbs – Self-quizzing

1. Conjugate the following verbs into first person singular (I form):
   A. Ir B. Tener C. Ser D. Ver

2. Conjugate the following verbs into first person plural (we form):
   A. Ir B. Tener C. Ser D. Ver

C – Reflexive verbs – Self-quizzing

1. Translate these phrases into Spanish:
A. I get up B. I have a shower C. I get dressed D. We have a shower E. We get up

A – Regular verbs

In the preterite, regular -ar verbs follow one pattern of endings and -er and -ir verbs follow another:

	-ar	-er	-ir
	bailar (to dance)	comer (to eat)	escribir (to write)
yo	bailé	comí	escribí
tú	bailaste	comiste	escribiste
él/ella / usted	bailó	comió	escribió
nosotros/as	bailamos	comimos	escribimos
vosotros/as	bailasteis	comisteis	escribisteis
ellos/as / ustedes	bailaron	comieron	escribieron

To conjugate a verb (change an infinitive verb) in the present tense, you usually remove the AR/ER/IR endings to be left with the stem. You then add on the appropriate ending.

Infinitive	**Stem**	**Present tense**
Cantar	Cant	Canté (I sang)
Comer	Com	Comí (I ate)
Describir	Describ	Describí (I described)

B – Irregular verbs

Some verbs don't follow the usual patterns in the preterite. Learn each verb by heart.

ir (to go)	**ser** (to be)	**hacer** (to do / make)	**tener** (to have)	**ver** (to see)
fui	fui	hice	tuve	vi
fuiste	fuiste	hiciste	tuviste	viste
fue	fue	hizo	tuvo	vio
fuimos	fuimos	hicimos	tuvimos	vimos
fuisteis	fuisteis	hicisteis	tuvisteis	visteis
fueron	fueron	hicieron	tuvieron	vieron

The verbs ir and ser are identical in the preterite, but the context makes it clear which verb is meant.
In the preterite, the following verbs are irregular in the 'I' form only:
sacar (to take) - saqué (I took) **jugar** (to play) - jugué (I played) **tocar** (to play) - toqué (I played)

Irregular verbs don't follow the same pattern, and you just need to learn the differences.

A – Regular Verbs – Self-quizzing

1. Conjugate the following verbs into first person singular (I form):
   A. Visitar B. Beber C. Vivir

2. Conjugate the following verbs into first person plural (we form):
   A. Hablar B. Leer C. Vivir

3. Translate these phrases into Spanish:
   A. I talked B. We drank C. I wrote D. We ate E. I read F. We visited

B – Irregular verbs – Self-quizzing

1. Conjugate the following verbs into first person singular (I form):
   A. Sacar B. Jugar C. Tocar

2. Conjugate the following verbs into first person plural (we form):
   A. Ir B. Ser C. Hacer

3. Translate these phrases into Spanish:
   A. I had B. We saw C. I went D. We had E. I was F. I did/I

A – Near future - Ir a + infinitive

The near future tense is used to talk about what you are going to do. Use the present tense of the verb ir followed by a plus the infinitive.

voy a salir con mis amigos	I am going to go out with my friends
vas a ver la television	you are going to watch TV
va a ir de paseo	he/she is going to go for a walk
vamos a jugar al voleibol	we are going to play volleyball
vais a chatear	you (plural) are going to chat online
van a hacer los deberes	they are going to do their homework

A – Use the present tense of the verb 'ir', the letter 'a' and then an infinitive.
Voy a jugar = I am going to play
Voy a beber = I am going to drink
Voy a visitar = I am going to visit
Voy a ir = I am going to go

B – Future time frame

Use a conjugated verb followed by the infinitive.

Quiero salir con mis amigos	**I want** to go out
Espero ver la television	**I hope** to watch TV
Me gustaría ir de paseo	**I would** like to go for a walk
Quisiera hacer los deberes	**I would** like to do my homework

A – Simple Future – Self-quizzing

1. Translate these phrases into Spanish:
   A. I am going to talk
   B. I am going to drink
   C. I am going to write
   D. We are going to eat
   E. I am going to read
   F. We are going to visit
   G. I am going to play
   H. We are going to watch TV
   I. I am going to do my homework

B – Future Time Frame – Self-quizzing

1. Translate these phrases into Spanish:
   A. I want to talk to my friends
   B. I hope to go for a walk
   C. I would like to write
   D. I want to eat
   E. I hope to go out with my friends
   F. I would like to watch TV
   G. I want to play videogames

A / B – Future – Self-quizzing

1. Choose the correct answer
   A. Voy a **hablar/hablo** con mis amigos
   B. Espero c**omo/comer** patatas
   C. Quiero **visitar/visito** mis abuelos
   D. Me gustaría **veo/ver** una película
   E. Quisiera **jugar/juego** al baloncesto
   F. Vamos a **escribo/escribir**

A – Opinion + infinitive

You can use infinitives after opinion verbs such as me gusta (I like), no me gusta (I don't like), me encanta (I love), detesto/odio (I hate) and prefiero (I prefer).

For example:

Me gusta leer libros	I like to read books / I like reading books.
No me gusta nadar	I don't like to swim / I don't like swimming.
Me encanta comer chocolate	I love to eat chocolate / I love eating chocolate.
Odio ver el telediario	I hate to watch the news / I hate watching the news
Prefiero salir con mis amigos	I prefer to go out with my friends / I prefer going out with my friends

B – Plural opinions

If the noun that you are giving an opinion about is plural (starts with 'los' or 'las'), opinion phrases that use 'me', such as 'me gusta', 'me encanta', 'me chifla', 'no me gusta' need to end in an 'n'.

Me gustan **las** matemáticas	I like Maths
Me encantan **los** animals	I love animals
No me gustan **las** montañas	I don't like the mountains

A – Opinion + Infinitive – Self-quizzing

1. Choose the correct answer:
   A. Me gusta **salir/salgo** con mis amigos B. Me encanta **como/comer** en un restaurante
   C. No me gusta **chatear/chateo** D. Me gustaría **veo/ver** la tele
   E. Odio **hago/hacer** mis deberes

2. Translate these sentences into Spanish:
   A. I like to visit my grandparents B. I prefer to read books C. I don't like eating chocolate

B – Plural Opinions – Self-quizzing

1. Choose the correct answer:
   A. Me **gusta/gustan** las ciencias B. Me **gusta/gustan** el chocolate C. Me **encanta/encantan** el fútbol
   D. Me **gusta/gustan** los caramelos E. Me **encanta/encantan** los fines de semana

2. Translate these sentences into Spanish:
   A. I like sports B. I love books C. I don't like pasta

A / B – Future – Self-quizzing

1. Choose the correct answer
   A. Voy a **hablar/hablo** con mis amigos B. Espero c**omo/comer** patatas
   C. Quiero **visitar/visito** mis abuelos D. Me gustaría **veo/ver** una película
   E. Quisiera **jugar/juego** al baloncesto F. Vamos a **escribo/escribir**

A – Opinion + infinitive

Modal verbs are used to express ideas like possibility, ability, permission or necessity. Modal verbs must be followed by an infinitive.

Key modal verbs	
Se puede	You can
Se debe	You must
Suelo	I usually
Tengo que	I have to

+

Key infinitives
Visitar – to visit
Ir – to go
Comer – to eat
Ver – to watch/see
Ser – to be
Hacer – to do
Hablar – to talk
Salir – to go out

Modal verb + infinitive
You can visit = **Se puede** visitar
You must watch = **Se debe** ver
I usually go = **Suelo** ir
I have to eat = **Tengo que** comer

A – Understanding – Self-quizzing

1. What is a modal verb and what must it be followed by in Spanish?

2. Translate the following into Spanish: “You must go.”

3. What does “Tengo que” mean in English?

4. Which Spanish modal verb means “I usually”?

5. Identify the infinitive in the sentence: “Suelo hablar”

B – Practice – Self-quizzing

1. Translate into English:
   a. Se puede salir b. Se debe ser c. Tengo que hablar d. Suelo ver

2. Translate these sentences into Spanish:
   a. I usually eat b. You can go c. You must talk d. I have to do

Time

A la/las	At
Es la/son las	It is
Y cuarto	Quarter past
Y media	Half past
Menos cuarto	Quarter to
Y cinco	Five past
Y diez	Ten past
Y veinte	Twenty past
Menos veinte	Twenty to
Menos diez	Ten to
Menos cinco	Five to

Examples
At one o’clock – A la una
At two o’clock - A las dos
At quarter past three – A las tres y cuarto
At half past four – A las cuatro y media
At quarter to five – A las cinco menos cuarto
It is one o’clock – Es la una
It is six o’clock – Son las seis
It is five past seven – Son las siete y cinco
It is ten past eight – Son las ocho y diez
It is ten to nine – Son las nueve menos diez
It is five to ten – Son las diez menos cinco

A – Match up – Self-quizzing

English	**Spanish**
a. It is quarter past 3	1. Son las ocho y diez
b. It is 10 past 8	2. Son las tres y cuarto
c. At quarter to 5	3. A las cinco menos cuarto
d. It is 5 to 10	4. Son las diez menos cinco
e. It is 6 o’clock	5. Son las seis

B – Fill in the gaps – Self-quizzing

1. Son las ocho y _____ (20 2. A las cinco menos _____ (15)
3. Es la _____ (1) 4. Son las siete y _____ (25)
5. A las cuatro y _____ (30)

C – Translate – Self-quizzing

1. Translate into Spanish:
   a. It is one o’clock b. It is ten past eight c. At quarter past three d. At five to ten

2. Translate into English:
   a. Son las seis b. A la una c. Son las nueve menos diez d. A las tres y cuarto

Vocabulary

Spanish	English	Spanish	English
Mi padre / el padrastro	**My dad / stepdad**	Le gustaría	He / she would like…
Mi madre / la madrastra	**My mum / stepmum**	**Juego a los videojuegos**	**I play video games**
Mi hermano	My brother	**Voy a las tiendas**	**I go to the shops**
Mi hermana	My sister	**Salgo con mis amigos**	**I go out with my friends**
Tiene el pelo…	**He/she has… hair**	Veo clips en YouTube	I watch clips on YouTube
Tiene … años	**He/she is … years old**	Todos los días	Every day
Es…	**He/she is…**	**Voy a (+ infinitive)**	**I'm going…**
Molesto	Annoying	**Vamos a (+ infinitive)**	**We are going…**
Amable	Kind	Espero (+ infinitive)	I hope…
Gracioso	Funny	Ver	To see
Me llevo bien con…	**I get on well with…**	**Comer en un restaurante**	**To eat at a restaurant**
No me llevo bien con…	**I don't get on well with…**	**Ir**	**To go**
Nos peleamos	**We argue / fight**	Visitar…	To visit…
Tenemos mucho en común	We have lots in common	**Va a ser**	**It's going to be**
Me hace reír	**He / she makes me laugh**	Será…	It will be…
Un buen amigo es	**A good friend is…**	**Fui**	**I went**
Me hace feliz	Makes me happy	**Salí**	**I went out**
Me acepta	Accepts me	Compré	I bought
Mi novio / a ideal	My ideal boyfriend / girlfriend	**Vi**	**I watched**
Sería…	**Would be…**	**Jugué**	**I played**
Tendría…	Would have…	**Fue…**	**It was…**

Vocabulary

Spanish	English
Cuando era pequeño	**When I was little**
Jugaba	I played / used to play
Iba	I went / used to go
Visitaba a…	**I visited / used to visit**
Me gustaba (+ infinitive)	**I liked to… / I used to like to…**

Vocabulary

Look		Write	Check
Mi padre / el padrastro	My dad / stepdad		
Mi madre / la madrastra	My mum / stepmum		
Tiene el pelo…	He/she has… hair		
Tiene … años	He/she is … years old		
Es…	He/she is…		
Me llevo bien con…	I get on well with…		
No me llevo bien con…	I don't get on well with…		
Nos peleamos	We argue / fight		
Me hace reír	He / she makes me laugh		
Un buen amigo es	A good friend is…		
Sería…	Would be…		
Juego a los videojuegos	I play video games		
Voy a las tiendas	I go to the shops		
Salgo con mis amigos	I go out with my friends		
Voy a (+ infinitive)	I'm going…		
Vamos a (+ infinitive)	We are going…		
Comer en un restaurante	To eat at a restaurant		
Ir	To go		
Va a ser	It's going to be		
Fui	I went		
Salí	I went out		

Vocabulary

Look		Write	Check
Vi	I watched		
Jugué	I played		
Fue…	It was…		
Cuando era pequeño	When I was little		
Visitaba a…	I visited / used to visit		
Me gustaba (+ infinitive)	I liked to… / I used to like to…		

Vocabulary

Spanish	English	Spanish	English
El desayuno	Breakfast	Bailé	I danced
El almuerzo / la comida	Lunch	Participé	I participated in…
La cena	Dinner / tea	Decoré	I decorated
Como	**I eat**	**Comí**	**I ate**
Bebo	**I drink**	Vi	I watched / saw
Una comida	Meal	Visité	I visited
Mi plato preferido	My favourite dish	**Fue**	**It was**
Decoramos	We decorate	**Me gustaría (+ infinitive)**	**I would like**
Hay	**There is / are**	**Me encantaría (+ infinitive)**	**I would love**
Celebran	They celebrate	**Ver**	**To see**
Decoran	They decorate	**Visitar**	**To visit**
Comen	They eat	Comer	To eat
Ven	They watch / see	Parece emocionante	It seems exciting
Visitan	They visit	Me interesa la cultura	I'm interested in culture
Celebramos	**We celebrate**	En comparación con…	In comparison to…
Decoramos	We decorate	**Es más…**	**It's more…**
Comemos	**We eat**	**Es menos…**	**It's less…**
Vemos	We watch / see	Tenemos	We have
Visitamos	We visit	Tienen	They have
El año pasado	**Last year**	Comemos	We eat
Celebré	**I celebrated**	Comen	They eat

Vocabulary

Spanish	English
Celebramos	**We celebrate**
Celebran	**They celebrate**
En la foto	**In the photo**
Hay	**There is / are**
Puedo ver	**I can see**
Muchas personas	Lots of people
Edificios	Buildings
Árboles	Trees
Hace buen tiempo	**It's nice weather**
Hace mal tiempo	**It's bad weather**

Vocabulary

Look		Write	Check
Como	I eat		
Bebo	I drink		
Hay	There is / are		
Celebramos	We celebrate		
Comemos	We eat		
El año pasado	Last year		
Celebré	I celebrated		
Celebramos	We celebrate		
Celebran	They celebrate		
En la foto	In the photo		
Hay	There is / are		
Puedo ver	I can see		
Hace buen tiempo	It's nice weather		
Hace mal tiempo	It's bad weather		

Vocabulary

Spanish	English	Spanish	English
En mi ciudad hay…	**In my town there is / are…**	**Menos…**	**Less…**
Una piscina	A swimming pool	Mi región es…	My region is…
Una biblioteca	A library	**Me gustaría (+ infinitive)**	**I would like to (+ verb)**
Un museo	**A museum**	**Me encantaría (+ infinitive)**	**I would love to (+ verb)**
Un centro comercial	**A shopping centre**	**En el extranjero**	**Abroad**
Un centro deportivo / polideportivo	A leisure centre	Soy fan de…	I am a fan of…
Bonito / a	Pretty	La comida	The food
Feo / a	Ugly	Amable	Friendly
Hay mucho que hacer	There is lots to do	Relajado / a	Relaxed / laid-back
Se puede (+ infinitive)	**You / one can**	Cerca de	Close to
Ir a la playa	**To go to the beach**	Quiero comprar	I want to buy
Ir de compras	To go shopping	**¿Cuánto cuesta?**	**How much does it cost?**
Jugar en el parque	To play in the park	Compré…	I bought…
Comer en un restaurante de comida rápida	**To eat at a fast food restaurant**	Fui a las tiendas / Fui de compras	I went to the shops / shopping
Visitar un / el castillo	To visit a / the castle	Me gustaría visitar	I would like to visit…
Antes	Before	Visitaría…	I would visit…
En el pasado	**In the past**	Quiero (+ infinitive)	I want to (+ verb)
Había	**There was / were**	Quisiera / me gustaría (+ infinitive)	I would like to (+ verb)
Estaba / era	**It was / used to be**	Visitar	To visit
Que	**Than**	**Ver**	**To see**
Más…	**More…**	Probar	To try

Vocabulary

Look		Write	Check
En mi ciudad hay…	In my town there is / are…		
Un museo	A museum		
Un centro comercial	A shopping centre		
Se puede (+ infinitive)	You / one can		
Ir a la playa	To go to the beach		
Comer en un restaurante de comida rápida	To eat at a fast food restaurant		
En el pasado	In the past		
Había	There was / were		
Estaba / era	It was / used to be		
Que	Than		
Más…	More…		
Menos…	Less…		
Me gustaría (+ infinitive)	I would like to (+ verb)		
Me encantaría (+ infinitive)	I would love to (+ verb)		
En el extranjero	Abroad		
¿Cuánto cuesta?	How much does it cost?		
Ver	To see		

Vocabulary

Spanish	English	Spanish	English
Hay	**There is / are**	Iba a pie	I used to walk
Mucho	A lot of	Uso	I use
Demasiado	**Too much**	Reciclo	I recycle
Ruido	**Noise**	**Tengo derecho a…**	**I have the right to…**
Basura	**Rubbish**	**Los niños tienen derecho a…**	**Children have the right to…**
Polución	Air / water pollution	Salir	To go out
Espacios verdes	Green areas	Es justo	It's fair
Fábrica	Factory	Tengo la intención de…	I have the intention of…
Se puede + infinitive	**You can…**	Quiere	He / she wants
Se debería (+ infinitive)	**We should…**	Ayudar a los demás	To help others
Las latas	Tins	**En el futuro**	**In the future**
Las botellas	Bottles	Me parece	It seems to me
El vidrio	Glass	**Podemos + infinitive**	**We can**
Cuando era pequeño	When I was little	Ser amable con todos	To be nice to everyone
Antes	**Before**	Dar ropa	To give / donate clothes
Era más / menos ecológico	I was more / less environmentally friendly	Dar dinero	To give / donate money
Que ahora	Than now		

Vocabulary

Look		Write	Check
Hay	**There is / are**		
Demasiado	**Too much**		
Ruido	**Noise**		
Basura	**Rubbish**		
Se puede + infinitive	**You can…**		
Se debería (+ infinitive)	**We should…**		
Antes	**Before**		
Tengo derecho a…	**I have the right to…**		
Los niños tienen derecho a…	**Children have the right to…**		
En el futuro	**In the future**		
Podemos + infinitive	**We can**		

Vocabulary

Look		Write	Check
Hay	**There is / are**		
Demasiado	**Too much**		
Ruido	**Noise**		
Basura	**Rubbish**		
Se puede + infinitive	**You can…**		
Se debería (+ infinitive)	**We should…**		
Antes	**Before**		
Tengo derecho a…	**I have the right to…**		
Los niños tienen derecho a…	**Children have the right to…**		
En el futuro	**In the future**		
Podemos + infinitive	**We can**		

YEAR 9
Religion

Key Vocabulary

Morality	Ideas about right and wrong
Ethics	The study of how we decide what is right and wrong
Ethical dilemma	A situation where all options have moral advantages and disadvantages
Consequentialism	The belief that the morality of an action is judged by its outcomes
Utilitarianism	The theory that actions are right if they produce the greatest happiness for the greatest number
Hedonic Calculus	A way of measuring how much pleasure or pain an action might cause
Higher / Lower Pleasures	Mill's idea that some pleasures (thinking, learning) are better than others (basic physical pleasure)
Natural Law	Aquinas' theory that says actions are right if they follow our natural purpose, given by God
Primary Precepts	Basic moral principles in Natural Law (e.g. preserve life, reproduce)
Absolute morality	The idea that some actions are always right or wrong, no matter the situation
Relative (morality)	The idea that what is right or wrong can change depending on the situation
Situation Ethics	The belief that the most loving action is always the right one
Agape	Selfless, unconditional love for others
Autonomy	The right to make your own decisions about your life
Sanctity of Life	The belief that life is sacred because it is created by God
Quality of Life	A measure of how good a person's life is in terms of wellbeing
Personhood	The qualities that give a being moral value and rights
Slippery slope	The idea that one action could lead to more extreme or harmful actions
Revelation	The belief that God reveals truth or guidance to humans
Qur'an	The holy book of Islam, believed to be the word of Allah

Key Vocabulary

Hadith	Recorded sayings and actions of the Prophet Muhammad
Sharia	Islamic laws based on the Qur'an and Hadith
Authority	A source people trust for guidance (e.g. religious texts or leaders)
Empathy	The ability to understand and share the feelings of others
Pro-life	Belief that unborn life should be protected
Pro-choice	Belief that individuals have the right to choose abortion
Euthanasia (active)	Ending a person's life on purpose to stop suffering (e.g. giving a lethal injection)
Euthanasia (passive)	Allowing someone to die by stopping treatment
Assisted suicide	Helping someone end their own life
PGD (Pre-implantation Genetic Diagnosis)	A medical process used to test embryos for genetic conditions before pregnancy
Saviour sibling	A child created to help treat a sick brother or sister (e.g. through stem cells)
Justice	Fairness in how people are treated and judged
Punishment	A penalty given for committing a crime or wrongdoing
Deterrence	Preventing crime by making an example that discourages others
Retribution	Punishment that matches the seriousness of the crime
Rehabilitation	Helping someone change so they don't commit crimes again
Capital punishment	The death penalty
Ahimsa	The belief in non-violence towards all living things
Atman	The soul or spiritual self in Hindu Dharma
Brahman	The ultimate spiritual reality in Hindu Dharma
Stewardship	The responsibility to care for the environment

Questions
1. What word describes ideas about right and wrong?
2. What word describes the study of how we decide what is right and wrong?
3. What is the key term for a situation where all options have moral advantages and disadvantages?
4. What word means the belief that the morality of an action is judged by its outcomes?
5. Which theory states that actions are right if they produce the greatest happiness for the greatest number?
6. What is a way of measuring how much pleasure or pain an action might cause?
7. What is Mill's idea that some pleasures (thinking, learning) are better than others (basic physical pleasure)?
8. What is Aquinas' theory that says actions are right if they follow our natural purpose, given by God?
9. What is the key term for the basic moral principles in Natural Law (e.g. preserve life, reproduce)?
10. What is the key term for the idea that some actions are always right or wrong, no matter the situation?

Questions
11. What is the key term for the idea that what is right or wrong can change depending on the situation?
12. What is the belief that the most loving action is always the right one?
13. What word describes selfless, unconditional love for others?
14. What word describes the right to make your own decisions about your life?
15. What is the belief that life is sacred because it is created by God?
16. What is a measure of how good a person's life is in terms of wellbeing?
17. What word means the qualities that give a being moral value and rights?
18. What is the idea that one action could lead to more extreme or harmful actions?
19. What is the belief that God reveals truth or guidance to humans?
20. What is the holy book of Islam, believed to be the word of Allah?

Questions
1. What word describes the recorded sayings and actions of the Prophet Muhammad?
2. What word describes Islamic laws based on the Qur'an and Hadith?
3. What word describes a source people trust for guidance (e.g. religious texts or leaders)?
4. What is the ability to understand and share the feelings of others?
5. What term means the belief that unborn life should be protected?
6. What term means the belief that individuals have the right to choose abortion?
7. What kind of euthanasia involves ending a person's life on purpose to stop suffering (e.g. giving a lethal injection)?
8. What kind of euthanasia involves allowing someone to die by stopping treatment?
9. What is the key term for helping someone end their own life?
10. What is a medical process used to test embryos for genetic conditions before pregnancy?

Questions
11. What term means a child created to help treat a sick brother or sister (e.g. through stem cells)?
12. What word means fairness in how people are treated and judged?
13. What word means a penalty given for committing a crime or wrongdoing?
14. What word means preventing crime by making an example that discourages others?
15. What word means punishment that matches the seriousness of the crime?
16. What word means helping someone change so they don't commit crimes again?
17. What key term means the death penalty?
18. What word describes the Hindu belief in non-violence towards all living things?
19. In Hindu Dharma, what word means the soul or spiritual self?
20. What word means the responsibility to care for the environment?

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