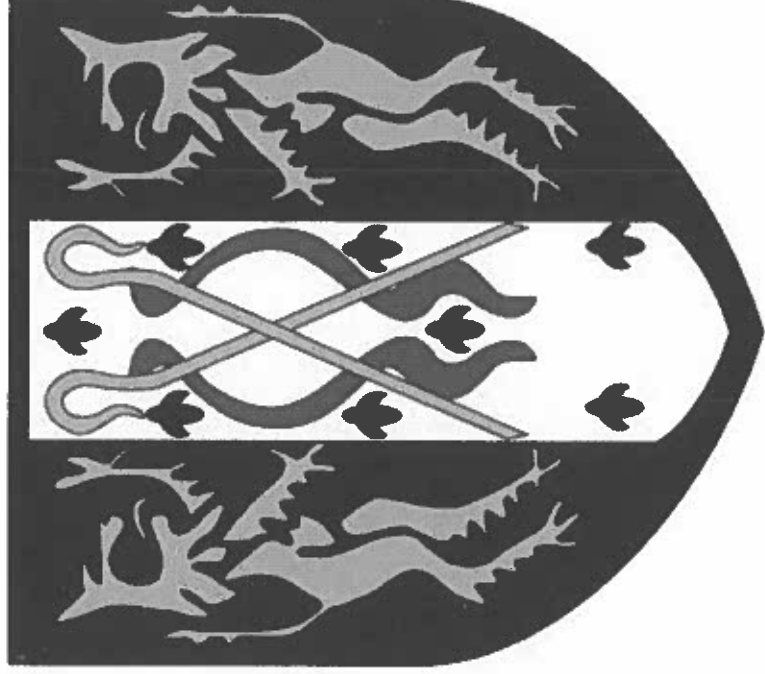


Year 10 Knowledge Organiser

EBACC – Booklet 1



English

English – Year 10 – HT1 – An Inspector Calls (Part 1)

Summary- Position in the Curriculum

Set in 1912 but written in 1945, *An Inspector Calls* opens with the Birling family celebrating the engagement of their daughter, Sheila, to Gerald Croft. The father, Arthur Birling, makes a series of speeches outlining his views on the marriage and also his views on social responsibility. Birling is interrupted by the arrival of Inspector Goole, who reveals that a girl has committed suicide that afternoon by drinking disinfectant. This girl is Eva Smith. The Inspector has a photograph and a diary from Eva. Inspector Goole interrogates the characters and we learn that Eva Smith used to work for Birling before being sacked after taking part in strike action. She then was employed at a shop called Milwards, but she lost that job after a customer (who we find out was Sheila) complained about her. Eva Smith changed her name to Daisy Renton and became Gerald's lover, but the affair came to an end.

<u>Terminology</u>	<u>Definitions</u>	<u>Core Knowledge</u>	<u>Preparing for Assessment</u>
Capitalism	A system whereby trade and industry are controlled by private owners for profit.	J.B. Priestley was ideologically Left Wing and was interested in the experiences of the working classes – he wrote a travelogue about the life of working classes during the Great Depression.	1. <i>What are the differences between Left Wing and Right Wing political ideologies?</i>
Socialism	A system whereby the means of production and distribution are owned by the state / community.	The play is set in 1912 but was written in 1945. During that period there were two World Wars and the Beveridge report , which outlined what was needed to rid poverty from Britain.	2. <i>What do Arthur Birling's opening speeches show about his character and his views on social responsibility – and how does he use language to persuade?</i>
Responsibility	Being answerable or accountable for something within your power.	As an upper-middle-class man in 1912, Arthur Birling would have had significant power and influence. He is a man who cares about his social position and demonstrating his power.	3. <i>In what ways are Arthur Birling and the Inspector initially contrasted? How does Arthur Birling try to intimidate the Inspector? How does the Inspector speak to the family?</i>
Dramatic Irony	The situation when an audience of a play know something that the characters do not.	Although Sheila Birling seems immature and selfish at the beginning of the play, she does demonstrate empathy for factory workers and expresses remorse for her actions.	4. <i>What did Arthur Birling do to Eva Smith and why? How does his behaviour reveal his Capitalist ideology? Does he express any remorse?</i>
Remorse	Deep regret coming from a sense of guilt at past wrongs.	Gerald Croft is involved in his father's business and shares some of the values of Birling – his marriage to Sheila seems like an advantageous business opportunity for Mr Birling.	5. <i>What are your first impressions of Sheila? How does she react to the news of Eva Smith's death? What was her role and how does she react when she realises this?</i>
<p>Key Quotations: 'I speak as a hard-headed business man' (Birling) * 'and every luxury – and unsinkable, absolutely unsinkable' (Birling) * 'as if we're all mixed up together like bees in a hive – community and all that nonsense' (Birling) * 'Well it's my duty to keep labour costs down' (Birling) * 'We let them all come back – at the old rates – except the four or five ringleaders' (Birling) * 'But these girls aren't cheap labour – they're people' (Sheila) * 'Old Joe Meggarty, half drunk and goggle-eyed, had wedged her into a corner with that obscene fat carcass of his' (Gerald) * 'She looked young and fresh and all together out of place' (Gerald) * 'You were the wonderful Fairy Prince' (Sheila) 'She was young and pretty and warm-hearted – and intensely grateful (Gerald) * 'Your daughter isn't living on the moon.' (Inspector)</p>			

Arthur Birling



Sheila Birling



Gerald Croft



Karl Marx



J.B. Priestley



English – Year 10 – HT2 – An Inspector Calls (Part 2)

Summary- Position in the Curriculum

The Inspector now turns his attention to Mrs Birling, who we learn volunteers at the Brumley Women's Charity Organisation. It is supposed to support women in distress, but when Eva Smith arrives under the name Mrs Birling and reveals that she is pregnant and alone, she is treated with contempt and snobbery from Sybil Birling - and any charity is refused. The father of the child was of a higher social class and was wild – and through foreshadowing it becomes clear to all but Sybil that Eric is the father. Eric returns and makes his confession: he was drunk, aggressive and forced himself on Eva Smith. He later stole money but she refused to take it. When Eric realises his mother's role, he again becomes aggressive. Inspector Goole makes a speech about social responsibility and then departs. Gerald returns and questions the authenticity of the Inspector and Eva, leaving the family thinking there has been a hoax – until a final twist!

<u>Terminology</u>	<u>Definitions</u>	<u>Core Knowledge</u>	<u>Preparing for Assessment</u>
Snobbery	A unattractive belief that you are inherently better than others due to your social class.	Sheila develops as an Everyman character, learning the moral message about social responsibility from the Inspector and Priestley.	1. How is Sybil Birling presented during her 'confession'? How do we know that she is a prejudiced and dishonest character? Can we understand her behaviour at all?
Condescend	Acting in a superior way and patronising others.	J.B Priestley read books and attended lectures about time travel, which could support one reading of the mysterious ending of the play.	2. In what ways could Eric's treatment of Eva Smith / Daisy Renton be said to be the most problematic of all the characters in the play?
Hoax	A trick or deception.	Sybil Birling is a dishonest snob who is prejudiced and believes that working class people lack integrity. Whilst she learns some things about family, she learns little about social responsibility.	3. What is the message of Inspector Goole's parting speech and how does he use language to persuade? How does his speech contrast with Arthur Birling's speeches?
Foreshadowing	Advance hints or clues of what is to come later in the story.	Eric Birling is awkward and embarrassed and a heavy drinker. He is aggressive and forceful. However, he accepts responsibility and is appalled by his parent's refusal to do so.	4. When the Inspector has departed, why do they doubt him and Eva Smith? What evidence do they have? Who leads the investigation in to his identity?
Everyman Character	In a morality play, a character who learns the moral message – in this case social responsibility.	We never meet Eva Smith, but learn about her through others. She represents the working class female experience in 1912 and her class and gender disenfranchisement.	5. Which characters seem most changed due to this experience? How do the different generations react when they think the Inspector might not be real?
<p>Key Quotations: 'You admit being prejudiced against her case?' (Inspector Goole) * 'She was giving herself ridiculous airs' (Sybil Birling) * 'As if a girl of that sort would ever refuse money' (Sybil Birling) * 'I was in that state when a chap easily turns nasty – and I threatened to make a row' (Eric) * 'Because you're not the kind of father a chap could go to when he's in trouble' (Eric) * 'We don't live alone. We are members of one body. We are responsible for each other' (Inspector Goole) * 'They will be taught it in fire and blood and anguish' (Inspector Goole) * [bitterly] 'I suppose we're all nice people now' (Sheila) * 'The famous younger generation who know it all – and they can't even take a joke.' (Birling)</p>			

Sybil Birling



Eric Birling



Eva Smith



Staging



Morality Play



English – Year 10 – HT3 – Jekyll and Hyde (Part 1)

Summary- Position in the Curriculum

Written in 1886 by Robert Louis Stevenson, the novel opens with Utterson taking his Sunday walk with friend Enfield. In a well-kept street they stumble upon a derelict doorway, which prompts Enfield to tell a story. Late at night he had seen a man trample a small girl. There was something very disturbing about the man and Enfield gives his name as Hyde. Later Utterson reads over his friend Jekyll's will. It says if he dies or disappears all his possessions will go to Hyde. Disturbed, Utterson visits Dr Lanyon, who says he no longer speaks to Jekyll. After troubled dreams, Utterson decides to meet Hyde for himself. He finds him repellent. Utterson visits Jekyll, who does not want to discuss Hyde or the will. A year later, the murder of Danvers Carew is told through the story of a maid who witnessed it. Half a broken cane and a letter to Utterson were found near the body. Utterson and Newcomen (the police officer) search Hyde's rooms. They find burned papers, the other part of the cane and a burned cheque book. At the bank they find Hyde has several thousand pounds.

<u>Terminology</u>	<u>Definitions</u>	<u>Core Knowledge</u>	<u>Preparing for Assessment</u>
Victorian Gothic	A style of writing that includes psychological terror, mystery, the supernatural and doubles.	Utterson is the narrative focaliser . He seems a reliable choice as he is a lawyer and a Victorian Gentleman – but he has dual sides to his personality, including curiosity and imagination.	1. How does Stevenson present the theme of duality in Chapter One? How do we see duality in Utterson, his friendship with Enfield and the different settings? 2. In Chapter Two Utterson has a nightmare. Which elements of the nightmare are based on Enfield's tale, and which does he invent himself? 3. Utterson meets Hyde in Chapter Two. How does Stevenson use language to present a terrifying character in both Utterson and Enfield's descriptions? 4. What do we learn about the appearance and personality of Jekyll in Chapter Three? How does he react when Utterson tries to discuss Hyde?
Duality	Having two conflicting, sides – for example, within a person.	Hyde is a strange, repugnant man who looks faintly pre-human. He is violent and cruel and anybody who sees him describes him as ugly and deformed – though no-one can say why.	
Atavism	A regression to more primitive life forms – almost the opposite of evolution.	Evil is personified in Hyde in the novel. He is entirely selfish, indulging in his own appetites without regard for others. Good is shown in the novel as being generous and kind.	
Victorian Gentleman	Was expected to behave in a certain way, repress their desires and be humble.	Jekyll is a 'good' religious man and a 'good' friend when not under the influence of Hyde. Although he is a respected man, he has a mysterious past and mysterious will.	
Narrative Focaliser	The character whose perspective the narrative follows.	London was a dirty, smoggy, dark and dangerous city at the time of writing. Sometimes covered in a brown fog from the factories of the Industrial Revolution . Riddled with crime which went largely unsolved by a relatively new and ineffective police force.	5. What is the theory of atavism? How did scientists like Lombroso believe you could identify someone regressing? How do descriptions of Hyde during the murder of Carew suggest that he is regressing?

Key Quotations:

'lean, long, dusty, dreary and yet somehow loveable' * 'The door, which was equipped with neither bell nor knocker, was blistered and distained' * 'It was like some damned juggernaut' * 'something displeasing, something down-right detestable' * 'such unscientific balderdash' * 'if he be Hyde,' he had thought, I shall be Mr Seek' * 'Mr Hyde shrank back with a hissing intake of breath' * 'Mr Hyde was pale and dwarfish' * 'with ape-like fury, he was trampling his victim underfoot and hailing down a storm of blows.'

Victorian Gentleman



Atavism



Murder of Carew



Utterson



R.L. Stevenson



English – Year 10 – HT4 – Jekyll and Hyde (Part 2)

Summary- Position in the Curriculum

Utterson visits Jekyll and finds him pale with illness. Jekyll says he will have no more to do with Hyde, and gives Utterson a letter signed by Hyde. Utterson later shows it to his clerk, Guest, who notices that Jekyll and Hyde have very similar handwriting – Utterson wonders if Jekyll forged it. Hyde has gone missing, and for two months Jekyll returns to his old self and is sociable. He then refuses to see Utterson, so Utterson visits Dr Lanyon. Dr Lanyon is physically changed and is dying from shock, but he won't say what has caused this – but it is clear it is connected to Jekyll. He dies two weeks later but leaves a letter for Utterson, which he can only open when Jekyll disappears or dies. On another Sunday walk Utterson and Enfield see Jekyll at his window, but something strange happens to him. Poole visits Utterson and asks for help. Poole thinks Hyde has murdered Jekyll. Utterson breaks down the door to Jekyll's laboratory and finds the body of Hyde twitching in clothes too big for him. They can't find Jekyll. Jekyll has left a letter, which Utterson leaves to read. This letter, and the letter from Dr Lanyon, explain the mystery.

<u>Terminology</u>	<u>Definitions</u>	<u>Core Knowledge</u>	<u>Preparing for Assessment</u>
Repression	The restraint, prevention or inhibition of a feeling or thought or desire.	Dr Lanyon is a respected lawyer. He represents rationality, reason and science. He serves as a contrast to Jekyll's mysticism. His death represents the victory of the supernatural.	1. How has Lanyon changed in Chapter 6? How does this description contrast with the description in Chapter 2?
Restraint	A measure to keep an action or behaviour under control.	Poole is a working-class character but intensely loyal and discreet. Utterson tries to patronise Poole in Chapter 8, but Poole fights for his master.	2. How does Stevenson use pathetic fallacy and Gothic conventions in the opening of the chapter 8? What mood is created?
Subconscious	Existing in the mind but beyond or beneath consciousness.	In Victorian times, Science was exciting but people were terrified of the possibilities and concerned about the conflict with traditional religion.	3. Create a timeline of events for Chapter 8? How does Utterson behave throughout – when meeting Poole and charging in to the room? How is Hyde described?
Reputation	The beliefs or opinions that are generally held about someone.	Victorians were religious and feared what went on 'behind closed doors.' This included sexual desires and temptations. To maintain reputations, many Victorian repressed desires.	4. In Chapter 9, How does Stevenson present science as something that is both terrifying and fascinating? How is language used to describe the transformation?
Vice	Immoral or wicked behaviour	An epistolary novel is one that uses letters to tell the story. Stevenson uses many letters, which is a trope of Gothic fiction. Most of these letters are given to Utterson who hides them in his safe – he seems to withhold evidence!	5. Summarise Chapter 10. Why did Jekyll begin his experiments? What obstacles did he face? What went wrong towards the end? What new information are we given?

Key Quotations:

'For more than two months the doctor was at peace' * 'He had his death-warrant written legibly upon his face. The rosy man had grown pale; his flesh had fallen away' * 'If I am the chief of sinners, I am the chief of sufferers also' * 'God forgive us' * 'Sir if that was my master, why had he a mask upon his face? If it was my master, why did he cry out like a rat?' * 'Your master, Poole, is plainly seized by one of those maladies that both torture and deform the sufferer' * 'I shall consider it my duty to break in that door' * 'for there before my eyes – pale and shaken, and half fainting, and groping before him with his hands, like a man restored from death – there stood Jekyll' * 'Man is not truly one, but truly two.'

Epistolary



Dr Lanyon



Transformation



The Last Night



Science Laboratory



English – Year 10 – HT5 – Power and Conflict Poetry (Part 1)

Summary- Position in the Curriculum

A selection of the *Power and Conflict* poems for English Literature Paper 2, focusing on the following themes: reality of war / suffering / patriotism / nature / bravery / shame / childhood

Poem	Content	Context	Form, Language and Structure	Preparing for Assessment
Bayonet Charge	An anonymous soldier is struggling on the battlefield. His previous feelings of patriotism are replaced with an overriding sense of fear.	Published in 1957 but most likely set in WWI. Draws a contrast between the idealism of patriotism and the reality of fighting and death.	The poem starts in media res to convey shock and pace - and enjambment maintains the momentum of the charge. Time stands still in the second stanza and there are contrasts between visual and aural imagery of battle with soldier's inner thoughts.	1. <i>What imagery does Hughes employ to convey the horrors of the battlefield and the loss of patriotism?</i>
Ted Hughes Charge of the Light Brigade	Describes a cavalry charge against Russians in the Crimean war, who shoot at the lightly armed British with canons. Many soldiers died.	Tennyson was poet laureate and had a responsibility to inspire the nation. He glorifies the soldiers, but does recognise that the commander made a mistake.	This is in ballad form to remember the courage of the soldiers. There are six verses , each representing 100 of the men who took part. Dactylic dimeter (DUM-de-de-) mirrors the galloping horses. Lots of repetition and anaphora to mirror the horrors of battle.	2. <i>How does Tennyson use personification to show how dangerous the battlefield was?</i>
Tennyson Remains	The narrative persona is a soldier who has killed a looter and is struggling with guilt. At first he seems nonchalant, but later is not.	Based on Guardsman Tromans, who fought in Iraq in 2003. The poem coincided with awareness of PTSD among the military.	A monologue told in the present tense to convey a flashback. The poem opens with colloquial language and sport imagery which presents the event almost as a game, but there is a clear volta and we realise the mental suffering. Repetition of 'possibly armed...'	3. <i>How is language used to describe the death of the looter in an unsympathetic way?</i>
Armitage Exposure	The speaker describes war as a battle against the weather. Imagery of cold and warm reflect the delusional mind of the dying man.	Written in 1917. Owen fought in WWI but died in battle in 1918. Although he highlighted the tragedy of war, he had a deep sense of duty.	The rhyme scheme ABBA and hexameter emphasises the monotony of war. The pararhymes only barely hold the poem together, like the men. There is a semantic field of weather, presenting weather as the enemy.	4. <i>How does Owen use personification to present the weather as the enemy?</i>
Owen Kamikaze	This poem explores a Kamikaze pilot's journey towards battle, his decision to return and how he is shunned when he returns.	In WWII, Japanese Kamikaze pilots would fly manned missiles in to targets. Cowardice or surrender was a great shame in wartime Japan.	The narrative and speaker is third person , representing the distance between her, her family, and his rejection by society. The first five stanzas are ordered (whilst flying on set mission) and there is only one full stop – when he makes his decision to return.	5. <i>Why are images of nature significant in the poem?</i>
Garland War Photographer	Tells the story of a war photographer developing photos at home in England, being reminded of the horrors of war.	Duffy was inspired by her friendship with a war photographer. She conveys the brutality of war and the indifference of the public viewing the photos in papers.	The enjambment reinforces the idea that the world is out of order and confused. The rhyme reinforces that he is trying to bring order to chaos by creating understanding. There are contrasts between rural England and war zones.	Annotating poems: Read at least twice Establish speaker, tense, addressee Establish narrative and theme
Duffy Poppies	Focuses on a mother whose son has gone to war. She helps him prepare and sends him off. His fate is ambiguous – does he die?	Set around the time of the Iraq and Afghan wars, but the conflict is ambiguous to give timeless relevance. Hints of criticism of the military.	This poem is an elegy , a poem of mourning. There is a strong sense of form despite the free verse stream of consciousness addressing her son directly. Nearly half the lines have caesura – she is trying to hold it together, but can't speak fluently.	Establish tone and mood Annotate structural devices Annotate language devices Consider the title
Weir				

Trench Warfare



Crimean War



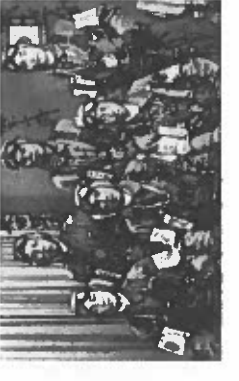
Exposure



Guardsman Tromans



Kamikaze pilots



English – Year 10 – HT5 – Power and Conflict Poetry (Part 2)

Summary- Position in the Curriculum

A selection of the *Power and Conflict* poems for English Literature Paper 2, focusing on the following themes: Power, control, inequality, loss, pride, fear, identity, anger, nature.

Poem	Content	Context	Form, Language and Structure	Preparing for Assessment
Ozymandias	The narrator meets a traveller who tells him about a forgotten and decayed statue in a desert that was of the ancient king, Ozymandias.	Shelley was a Romantic poet who was interested in emotion and nature and disliked the concept of monarchy and the oppression of ordinary people.	A sonnet but with an unconventional structure – the structure is normal until a turning point (volta), reflecting how human structures can be destroyed or decayed. The iambic pentameter rhyme scheme is also disrupted.	1. How does Shelley explore the idea that human power is only temporary? How is irony employed?
Shelley My Last Duchess	A Duke confesses to having his previous wife killed because he believed that she was flirtatious and ungrateful.	Browning may have been inspired by the story of an Italian Duke, Duke of Ferrara, whose wife died in suspicious circumstances. She was maybe poisoned.	A Dramatic Monologue in iambic pentameter written in couplets – no breaks or gaps or weaknesses, like the Duke. However, heavy use of caesura suggests stuttering and frustration and anger. The enjambment makes it seem conversational, but it is one-sided.	2. How is the Duke shown to be obsessed with power and control – but also as an unstable man?
Browning London	The narrator describes a walk around London and how he is saddened by the sights and sounds of poverty and loss of innocence.	Published in 1794, a time of great poverty in London. Blake focuses on how innocence is lost and society is corrupt, including the Church and Government.	A Dramatic Monologue where a 1 st person narrator speaks passionately about what he sees. A simple ABAB rhyme scheme shows the unrelenting misery of the city and his footsteps as he treads around.	3. What is the meaning of the metaphor 'mind forged manacles'? How does Blake use sensory imagery?
Blake Storm on the Island	The narrator describes how a rural community prepare for a storm. When the storm hits they are shocked by its power.	Seamus Heaney was Northern Irish. One possible reading of this poem is that it is a metaphor for the political storm that was building during the Irish Troubles.	The poem is split in to three sections: confidence, violence of the storm, and fear. There is a volta in line 14 'But no' – the monosyllabic phrase and the caesura reflects the final calm before the storm. The use of 'we' creates a sense of community.	4. How does Heaney use war imagery to describe the storm? How is personification employed?
Heaney Extract from the Prelude	The story of a boy's love of nature and a night-time adventure in a rowing boat that instils a fearful respect for nature's power.	Wordsworth was a Romantic poet and his poetry explores themes of nature, human emotion and how humans are shaped through interaction with nature.	The poem is split in to three sections: carefree and confident rowing, dark and fearful with the appearance of the mountain, reflective and troubled in the following days. Nature is personified as a powerful beast and is contrasted with the boy's panic.	5. How does Wordsworth use language to present the mountain as a terrifying beast?
Wordsworth Checking Out Me History	Represents the voice of a Caribbean man who is frustrated by the Eurocentric history curriculum.	Agard was born in the Caribbean in 1949 and moved to the UK in the 1970s. His poetry challenges racism and prejudice.	Stanzas concerning Eurocentric history (normal font) are interspersed with stanzas on black history (in italics to represent separateness and rebellion). Lack of punctuation, free verse, irregular rhyme scheme and phonetic spelling show rebellion.	Personal Research Tissue (Imtiaz Dharker)
Agard The Emigree	A speaker describes her memories of a home city that she was forced to flee. Despite citing problems, she has positive memories.	The home country of the speaker is not revealed – this ambiguity gives the poem a timeless and universal relevance.	The last line of each stanza is the same (epistrophe) 'sunlight', reinforcing the positivity of the city and of the poem. The first two stanzas have a lot of enjambments, conveying freedom, while the final stanza has full stops, conveying that she is now trapped.	
Rumens				

Ozymandias



London



Storm on the Island



The Lake District



John Agard



Maths



By the end of this half-term, you should be able to:

Chapter 1 – Number

- Use the product rule of counting
- Estimate answers to one- or two-step calculations, including use of rounding numbers and formal estimation to 1 significant figure
- Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractional and negative powers, and powers of a power
- Find the LCM and HCF of two numbers, by listing, Venn diagrams and using prime factors
- Add, subtract, multiply and divide numbers in standard form
- Simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{4 \times 3} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$)

Chapter 2 – Algebra

- Use instances of index laws, including use of zero, fractional and negative powers
- Expand the product of two linear expressions
- Factorise quadratic expressions of the form $ax^2 + bx + c$ including D.O.T.S.
- Solve linear equations which contain brackets, negative signs, unknown on either side or on both sides of the equation & with integer or fractional coefficients
- Derive a formula and set up simple equations from word problems, then solve these equations, interpreting the solution in the context of the problem
- Change the subject of a formula, including cases where the subject is on both sides of the original formula, or involving fractions and small powers of the subject
- Find and use the n th term of an arithmetic and quadratic sequence
- Continue geometric progression and find term to term rule

Keywords

Integer: a whole number which can be either positive, negative or zero.

Fractions, decimals and surds are not integers.

Estimate: an approximate answer which is usually found by rounding each number to 1 significant figure.

Factor: a factor of a number is a number that divides the given number evenly or exactly, leaving no remainder.

Surd: an expression that includes a square root, cube root or other root symbol.

Preparing for Assessment

- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge

Rationalise the denominator.

$$\begin{aligned} \text{a } \frac{1}{\sqrt{2}} &= \frac{1}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} \\ \text{b } \frac{5}{\sqrt{75}} &= \frac{5}{5\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{\sqrt{9}} = \frac{\sqrt{3}}{3} \end{aligned}$$

Multiplying by $\frac{\sqrt{2}}{\sqrt{2}}$ is the same as multiplying by 1, so this does not change the value.

First simplify $\sqrt{75}$

$$\frac{5}{\sqrt{75}} = \frac{5}{5\sqrt{3}} = \frac{1}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{\sqrt{9}} = \frac{\sqrt{3}}{3}$$

Simplify the fraction before rationalising.

Work out the value of a $27^{\frac{2}{3}}$ b $16^{-\frac{1}{2}}$

Use the rule $(x^m)^n = x^{mn}$. Work out the cube root of 27 first. Then square your answer.

$$\text{Use } x^{-n} = \frac{1}{x^n}$$

When there are m ways of doing one task and n ways of doing a different task, the total number of ways the two tasks can be done is $m \times n$.

Rational: A number is described as rational if it can be written as a fraction. The decimal form of a rational number is either a terminating or a recurring decimal.

Irrational: a number is irrational if it cannot be written as a fraction.

Identity: an equation that is always true, no matter what values are substituted.

Fractional indices: an example of a fractional index is $64^{\frac{2}{3}}$. The denominator of the fraction is the root of the number or letter, the numerator of the fraction is the power to raise the answer to.

Linear sequence: A linear sequence repeatedly increases or decreases by the same amount which is commonly known as the 'common difference'.

Quadratic sequence: sequences that include an n^2 term. They can be identified by the fact that the differences between the terms are not equal, but the second differences between terms are.

Geometric sequence: the terms increase (or decrease) by a constant multiplier.

The n th term is ar^n .

a Make a the subject of the formula $u^2 = u^2 + 2as$

b Make x the subject of the formula $y = \frac{ax + b}{c}$

a $v^2 = u^2 + 2as$

$v^2 - u^2 = 2as$ — Subtract u^2 from both sides.

$\frac{v^2 - u^2}{2s} = a$ — Divide both sides by $2s$.

$a = \frac{v^2 - u^2}{2s}$ — Re-write in the form $a = \dots$

b $y = \frac{ax + b}{c}$

$cy = ax + b$ — Multiply both sides by c .

$cy - b = ax$ — Subtract b from both sides.

$\frac{cy - b}{a} = x$ — Divide both sides by a .

$x = \frac{cy - b}{a}$ — Re-write in the form $x = \dots$

Find a formula for the n th term of the sequence 8, 23, 48, 83, 128, ...

sequence 0 23 48 83 128

1st differences +15 +25 +35 +45

2nd differences +10 +10 +10

$50 a = 10 \div 2 = 5$

The formula has a $5n^2$ term in it.

$5n^2$	5	20	45	80	125
Sequence	8	23	48	83	128

The n th term is $5n^2 + 3$

Factorise $x^2 + 5x + 6$

$x^2 + 5x + 6$

$(x + 2)(x + 3)$

$1 \times 6 = 2 \times 3$

$1 + 6 = 7 = 2 + 3 = 5$

$(x + 2)(x + 3)$

Check: $(x + 2)(x + 3) = x^2 + 5x + 6$

Work out the second differences.

Halve the second difference to find the coefficient of n^2 .

Compare the given sequence with $5n^2$.

The numbers in the second row are 3 more than those in the first row.

Write a pair of brackets with x in each one. This gives the x^2 term when multiplied.

Work out all the factor pairs of 6, the number term.

Work out which factor pair will add to give 5, the number in the x term.

Then write each number in each of the brackets with x .

The expression is now factorised. Expand the brackets to check it is correct.

A number in **standard form** is written in the format $A \times 10^n$, where A is a number between 1 and 10 and n is an integer.

When multiplying powers, add the indices: $x^m \times x^n = x^{m+n}$

When dividing powers, subtract the indices: $x^m \div x^n = x^{m-n}$

To raise a power to another power, multiply the indices.

$(x^m)^n = x^{mn}$

Other rules of indices:

$x^0 = 1$

$x^{-m} = \frac{1}{x^m}$

$\frac{1}{x^n} = \frac{1}{x^n}$

$x^{\frac{m}{n}} = (\sqrt[n]{x})^m$

A **formula** has an equals sign and letters to represent different quantities, e.g. $A = \pi r^2$ or

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



By the end of this half-term, you should be able to:

Chapter No.3 – Interpreting and representing data

- - Design, use, and complete two-way tables for discrete and grouped data.
- - Sort, classify, and tabulate discrete or continuous quantitative data.
- - Calculate mean, range, median, and mode from small data sets; use spreadsheets for these calculations.
- - Recognize advantages and disadvantages of different measures of average.
- - Construct and interpret stem-and-leaf diagrams (including back-to-back) to find mode, median, range, and compare distributions.
- - Calculate mean, mode, median, and range from frequency tables for discrete data.
- - Construct and interpret grouped frequency tables for continuous data; find intervals for median and modal class, estimate mean using mid-interval values.
- - Choose appropriate charts for different data sets; produce and interpret composite, comparative, and dual bar charts, pie charts, and frequency polygons.
- - Produce and interpret histograms, line graphs, frequency diagrams for grouped data, and time-series graphs; estimate median and calculate total population from these.
- - Compare mean, range, median, and mode of distributions; recognize patterns and relationships in various charts.
- - Draw and interpret scatter graphs; draw lines of best fit, identify outliers, and use lines to predict values and understand correlation types.
- - Understand that correlation does not imply causality; explain isolated points on scatter graphs and make cautious predictions from trends.

Chapter No.4 – Fractions, ratio and percentages

- - Express numbers as fractions, find equivalent fractions, and compare their sizes.
- - Simplify fractions and use them to simplify calculations.
- - Calculate a fraction of a quantity or measurement.
- - Convert between fractions and decimals.
- - Convert between mixed numbers and improper fractions.
- - Perform arithmetic operations (add, subtract, multiply, divide) with fractions, mixed numbers, and whole numbers.
- - Understand and use unit fractions as multiplicative inverses.
- - Determine if fractions can convert to recurring or terminating decimals by using prime factors.
- - Convert between fractions, decimals, and percentages.
- - Express quantities as percentages, including those greater than 100%.
- - Calculate percentages of quantities, including percentage increase or decrease.
- - Work out percentage changes, including real-life contexts like simple interest and tax.
- - Use percentages to compare quantities and solve reverse percentage problems.
- - Apply percentages in practical situations, describing increases/decreases with fractions.
- - Use fractions for more accurate calculations over rounded percentages or decimals.
- - Express divisions as ratios, simplify ratios, and divide quantities based on ratios.
- - Use ratios to find unknown quantities, convert between measures and currencies, and scale models and recipes.
- - Identify direct proportion and use ratios for comparisons and conversions.

Keywords

Percentage: a way to express a number as a part of 100. For example, 50% means 50 out of 100.

Preparing for Assessment

- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

Percent: another way to say "per hundred." If something is 20%, it's like saying 20 out of every 100.

Percentage Increase: how much something has grown compared to its original amount, shown as a percent.

Percentage Decrease: how much something has shrunk compared to its original amount, shown as a percent.

Simple Interest: extra money you earn or pay on a loan or savings, based only on the original amount.

VAT (Value Added Tax): a tax added to the price of goods and services when you buy them.

Multiplier: a number you use to multiply another number to increase or decrease it.

Reverse Percentage: figuring out the original number before a percent change happened.

Core Knowledge

The stem and leaf diagram shows the scores achieved in a test by 21 students.

2	3	7
3	0	2 3 5 5 7
4	1	5 5 5 6 8 9
5	0	6 7 7
6	4	8

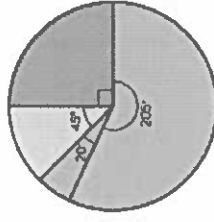
Key
4 1 means 41

Work out the range of the marks.

Find the median and the mode of the marks.

Put the data into groups 20 to 29, 30 to 39 etc. and find an estimate of the mean mark. Compare your answer to the actual mean.

The pie chart shows the results of a survey of people by a bus company to find out whether they thought the service had improved.

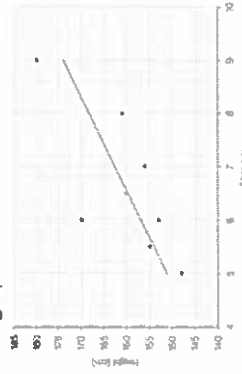


What percentage of the people surveyed thought the service had improved?

100 people said the service had got worse. What other information can you work out?

- Same
- Don't know
- Got worse
- Improved

The graph shows the shoe sizes and heights of a group of people.



Use the line of best fit to estimate the height of a person with:

- shoe size 7
- shoe size 7.5

Use the line of best fit to estimate the shoe size of someone 170 cm tall. How reliable do you think your answers are? Why?

Teddy and Mo are asked to calculate 35% of 150 cm. Which of their methods do you prefer and why?

Mo
$35 + 100 = 0.35$
$0.35 \times 150 = 52.5$ cm

Teddy
$150 + 10 = 15$ cm
10% = 15 cm
30% = 45 cm
$30\% + 5\% = 45$ cm + 7.5 cm
35% = 52.5 cm

Use the bar model to answer the questions.



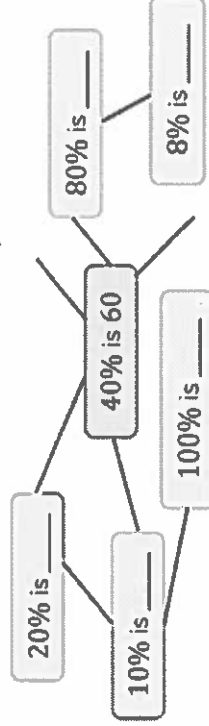
Amir and Tommy share £240 in the ratio 3 : 1. How much do they each receive?

Amir and Tommy share some money in the ratio 3 : 1. Tommy gets £240 more than Amir. How much did Amir receive?

Amir and Tommy share some money in the ratio 3 : 1. Amir gets £240. How much money did they share?

What's the same and what's different about the questions and the approaches to solving them?

40% of a number is 60. What other facts can you find?



By the end of this half-term, you should be able to:

- Chapter 5 – Angles and Trigonometry: 5a – Polygons, angles and parallel lines
5b – Pythagoras’ Theorem and trigonometry
- Classify quadrilaterals and triangles by their geometric properties
 - Understand and use the proof that angle sum of a triangle is 180, and find missing angles in scalene and isosceles triangles
 - Understand and use the angle sum of a quadrilateral is 360° to calculate unknown angles in a triangle.
 - Understand and use the angle properties of parallel lines and find missing angles using the properties of corresponding and alternate angles, giving reason.
 - Calculate and use the sums of the interior angles of polygons; use the sum of angles in a triangle and use the angle sum in any polygon to derive the
 - Understand ‘regular and irregular’ polygon and use angle facts to find angles in a polygon.
 - Find the size of each interior angle, or the size of each exterior angle, or the number of sides of a regular polygon.
 - Use angle facts to demonstrate how shapes would ‘fit together’, and work out the interior angles of shapes in a pattern
 - Understand, recall and use Pythagoras’ Theorem in 2D
 - Calculate the length of a line segment AB given pairs of points
 - Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures.
 - Know the exact value of $\sin \theta$, $\cos \theta$ and $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90°

- Chapter 6 – Graphs: 6a – The basics and real-life graphs
6b – Linear graphs and coordinate geometry
6c – Quadratic, cubic and other graphs
- Draw and interpret straight-line graphs for real-life situations, including conversion graphs, fuel bills, fixed charge and cost per item
 - Draw distance-time and velocity graphs
 - Use graphs to calculate various measures such as: average speed, distance, time, acceleration.
 - To be able to find midpoint and calculate the length of a line segment given the coordinates or the end points.
 - Find the equation of a straight line from a graph in the form of $y = mx + c$, by identifying the gradient and y-intercept. Including one point with a given gradient.
 - Plot and draw graphs of straight lines of the form $y = mx + c$ with and without a table of values.
 - Identify and interpret gradient; find the equation; plot and graphs of straight lines in the form $ax + by = c$
 - Interpret and analyse a straight-line graph and generate equations of line parallel and perpendicular to the given line. Also understand that a parallel line to it will have a gradient of m and a line perpendicular to this line with a gradient of $-\frac{1}{m}$
 - Recognise a linear, quadratic, cubic, reciprocal and circle graph from its shape.
 - Generate points and plot graphs of simple quadratic functions and find approximate solutions of a quadratic equation from the graph of the function.
 - Draw and interpret graph of simple cubic and reciprocal functions using table of values.
 - Draw circles, centre the origin, equation $x^2 + y^2 = r^2$

Keywords

Quadrilateral: a shape with four sides.

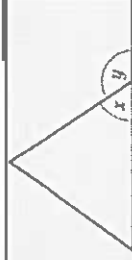
Angle: the amount of turn needed to move from one line to the other.

Polygon: a closed shape with three or more straight lines.

Preparing for Assessment

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- Use **‘Read, Cover, Write, Check’** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge



- When one side of a triangle is extended at the vertex:
- the angle marked x is called the **interior angle**.
- the angle marked y is called the **exterior angle**.

$x + y = 180^\circ$ (angles on a straight line)



In a right-angled triangle:

The **sine** of angle θ is the ratio of the opposite side to the hypotenuse, $\sin \theta = \frac{\text{opp}}{\text{hyp}}$

The **cosine** of angle θ is the ratio of the adjacent side to the hypotenuse, $\cos \theta = \frac{\text{adj}}{\text{hyp}}$

The **tangent** of angle θ is the ratio of the opposite side to the adjacent side, $\tan \theta = \frac{\text{opp}}{\text{adj}}$

You can find the sine, cosine and tangent of an angle using the **[sin]** **[cos]** **[tan]** keys on your calculator.

Interior angle: an angle between the sides inside a polygon.

Exterior: angle formed outside a polygon when a side is extended.

Tessellation: a pattern of shapes that fit together perfectly, without any gaps.

Symmetry: something is symmetrical when it has two matching halves.

Parallel lines: lines that do not intersect or meet each other at any point.

Corresponding angles: a pair of angles that are found in the same relative position on different intersections. They are equal.

Alternate angles: a pair of angles that occur on opposite sides of the transversal line and have the same size.

Co-interior: the two angles that occur on the same side of the transversal. Co-interior angles add up to 180° .

Vertices: the points where two or more line segments or edges meet.

Edge: a line segment between faces.

Face: a flat surface on a 3D shape.

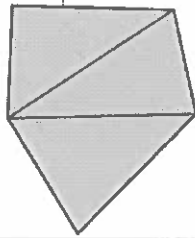
Pythagoras' Theorem: $a^2 + b^2 = c^2$

Trigonometry: it is about the relationship between angles and side lengths of a triangle. The trigonometric functions relate the angles of a right-angled triangle with ratios of its side lengths.

Sine: one of the main trigonometric functions. It is the ratio of the side of the angle opposite the angle divide by the hypotenuse.

Cosine: the trigonometric function that is equal to the ratio of the side adjacent to an acute angle to the hypotenuse.

Work out the sum of the interior angles of a pentagon.



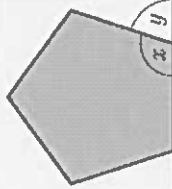
A pentagon has five sides. Sketch a pentagon. Draw in the diagonals from one vertex to all the other vertices.

The pentagon has been divided into 3 triangles. The angle sum of each triangle is 180° .

Sum of the interior angles of a pentagon = $3 \times 180^\circ = 540^\circ$

When one side of a polygon is extended at a vertex:

- angle x is the interior angle
- angle y is the exterior angle.



interior angle + exterior angle = 180° (angles on a straight line add up to 180°)

The sum of the exterior angles of a polygon is always 360° .

In a regular polygon all the angles are the same size, so exterior angle = $\frac{360^\circ}{\text{number of sides}}$

The sum of the interior angles of a polygon is 1620° . How many sides does the polygon have?

$$(n-2) \times 180^\circ = 1620^\circ$$

$$n-2 = \frac{1620}{180}$$

$$n-2 = 9$$

$$n = 11$$

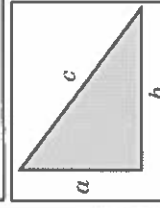
Form an equation using the sum of interior angles.

Divide both sides by 180.

Add 2 to both sides.

In a right-angled triangle the longest side called the hypotenuse. Pythagoras' theorem states that, in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

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



Calculate the length of the hypotenuse.

Give your answer correct to 2 significant figures.

$$a = 5, b = 4, c = x$$

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

$$x^2 = 5^2 + 4^2$$

$$x^2 = 25 + 16$$

$$x^2 = 41$$

$$x = \sqrt{41}$$

$$x = 6.4031\dots$$

$$x = 6.4 \text{ cm (to 2 s.f.)}$$

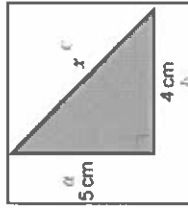
Sketch the triangle. Label the hypotenuse c and the other two sides a and b .

Substitute the values of a , b and c into the formula for Pythagoras' theorem.

Use a calculator to find the square root.

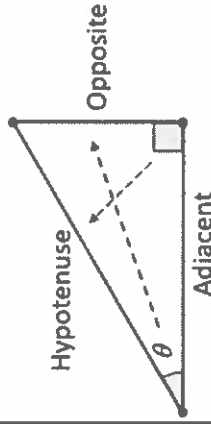
Round your answer to 2 significant figures and put the units in your answer.

Discussion Does it matter which side is a and which is b ?



SOHCAHTOA

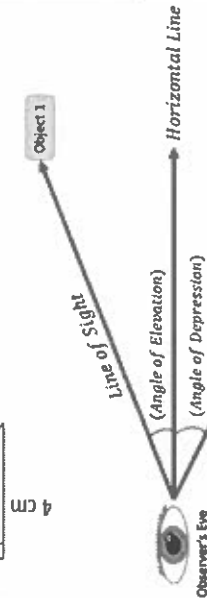
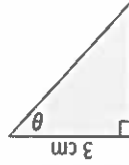
SOH $\sin \theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$
 CAH $\cos \theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$
 TOA $\tan \theta = \frac{\text{Opposite}}{\text{Adjacent}}$



You can use \sin^{-1} , \cos^{-1} or \tan^{-1} on your calculator to find an angle when you know its sin, cos or tan.

$$\tan \theta = \frac{4}{3} \quad \theta = \tan^{-1} \left(\frac{4}{3} \right)$$

$$\theta = 53.1^\circ$$



Angle of Depression

When an object is positioned below the observer's eye level, an angle of depression is formed.

Angle of Elevation

When an object is positioned above the observer's eye level, the angle of elevation is formed.

The sine, cosine and tangent of some angles may be written exactly

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

Tangent: the ratio of the side opposite the angle divide by the side adjacent to that angle.

Opposite: the side of a right-angled triangle facing the angle we know or want to know.

Hypotenuse: the longest side of a right-angled triangle opposite the right angle.

Adjacent: angles that are directly next to each other and do not overlap.

Ratio: is a way of comparing two or more quantities.

Segment: a part of a line or curve between two points.

Pythagoras Theorem: in a right-angled triangle, the square of the hypotenuse side is equal to the sum of squares of the other two sides.

Speed: a measure of how fast something is travelling.

Velocity: how fast something is moving as well as in what direction it is moving.

Quadratic function: the general form of the quadratic equation is: $ax^2 + bx + c = 0$ where x is an unknown variable and a, b, c are numerical coefficients.

Root: the values of the variables that satisfy the equation. Also known as the quadratic equation's "solutions" or "zeros"

Linear equation: an algebraic equation where the highest power of the variable is always one. The graph is a straight line.

Gradient: the measure of the steepness of a straight line. Can be either +ve or -ve.

Cubic function: a polynomial function of degree 3. The graph may intersect the x -axis at maximum of 3 points.

Perpendicular: a straight line that makes a right angle (90 degrees) with the other line.

- A linear equation generates a straight-line graph and the equation can be written as $y = mx + c$ where m is the gradient and C is the y -intercept. Parallel lines have the same gradient.

- To compare the gradient and y -intercept of two straight lines, make sure their equations are in the form $y = mx + c$
- To find the y -intercept of a graph, find the y -coordinate where $x = 0$. To find the x -intercept of a graph, find the x -coordinate when $y = 0$

- A **distance-time graph** represents a journey.

- Straight lines mean constant speed

- horizontal lines mean no movement

- the gradient is the speed, since average speed = $\frac{\text{total distance}}{\text{total time}}$

- Average speed = $\frac{\text{total distance}}{\text{total time}}$

Make sure your units match.

- The gradient of a straight line is the rate of change.

- On a **velocity-time graph**

- straight lines mean constant acceleration

- horizontal lines mean no change in velocity (i.e. travelling at a constant velocity)

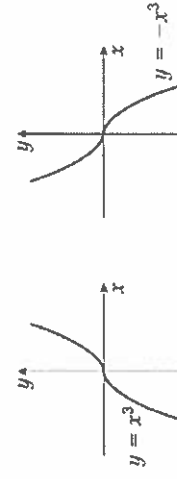
- the gradient is the acceleration, since acceleration = $\frac{\text{change in velocity}}{\text{time}}$

- the area under a velocity-time graph is the distance travelled.

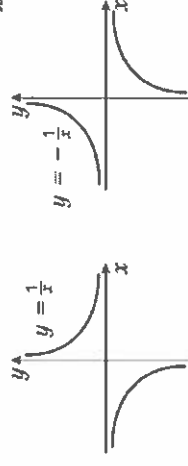
A **quadratic equation** contains a term in x^2 but no higher power of x . A quadratic graph has either a **minimum point** or a **maximum point**. The graph of a quadratic equation is a curved shape called a **parabola**, where the graph turns.



A **cubic function** contains a term in x^3 but no higher power of x . It can also have terms in x^2 and x and number terms.



Reciprocal functions are in the form $\frac{k}{x}$ where k is a number.





By the end of this half-term, you should be able to:

Chapter 7 – Area and Volume: 7a – Perimeter, area and circles
 7b – 3D forms and volume, cylinders, cones, spheres
 7c – Accuracy and bounds

- Recall and use the formulae for the area of a triangle, rectangle, trapezium and parallelogram calculate area of 2D shapes. Including compound shapes.
- Calculate the perimeter of 2D shapes. Including compound shapes.
- Recall and use formulae for the circumference and area of a circle using circumference = $\pi d = 2\pi r$ and area of a circle = πr^2 to calculate area and perimeter of shapes involving circles.
- Calculate arc lengths, and angles and area of sectors of circles.
- Form equations involving more complex shapes and solve these equations.
- Recall and use the formula to find surface area and volume of prisms, pyramid, cones, spheres, hemisphere, etc.
- Convert between metric measures of volume and capacity, e.g 1 ml – 1 cm³
- Calculate the upper and lower bounds of number/expressions given to varying degrees of accuracy.
- Find the upper and lower bounds of calculations involving perimeters, areas and volumes of 2D and 3D shapes.

Chapter 8 – Transformation and constructions: 8a - Transformations

8b – Constructions, loci and bearings

- Rotate 2D shapes using the origin or any other point (not necessarily on a coordinate grid).
- Recognise and describe reflections on a coordinate grid – know to include the mirror line as a simple algebraic equation, $x = a, y = a, y = x, y = -x$ and lines not parallel to the axes.
- Recognise and describe single translations using column vectors on a coordinate grid.
- Describe and transform 2D shapes using enlargements by a positive integer, positive fractional, and negative scale factor.
- Understand and draw front and side elevations and plans of shapes made from simple solids.
- Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid.
- Calculate bearings and solve bearings problems, including on scaled maps, and find/mark and measure bearings.
- Use the standard ruler and compass constructions to bisect a given angle; construct a perpendicular to a given line form/at a given point; construct angles of 90°, 45°; perpendicular bisector of a line segment.
- Find and describe regions satisfying a combination of loci, including in 3D.

Keywords

Area: The space inside the boundary of a closed shape. It is measured in square units.

Perimeter: The total distance around the outside of a shape.

Formula: A rule written with mathematic symbols. It usually connects two or more quantities with an equal sign.

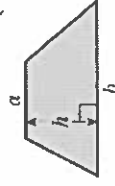
Prism: A 3D solid that has the same cross-section all through its length.

Preparing for Assessment

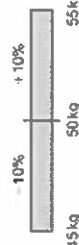
- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use **‘Read, Cover, Write, Check’** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge

- To convert from cm² to mm², multiply by 100. To convert from mm² to cm², divide by 100.
- 1 hectare (ha) is the area of a square 100m by 100m. 1 ha = 100m x 100m = 10000 m²



Area of a trapezium = $\frac{1}{2}(a + b)h$



- A 10% error interval means that a measurement could be up to 10% larger or small than the one given. ⁴⁵kg ⁵⁵kg

Compound shape: Any shape that is made up of two or more geometric shapes.

Polygon: A closed 2D shape with 3 or more side made of straight lines.

Cuboid: A 3D shape that has six faces, twelve edges and eight vertices.

Volume: The amount of space in a 3D object.

Capacity: The maximum amount that something can contain.

Nets: A term used to describe what a 3D shape would look like if it was opened out and laid flat.

Symmetry: Means that one shape becomes exactly like another when you move it in some way: turn, flip or slide.

Vertices: The points where two or more line segments or edges meet.

Edge: A line segment between faces

Face: A flat surface on a 3D shape

Segment: A part of a line or curve between two points.

Arc: A portion of the boundary of a circle or a curve.

Sector: A part of a circle made of the arc of the circle along with its two radii.

Circumference: This distance around the boundary of a circle

Radius: Distance from the centre of the circle to any point in its circumference.

Diameter: Distance across the circle, going through the centre.

Pi (π): The ratio of the circumference of a circle to its diameter.

Hemisphere: 3D shapes that is half of a sphere with one flat, circular side.

- Measurements rounded to the nearest unit could be up to half a unit smaller or larger than the round value. The possible values of x that round to 3.4 to 1 d.p. are $3.35 \leq x < 3.45$.

- The upper bound is half a unit greater than the rounded measurement. The lower bound is half a unit less than the rounded measurement. 12.5 (lower bound) $\leq x < 13.5$ (upper bound).

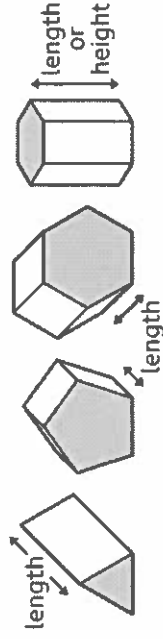
- When giving the answer to a calculation to an appropriate degree of accuracy, round the upper and lower bounds by the same amount. If the upper and lower bound give the same value when rounded, then the answer is to an appropriate degree of accuracy.

- Volume is measure in mm^3 , cm^3 , m^3 .

- Capacity is measure in ml and litres. $1\text{cm}^3 = 1\text{ml}$, $1000\text{cm}^3 = 1\text{litre}$.

- Volume of a prism = area of cross-section \times length

- Volume = Area of cross-section \times length

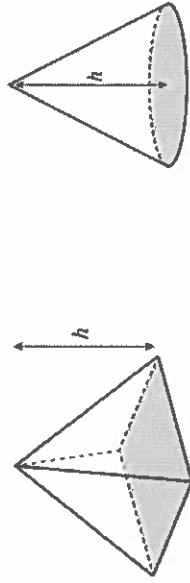


- The volume of a cylinder of radius r and height h is $V = \pi r^2 h$

- Volume of pyramid

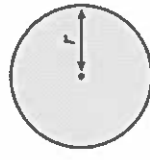
- The circumference of a circle is its perimeter. For any circle circumference = $\pi \times$ diameter. $C = \pi d$ or $C = 2\pi r$
- Volume of pyramid = $\frac{1}{3}$ area of base \times vertical height

- Volume of cone = $\frac{1}{3}$ area of base \times vertical height = $\frac{1}{3}\pi r^2 h$



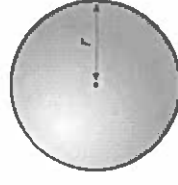
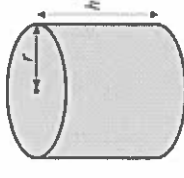
- Curved surface area of a cone = $\pi r l$, where r is the radius and l is the slant height.

Total surface area of a cone = $\pi r l + \pi r^2$.

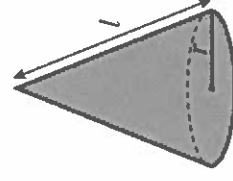


The formula for the area, A , of a circle with radius r is $A = \pi r^2$

The surface area of a cylinder of radius r and height h is $2\pi r^2 + 2\pi r h$



For a sphere of radius r
surface area = $4\pi r^2$
volume = $\frac{4}{3}\pi r^3$



- The plan is the view from above an object. The front elevation is the view of the front of the object. The side elevation is the view of the side of the object.

Frustum: The lower portion or base of a pyramid or cone that is a result of cutting off the upper portion parallel to the base.

Surface area: The total area of all the faces of a 3D shape.

Scale factor: The ratio of corresponding sides on two similar shapes.

Vector: A quantity containing both magnitude and direction.

Centre of Enlargement: A point that tells you where to draw an enlargement.

Mirror line: Line drawn to show that both sides have exact reflective symmetry.

Congruent: The same shape and size.

Constructions: To draw accurately using a ruler and compasses.

Bisect: To cut or divide something into two equal parts.

Bisector: A line that divides a line or an angle into two equivalent parts.

Line segment: A line section that can link two points.

Perpendicular line: A straight line that makes a right angle (90 degrees) with the other line.

Loci (Locus) is the set of all points that obey a certain rule. Often the locus is a continuous path.

Bearing is an angle in degrees, clockwise from north. A bearing is always written using three digits.

- A **transformation** moves a shape to a different position. **Reflections, rotations, translations and enlargements** are all types of transformation.

- An original shape is called an **object**. When the object is reflected, rotated, translated or enlarged, the resulting shape is called an **image**.

- To describe a **rotation**, you need to give the direct of turn (clockwise or anticlockwise), the angle of turn and the **centre of rotation**.

- An **enlargement** is a transformation where all the side lengths of a shape are multiplied by the same **scale factor**.

- To describe an **enlargement**, you need to give the **centre of enlargement** and the scale factor. To find the centre of enlargement, join corresponding points of the object and the image.

- To **enlarge** a shape by a **fractional scale factor**, multiply the distance from the centre to each point on the shape by the **scale factor**.

- A **negative scale factor** takes the image to the opposite side of the **centre of enlargement**.

- When a shape is enlarged the area increases by (scale factor)².

- You can describe a translation using a column vector. The column vector for a translation 2 squares right and 3

square down is $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$. The top number in the **column vector** gives the movement parallel to the *x-axis* and the bottom number give the movement parallel to the *y-axis*.

- The **resultant vector** is the vector that moves the original shape to its final position after a number of translations or other transformations.

- In reflections, rotations and translations, the object and the image are **congruent**, as the lengths of the sides and the angles do not change.

- In an **enlargement**, the **object** and the **image** are similar.

- To **construct** means to draw accurately using a ruler and compasses.

- A **perpendicular bisector** cuts a line in half at right angles. The shortest distance from a point to a line is perpendicular to the line.

- An **angle bisector** cuts an angle exactly in half

- The **locus** of a point that moves so it is always a fixed distance from a fixed point is a circle.

- Points **equidistant** from two points lie on the perpendicular bisector of the line joining the two points.

- Points **equidistant** from two lines lie on the angle bisector.



By the end of this half-term, you should be able to:

Chapter 9 - Equations and Inequalities

- Factorise and solve quadratic equations in the form of $ax^2 + bx + c$
- Solving quadratic equations using the quadratic formula
- Solve quadratic equations by factorising and completing the square
- Solving simple simultaneous equations in two unknowns
- Solving linear, quadratic and circle ($x^2 + y^2 = r^2$) simultaneous equations
- Solving linear inequalities
- Write down whole number values that satisfy an inequality
- Solve simple linear inequalities in one variable, and represent the solution set on a number line
- Solve two linear inequalities in x , find the solution sets and compare them to see which value of x satisfies both solve linear inequalities in two variables algebraically
- Use the correct notation to show inclusive and exclusive inequalities

Chapter 10 - Probability

- Write probabilities using fractions, percentages or decimals
- Understand and use experimental and theoretical measures of probability and know that the sum of the probabilities of all outcomes is 1
- Estimate the number of times an event will occur, given the probability and the number of trials
- Draw sample space diagrams and use them for adding simple probabilities
- To use union and intersection notation
- To use two-way tables, tree diagrams and Venn diagrams to calculate conditional probabilities
- Compare relative frequencies from samples of different sizes

Keywords

Keyword:

Quadratic: An expression where the highest power of the variable (e.g. x) is 2.

Root: The solutions to the equation.

Where $y = 0$ so where the graph intersects the x -axis. There can be 0, 1 or 2 roots

Linear: a function that has either one or two variables without exponents

Preparing for Assessment

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- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge

Solve $x^2 + 2x - 8 = 0$

$(x + 4)(x - 2) = 0$

So either $x + 4 = 0$ or $x - 2 = 0$

$x = -4$ or $x = 2$

You can show **inequalities** on a number line.

An empty circle \circ shows that the value is not included.

A filled circle \bullet shows that the value is included.

An arrow \rightarrow shows that the solution continues towards infinity.

You can rearrange an inequality in the same way as you rearrange an equation.

Solve these simultaneous equations.

① $2x + y = 3$
 ② $x^2 + y = 6$

$y = 3 - 2x$

Rearrange equation ① to make y the subject.

$x^2 + (3 - 2x) = 6$

Substitute $y = 3 - 2x$ into equation ②

$x^2 - 2x + 3 = 6$

Expand the bracket, and rearrange so the right-hand side is 0.

$x^2 - 2x - 3 = 0$

Solve the quadratic equation.

$(x + 1)(x - 3) = 0$

So either $(x + 1) = 0$ or $(x - 3) = 0$

$x = -1$ or $x = 3$

Substitute $x = -1$ into equation ① to find one value of y .

$2 \times (-1) + y = 3$

$-2 + y = 3$

$y = 5$

Substitute $x = 3$ into equation ① to find the second value of y .

$2 \times 3 + y = 3$

$6 + y = 3$

$y = -3$

So the solutions are $x = -1, y = 5$ and $x = 3, y = -3$

Surd: An irrational number that can't be simplified to remove a square root

Function: an expression, rule, or law that defines a relationship between one variable (the independent variable) and another variable (the dependent variable)

Sets: A collection of 'things'

Union: $A \cup B$ means all elements in A OR B OR both

Intersection: $A \cap B$ means all elements in A AND B

Probability: How likely an event is to occur

Mutually exclusive: They cannot happen at the same time.

Tree diagrams:

- Frequency Tree (Shows the number of people who chose different options for different choices)
- Probability Tree (Shows combinations of outcomes and their probabilities.)

Probability = $\frac{\text{number of successful outcomes}}{\text{total number of possible outcomes}}$

You can use the **quadratic formula**

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

to find the solutions to a quadratic equation $ax^2 + bx + c = 0$

Solve $x^2 + 4x + 2 = 0$. Give your solutions in surd form.

$$a = 1, b = 4, c = 2$$

Compare with $ax^2 + bx + c$. Write the values of a, b and c .

$$x = \frac{-4 \pm \sqrt{4^2 - 4 \times 1 \times 2}}{2 \times 1}$$

Substitute a, b and c into the quadratic formula.

$$= \frac{-4 \pm \sqrt{16 - 8}}{2}$$

$$= \frac{-4 \pm \sqrt{8}}{2}$$

You are asked to give your solutions in surd form, so simplify the surds.

$$= \frac{-4 \pm \sqrt{4 \times 2}}{2}$$

$$= \frac{-4 \pm 2\sqrt{2}}{2} = -2 \pm \sqrt{2}$$

\pm means plus or minus.

$+$ gives one solution and $-$ gives the other.

The solutions are $x = -2 + \sqrt{2}$ and $x = -2 - \sqrt{2}$

Two fair five-sided spinners are spun and the results are added together.

- Draw the sample space diagram to show all the possible outcomes.
- Work out the probability of getting a total of 2.
- Work out the probability of getting a total of 6.
- Work out the probability of getting a total that is a prime number.

		Red spinner				
		1	2	3	4	5
Blue spinner	1	2	3	4	5	6
	2	3	4	5	6	7
	3	4	5	6	7	8
	4	5	6	7	8	9
	5	6	7	8	9	10

$P(2) = \frac{2}{25}$
 $P(6) = \frac{2}{25} = \frac{2}{5}$
 $P(\text{prime}) = \frac{11}{25}$

The outcomes that are prime numbers are 2, 3, 5 and 7.

A tree diagram shows two or more events and their probabilities.

$A \cap B$ means A intersection B. This is all the elements that are in A and in B.

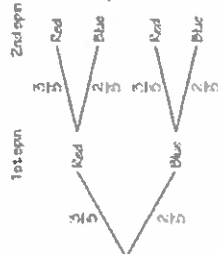
$A \cup B$ means A union B. This is all the elements that are in A or B or both.

A' means the elements not in A.

ξ means the universal set - all elements being considered.

This fair five-sided spinner is spun twice.

- Draw a tree diagram to show the probabilities.
- What is the probability of both spins landing on red?
- What is the probability of landing on one red and one blue?



Write the probability on each branch of the diagram.

Go along the branches for Red. Red. The 1st and 2nd spins are independent, so multiply the probabilities.

$$P(R, R) = \frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$$

$$P(R, B) = \frac{1}{5} \times \frac{4}{5} = \frac{4}{25}$$

$$P(B, R) = \frac{4}{5} \times \frac{1}{5} = \frac{4}{25}$$

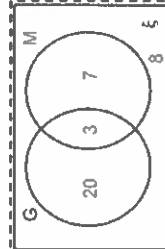
Go along the branches for Red. Blue and Blue. Red. The outcomes Red, Blue and Blue, Red are mutually exclusive, so add the probabilities of their outcomes.

$$P(R, B \text{ or } B, R) = \frac{4}{25} + \frac{4}{25} = \frac{8}{25}$$

The Venn diagram shows the number of students studying German (G) and Mandarin (M).

A student is picked at random. Work out

- $P(G \cap M)$
- $P(G')$
- $P(G \cup M)$



Work out the total number of students.

$$20 + 3 + 7 + 8 = 38$$

Number of students in $G \cap M$ total number of students

$$P(G \cap M) = \frac{3}{38}$$

Number of students in G' total number of students

$$P(G') = \frac{7 + 8}{38} = \frac{15}{38}$$

Number of students in $G \cup M$ total number of students

$$P(G \cup M) = \frac{20 + 3 + 7}{38} = \frac{30}{38}$$



By the end of this half-term, you should be able to:

Chapter 11 – Multiplicative Reasoning

- Express a multiplicative relationship between two quantities as a ratio or a fraction, e.g. when $A:B$ are in the ratio $3:5$, A is $\frac{3}{5}B$. When $4a = 7b$, then $a = \frac{7b}{4}$ or $a:b$ is $7:4$
- Solve proportion problems using the unitary method
- Represent repeated proportional change using a multiplier raised to a power,
- To solve problems involving compound interest and depreciation
- Understand and use compound measures and convert
- Calculate an unknown quantity from quantities that vary in direct or inverse proportion
- Set up and use equations to solve word and other problems involving inverse proportion, and relate algebraic solutions to graphical representation of the equations.

Chapter 12 – Similarity and Congruency

- Understand and use SSS, SAS, ASA and RHS conditions to prove the congruence of triangles
- Understand similarity of triangles and of other plane shapes, and use this to make geometric inferences
- Prove that two shapes are similar by showing that all corresponding angles are equal in size and/or lengths of sides are in the same ratio/one is an enlargement of the other, giving the scale factor
- Find missing lengths, areas and volumes in similar 3D solids
- Know the relationships between linear, area and volume scale factors of mathematically similar shapes and solids
- Solve problems involving frustums of cones where you have to find missing lengths first using similar triangles

Keywords

Keyword:

Ratio: Relationship between the number of parts. Has a colon (:)

Proportion: an equation in which two ratios are equal

Best value: problems which involve

assessing items that are best value for money

Unitary: find the value of one item and then scale up

Preparing for Assessment

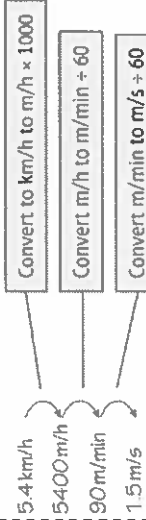
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Core Knowledge

You can calculate an amount after n years' compound interest using the formula:

$$\text{amount} = \text{initial amount} \times \left(\frac{100 + \text{interest rate}}{100} \right)^n$$

A man walks at an average speed of 5.4 km/h. What is his average speed in m/s?



Compound measures combine measures of two different quantities. Speed is a measure of distance travelled and time taken. It can be measured in metres per second (m/s), kilometres per hour (km/h) or miles per hour (mph).

$$\text{Average speed} = \frac{\text{distance}}{\text{time}} \text{ or } S = \frac{D}{T}$$

The diagram shows a block of wood in the shape of a cuboid.

The density of wood is 0.6 g/cm^3 .

Work out the mass of the block of wood.

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

Volume of block = $l \times w \times h$

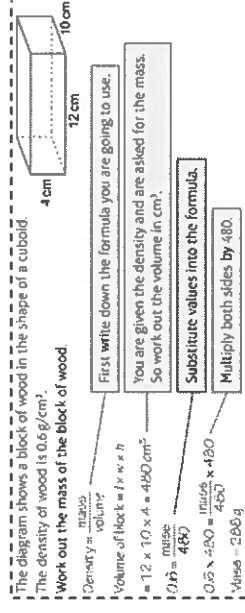
$$= 12 \times 10 \times 4 = 480 \text{ cm}^3$$

∴ mass

$$= 0.6 \times 480 = 288 \text{ g}$$

Substitute values into the formula.

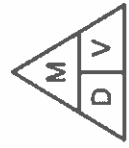
Multiply both sides by 480.



Proportional change: when you repeatedly increase or decrease an amount by the same percentage

Compound measure: measures which are found from two other measures

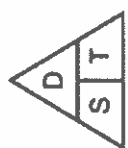
Density: The mass of substance contained in a certain volume,
Density = mass/volume



Mass: is a parameter of measurement that calculates how much matter is contained in a body.

Volume: the space occupied within the boundaries of an object in three-dimensional space. It is also known as the capacity of the object.

Speed: The distance travelled in an amount of time, Speed = distance/time



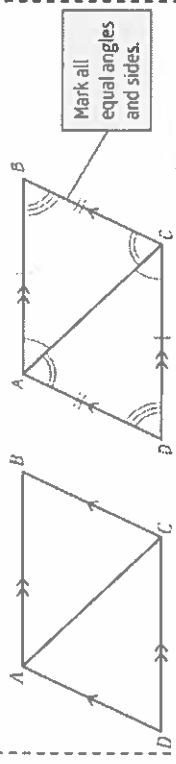
Paul invests £4500 in an account for 2 years. The account pays 3.2% compound interest per annum. Paul has to pay 20% tax on the interest earned each year. The tax is taken from the account at the end of each year.
Paul thinks that at the end of the 2 years he will have at least £4700 in this account.
Is Paul correct? Show all your working.

Year 1
Interest = $0.032 \times 4500 = £14.4$
Tax = $0.2 \times 14.4 = £2.88$
Amount in account at end of year 1 = $4500 + 14.4 - 2.88$
= £4615.20
Year 2
Start with £4615.20
Interest = $0.032 \times 4615.20 = £147.69$
Tax = $0.2 \times 147.69 = £29.54$
Amount in account at end of year 2 = $4615.20 + 147.69 - 29.54$
= £4733.35
Paul is correct. £4733.35 is more than £4700.

Amount in account at end of year 1: £4500 + interest - 20% of interest

Amount in account at end of year 2: £4615.20 + interest - 20% of interest

ABCD is a parallelogram. Prove triangle ABC is congruent to ADC.

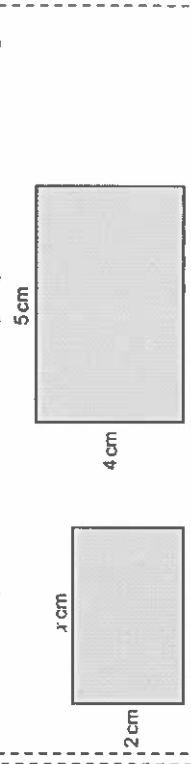


Length AB = length CD because opposite sides in a parallelogram are equal.
Length BC = length AD because opposite sides in a parallelogram are equal.
Length AC is common to both triangles.
So triangle ABC is congruent to triangle ADC (SSS).
State the condition used to prove congruence.
Mark all equal angles and sides.
State why AB = CD
State why BC = AD

Two triangles are congruent when one of these conditions of congruence is true:

- SSS (all three sides equal)
- SAS (two sides and the included angle are equal)
- AAS (two angles and a corresponding side are equal)
- RHS (right angle, hypotenuse and one other side are equal)

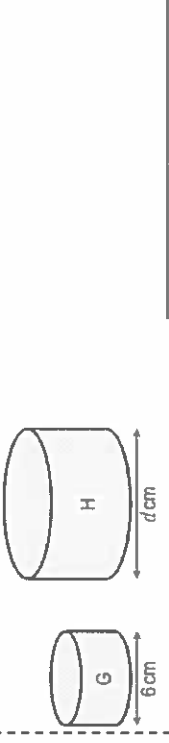
These two rectangles are similar. Find the missing length x in the smaller rectangle.



ratio of lengths: $\frac{x}{2} = \frac{5}{4}$
ratio of widths: $\frac{2}{4} = \frac{1}{2}$
small = $\frac{1}{2}$
large = $\frac{1}{2} \times 5$
 $2x = 5$
 $x = \frac{5}{2} = 2.5 \text{ cm}$
Write the ratio $\frac{\text{small}}{\text{large}}$ for the lengths and the widths.
Write an equation to solve for x.

Cylinders G and H are similar.

The diameter of G is 6 cm.
The volume of G is 108 cm³. The volume of H is 256 cm³.
Work out the diameter d of cylinder H.



Volume scale factor = $\frac{\text{large}}{\text{small}} = \frac{256}{108} = \frac{64}{27} = k^3$
 $k = \sqrt[3]{\frac{64}{27}} = \frac{\sqrt[3]{64}}{\sqrt[3]{27}} = \frac{4}{3}$
 $d = \frac{4}{3} \times 6 = 8 \text{ cm}$
In an enlargement by scale factor k, the volume is enlarged by scale factor k³.

Shapes are similar when one shape is an enlargement of the other. Corresponding angles are equal and corresponding sides are all in the same ratio.

When a shape is enlarged by linear scale factor k, the volume of the shape is enlarged by scale factor k³.

Pressure: The force applied over an area, $\text{Pressure} = \text{force/area}$



Inverse: If two quantities are inversely proportional then as one quantity increases, the other decreases.

Direct: as one value increases, so does the other value and conversely, as one value decreases, so does the other value. The symbol \propto represents a proportional relationship.

Congruence: When shapes are identical. The shape can be rotated, reflected or translated

Angle: the figure formed by two lines extending from the same point

Compass: an instrument which enables us to draw circles and arcs.



By the end of this half-term, you should be able to:

Chapter 1 – Number

- Use and order positive and negative numbers (integers) and decimals; use the symbols $<$, $>$ and understand the \neq symbol
- Add, subtract, multiply and divide positive and negative numbers (integers), as well as decimals including calculations involving money
- Round numbers to a given power of 10 and round to the nearest integer and to a given number of decimal places and significant figures
- Use index notation for squares and cubes, for powers of 10 including negative powers;
- Identify factors and multiples and list all factors and multiples of a number systematically, find common factors and multiples of two numbers
- Find the prime factor decomposition of positive integers and write as a product using index notation
- Find the LCM and HCF of two numbers, by listing, Venn diagrams and using prime factors: include finding LCM and HCF given the prime factorisation of two numbers

Chapter 2 – Algebra

- Use correct algebraic notation, write and simplify expressions
- Use the index law, multiply/divide expressions
- Substitute numbers into expressions/formula
- Expand brackets, simplify expressions with brackets
- Factorise algebraic expressions
- Write expressions and simple formulae to solve problems

Keywords

Integer: positive and negative numbers including zero e.g. -11, -4, 0, 5, 12, 14.

Decimal: a number that consists of a whole and a fractional part e.g. 17.48 - (17 is the whole and .48 is the fractional part $\frac{48}{100}$).

Estimate: approximately calculating an answer.

Power/index: the small number written at the top right/superscript of another number to indicate multiplication by itself e.g. 4^2 means 4×4 .

Factor: a number that divides exactly into another number without a remainder. It is useful to write factors in pairs.

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Core Knowledge

Simplifying expressions- adding/subtracting

$$2x + x = 3x$$

$$2x - x = x$$

$$3x - x + 2x = 4x$$

$$a + b \quad \text{Not like terms}$$

$$a + a^2 \quad \text{Not like terms}$$

Substitution

$$a = 3, b = 2 \text{ and } c = 5$$

$$3a - 2b + c =$$

$$3 \times 3 - 2 \times 2 + 5 = 10$$

Simplifying expressions – multiplying/dividing

$$a \times a \times a = a^3$$

$$2 \times 3 \times a \times a \times b \times b = 6a^3b^2$$

$$10a \div 2a = \frac{10 \times a}{2 \times a} = 5$$

$$\frac{6a^2b^3}{2a^2b} = \frac{6 \times a \times a \times b \times b \times b \times b}{2 \times a \times a \times b} = 3b^2$$

Multiple: the result of multiplying a number by an integer. The times tables of a number.

Prime Number: a number with exactly two factors (1 and itself).

The number 1 is not prime, as it only has one factor, not two.

Prime factor: a factor which is a prime number.

Square root: the number you multiply by itself to get another number e.g. the square root of 25 is +5 or -5.

Cube root: the number you multiply by itself three times to get another number e.g. the cube root of 64 is 4.

Variable: a letter in an algebraic expression is called a variable because its value can change (vary).

Expressions: a mathematical statement written using symbols, numbers or letters, no equal sign.

Coefficient: how many of the variable you have/a number multiplied by the variable.

Simplify: combining like terms in an algebraic expression.

Formula: shows the relationship between two or more variables.

Substitute: replace letters with numbers.

Core Knowledge

a Express these numbers as products of their prime factors.

i 36

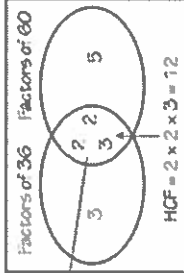
ii 60

b Find the highest common factor of 36 and 60.

c Find the lowest common multiple of 36 and 60.

a i $36 = 2 \times 2 \times 3 \times 3$
ii $60 = 2 \times 2 \times 3 \times 5$

Write the products without powers.



Factors of 36

Factors of 60

Draw a Venn diagram. Put the common factors in the intersection.

HCF = product of numbers in the intersection.
Compare the prime factors of 36 and 60

$36 = (2 \times 2) \times (3 \times 3) \times 3$
 $60 = (2 \times 2) \times (3 \times 3) \times 5$

HCF = $2 \times 2 \times 3 = 12$

c LCM = $3 \times 2 \times 2 \times 3 \times 5 = 180$ LCM = product of all the numbers in the diagram.

Prime Factor

A factor which is a prime number.

The prime factors of 18 are:

2, 3

Prime Number

A number with exactly two factors.

A number that can only be divided by itself and one.

The number 1 is not prime, as it only has one factor, not two.

The first eight prime numbers are:

2, 3, 5, 7, 11, 13, 17, 19

Multiple

The result of multiplying a number by an integer. The times tables of a number.

The first five multiples of 7 are:

7, 14, 21, 28, 35

Factor

A number that divides exactly into another number without a remainder.

It is useful to write factors in pairs

The factors of 18 are:

1, 2, 3, 6, 9, 18

The factor pairs of 18 are:

1, 18
2, 9
3, 6



By the end of this half-term, you should be able to:

Chapter 3 – Graphs, tables and charts

- Use correct notation for time, 12- and 24-hour clock and work out time taken for a journey from a timetable.
- Design and use data-collection sheets for grouped, discrete and continuous data, use inequalities for grouped data, and introduce \leq and \geq signs.
- Sort, classify and tabulate data, both discrete and continuous quantitative data, and qualitative data; Extract data from lists and tables
- Draw and interpret various statistical drawings such as pictograms, bar charts, pie charts, stem and leaf diagrams e.t.c
- Find/calculate averages from statistical diagrams

Chapter 4 – Fractions and percentages

- Express a given number as a fraction of another, using very simple numbers, some cancelling, and where the fraction is both < 1 and > 1
- Write a fraction in its simplest form and find equivalent fractions; order fractions, by using a common denominator; compare fractions, use inequality signs, compare unit fractions
- Convert between mixed numbers and improper fractions; add and subtract fractions; add fractions and write the answer as a mixed number; multiply and divide an integer by a fraction and vice versa
- Express a given number as a percentage of another number; find a percentage of a quantity without a calculator: 50%, 25% and multiples of 10% and 5%
- Use percentages to solve problems, including comparisons of two quantities using percentages; use percentages in real-life situations, including percentages greater than 100% such as price after VAT; find a percentage of a quantity, including using a multiplier

Keywords


Average: A value to best represent a set of data.

Data: is a collection of information gathered by observation, questioning or measurement (data is often organised in graphs or charts for analysis and may include facts, numbers or measurements).

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- Use **'Read, Cover, Write, Check'** to test your understanding on the key words and core knowledge in this organiser.

Core Knowledge

Pie Chart	<p>Used for showing how data breaks down into its constituent parts.</p> <p>Remember to label the category that each sector in the pie chart represents.</p>	<p>100 people answered a survey about their favourite pizza topping.</p>  <p>Half of the group chose Mushroom. Half of 100 is 50.</p>
Find the angle in a Pie Chart	<p>-When drawing a pie chart, divide 360° by the total frequency. This will tell you how many degrees to use for the frequency of each category.</p> <p>Angle = $\frac{\text{Frequency}}{\text{Total Frequency}} \times 360$</p>	<p>In a survey of 30 people, each person would be represented by $\frac{1}{30}$ of the full circle.</p> <p>$360 \div 30 = 12^\circ$</p> <p>Each person would get 12°</p> <p>In a survey of 30 people, 12 said their favourite colour is red.</p> <p>$\frac{12}{30} \times 360 = 144^\circ$</p>

Mean: A type of average found by adding up a list of numbers and dividing by how many numbers are in the list.

Median: The middle value when a list of numbers is put in order from smallest to biggest, a type of average.

Mode: The most common value in a list of numbers, if two values are tied, there are two modes (bimodal). If more than two modes, there is no mode. A type of average.

Qualitative: data categories including characteristics, for example, names, ages, locations and occupations or personal preferences, for example, food, clothes and leisure activities.

Quantitative Data: Data that can be quantified by counting or measuring. There are two types of quantitative data: data that can be counted (discrete data), and data that can be measured (continuous data).

Correlation: the strength of a relationship between two variables.

Sample: a section of a whole group.

<p>Scatter Graphs</p> <p>A graph used to plot data measured in two ways.</p> <p>Each point plotted is a single piece of data with two measurements. For example each point plotted here is a single pupil, with their Maths and English scores from a test</p>	
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<p>Types of Bar Chart</p> <p>Compound/Composite Bar Charts show data stacked on top of each other.</p>	
<p>Comparative/Dual Bar Charts show data side by side.</p>	

<p>Fraction</p> <p>A mathematical expression representing the division of one integer by another.</p> <p>Fractions are written as two numbers separated by a horizontal line.</p>	<p>$\frac{2}{4}$ is a 'proper' fraction.</p> <p>$\frac{7}{4}$ is an 'improper' or 'top-heavy' fraction.</p> <p>It is greater than one. It can also be written as $1\frac{3}{4}$</p>
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<p>Correlation</p> <p>When the points plotted on a scatter graph are all very close together, we say there is a strong correlation between the two things being measured. This might mean the two things are connected.</p> <p>If the higher the x value, the higher the y value, then there is a positive correlation.</p> <p>If it's the opposite, then the correlation is negative.</p> <p>The closer the points, the stronger the correlation.</p>	<p>What type of correlation is shown here?</p>
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<p>Line of best fit</p> <p>If a scatter graph has a strong correlation, we draw a line of best fit to make a prediction about a new piece of data.</p> <p>The line should follow the points, and there should be the same number of points on each side of the line.</p>	<p>Which graph shows the most appropriately drawn line of best fit?</p>
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<p>Converting Mixed Numbers and Improper Fractions</p> <p>To convert a mixed fraction into an improper fraction, multiply the integer by the denominator and add that to the numerator</p> <p>To convert a top-heavy fraction into a mixed number, divide the numerator by the denominator. The remainder is the new numerator.</p>	<p>$3\frac{2}{5}$</p> <p>$3 \times 5 + 2$</p> <p>$\frac{17}{5}$</p> <p>$17 \div 5 = 3 \text{ (r2)}$</p>
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<p>Reciprocal</p> <p>The reciprocal of a number is 1 divided by the number.</p> <p>The reciprocal of a is $\frac{1}{a}$</p> <p>When we multiply a number by its reciprocal, we get 1. This is called the multiplicative inverse.</p>	<p>The reciprocal of 5 is $\frac{1}{5}$</p> <p>The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$ because $\frac{2}{3} \times \frac{3}{2} = 1$</p>
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Population: whole set of individuals, items or data from which a statistical sample is drawn.

Frequency: How many times something happens.

Estimate: To work out a rough value or an approximate answer to a calculation.

Integer: A whole number.

Decimal: Not a whole number or integer. For example 3.4 or 0.325

Percentage: a percent or percentage is a fraction expressed as a number out of 100, followed by the % symbol. For example $20/100 = 20\%$, $50/100 = 50\%$, $1/2 = 50\%$.

Fractions: any part of a group, number or whole.

Recurring decimal: a decimal which has repeating digits or a repeating pattern of digits. For example $\frac{1}{3} = 0.3333333333333333...$

$$\frac{1}{7} = 0.142857142857142857...$$

Terminating decimal: has a finite number of digits. For example $\frac{1}{2} = 0.5$

$$\frac{1}{4} = 0.25$$

Reverse Percentage

Find the correct percentage given in the question, then work backwards to find 100%
 Look out for words like 'before' or 'original'
 A jumper was priced at £48.60 after a 10% reduction. Find its original price.
 $100\% - 10\% = 90\%$
 $90\% = £48.60$
 $1\% = £0.54$
 $100\% = £54$

Percentage Multiplier

The number you multiply a quantity by to increase or decrease it by a percentage.
 The multiplier for increasing by 12% is 1.12
 The multiplier for decreasing by 12% is 0.88
 The multiplier for increasing by 100% is 2.

Adding or Subtracting Fractions

Find the Lowest Common Multiple of the denominators
 Find a common denominator. Use equivalent fractions to change each fraction to the common denominator. Then just add or subtract the numerators and keep the denominator the same.
 $\frac{2}{3} + \frac{4}{5}$
 Multiples of 3: 3, 6, 9, 12, 15...
 Multiples of 5: 5, 10, 15...
 LCM of 3 and 5 = 15
 $\frac{2}{3} = \frac{10}{15}$
 $\frac{4}{5} = \frac{12}{15}$
 $\frac{10}{15} + \frac{12}{15} = \frac{22}{15} = 1\frac{7}{15}$

Dividing Fractions

Multiply by the reciprocal
 Keep the first fraction the same
 Flip the second fraction upside down
 Change the divide to a multiply
 Multiply by the reciprocal of the second fraction.
 $\frac{1}{2} + \frac{1}{7} = \frac{2}{7} \times \frac{1}{7} = \frac{1}{7}$
 $\frac{3}{4} + \frac{5}{6} = \frac{3}{4} \times \frac{6}{5} = \frac{18}{20} = \frac{9}{10}$

Multiplying Fractions

Multiply the numerators together and multiply the denominators together.
 Simplify if you can.
 $\frac{1}{2} \times \frac{1}{7} = \frac{1}{14}$
 $\frac{3}{8} \times \frac{6}{9} = \frac{18}{72} = \frac{1}{4}$

Fraction, Decimal and Percentage Conversion

Fractions to Decimals	numerator ÷ denominator	$1/4 = 1 \div 4 = 0.25$
Fractions to Percentages	numerator ÷ denominator x 100	$1/4 = 1 \div 4 = 0.25$ $0.25 \times 100 = 25\%$
Decimals to Fractions	-write decimal as a fraction over 1 -multiply numerator and denominator by 10 for each decimal digit -simplify	$0.25 = 0.25/1$ $0.25/1 = 25/100$ $25/100 = 1/4$
Decimals to Percentages	x 100	$0.25 \times 100 = 25\%$
Percentages to Fractions	-write as a fraction over 100 -simplify	$25\% = 25/100$ $25/100 = 1/4$
Percentages to Decimals	+ 100	$25\% + 100 = 0.25$

Percentage Multiplier

The number you multiply a quantity by to increase or decrease it by a percentage.
 The multiplier for increasing by 12% is 1.12
 The multiplier for decreasing by 12% is 0.88
 The multiplier for increasing by 100% is 2.



By the end of this half-term, you should be able to:

Chapter 5 – Equations and Inequalities

- Understand and use inverse operations.
- Solve linear equation (with brackets and unknown on both sides).
- Use the n th term to generate terms of a sequence
- Use correct notation to show inclusive and exclusive inequalities.
- Solve linear inequalities.
- Represent inequalities on a number line.
- Substitute values into formulae and solve equations.
- Change the subject of a formula.

Chapter 6 – Angles

- Solve geometric problems using side and angle properties of quadrilaterals.
- Understand and use the angle properties of parallel lines (find missing angles using corresponding and alternate angles.)
- Solve angle problems in triangles.
- Calculate the interior and exterior angles of polygons.
- Solve angle problems using equations
- Solve geometrical problems showing reasoning

Keywords

Coefficient: the number before the variable (letter).

Term: the variable(s), coefficient and symbol (+/-) before it.

Equation: one or more terms with an equal (=) sign which can be solved.

Solve mean: find the answer/value of an unknown letter.

Inverse mean: opposite.

Inequality: it compares two values, showing if one is less than, greater than or not equal to another value.

<: Less than

>: Greater than

≤: Less than or equal to

Preparing for Assessment

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Core Knowledge

How do you solve a linear equation?

Use inverse operations on both sides of the equation (balancing method) to undo each step

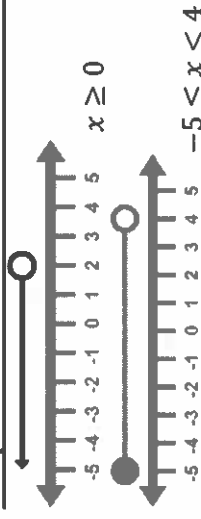
$$\begin{array}{r} 2 + a = 10 \\ (-2) \quad (-2) \\ \hline a = 8 \end{array}$$

How do you solve a linear equation with brackets?

Expand the brackets first and then solve.

$$\begin{array}{r} 2(x + 8) = 18 \\ 2x + 16 = 18 \\ (-16) \quad (-16) \\ \hline 2x = 2 \\ (+2) \quad (+2) \\ \hline x = 5 \end{array}$$

Inequalities can be shown on a number line.



Inequalities are solved in the same way as equations

$$\begin{array}{r} 4x - 2 > 6 \\ 4x > 8 \\ x > 2 \end{array}$$

Always check by substituting values

\geq : Greater than or equal to
Integer: a whole number (no decimal places).
Sequence: a list of numbers or shapes that follows a particular rule.
Term-to-term rule: the rule that tells us how to go from one term to the next.
Arithmetic sequence: the term-to-term rule is adding or subtracting the same number. E.g. add 3 or subtract 6.
Nth term: the n th term of a sequence tells you how to work out the term at position n (any position).
Fibonacci-type sequence: the term-to-term rule is 'add together the previous two terms'.
Congruent Shapes: two shapes with exactly same shape and size.
Similar shapes: two same shapes but different sizes.
Parallel lines: straight lines that will never meet, no matter how far they are extended.

$x > 2$ means x is greater than 2
 $x < 3$ means x is less than 3
 $x \geq 1$ means x is greater than or equal to 1
 $x \leq 6$ means x is less than or equal to 6
Example: State the integers that satisfy $-2 < x \leq 4$. *Solution:* -1, 0, 1, 2, 3, 4

How do we find the n th term of a sequence?

1. Find the coefficient of n by finding the common difference ($_n$)
2. Find the 0^{th} term by doing the inverse of the common difference. This number is the constant that goes on its own at the end

Worked Example:

1. Find the n th term of:
3, 7, 11, 15...
1. Difference is +4
2. Start with $4n$
3. $4n: 4, 8, 12, 16...$
3, 7, 11, 15...

Each term of our sequence is always 1 less than $4n$, so the n th term is $4n-1$

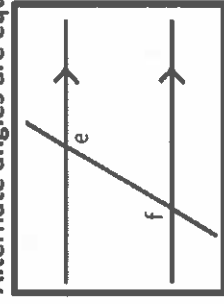
100th term:
 $4 \times 100 - 1 = 399$

2. The n th term is $3n - 1$.

1st term: $3 \times 1 - 1 = 2$
 2nd term: $3 \times 2 - 1 = 5$
 3rd term: $3 \times 3 - 1 = 8$

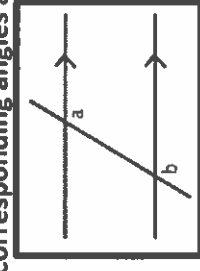
4th term: $3 \times 4 - 1 = 11$

Alternate angles are equal



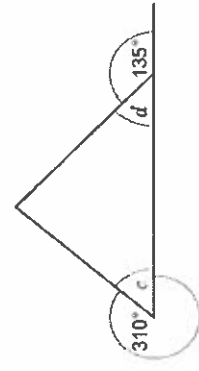
Angles e and f are equal and alternate.

Corresponding angles are equal



Angles a and b are equal and corresponding. They lie inside the "F" shape of the lines.

$C = 360 - 310 = 50$ (Angles at a point = 360 degrees)
 $D = 180 - 135 = 45$ (Angles on a straight line = 180 degrees)





By the end of this half-term, you should be able to:

Unit 7: Averages and Range

- Calculate the mean from a list and from a frequency
- Find the mode, median and range from a stem and leaf diagram
- Find the modal class and the median from a frequency table
- Estimate the mean of grouped data.
- Understand the need for sampling and how to avoid bias.

Unit 8: Perimeter, Area and Volume 1

- Calculate the perimeter and area of rectangles, parallelograms and triangles
- Calculate the area and perimeter of trapezia.
- Calculate the perimeter and area of compound shapes
- Calculate the surface area of a prism, eg, cuboid
- Calculate the volume of a prism, eg, cuboid.

Keywords

Mean: the mean of a set of values is the total of the set of values divided by the number of values.

Median: the median is the middle value when the data is written in order.

Outlier: it is an extreme data value that doesn't fit the overall pattern.

Mode /

Modal Value: the frequent/common data.

Range: the difference between the highest and lowest values. It is also a 'measure of spread'. The smaller the range the more consistent the data.

Frequency Table: a record of how often each value in a set of data occurs.

Preparing for Assessment

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Core Knowledge

The mean of 3, 4, 7, 6, 0, 4, 6 is

$$\frac{3 + 4 + 7 + 6 + 0 + 4 + 6}{7} = 5$$

Find the mode: 4, 5, 2, 3, 6, 4, 7, 8, 4

Mode = 4

Find the median of: 4, 5, 2, 3, 6, 7, 6

Ordered: 2, 3, 4, 5, 6, 6, 7

Median = 5

Find the range: 3, 31, 26, 102, 37, 97

Range = 102-3 = 99

Group	Mid	Freq
$0 < m \leq 100$	50	15
$100 < m \leq 200$	150	17
$200 < m \leq 300$	250	11

$$50 \times 15 = 750$$

$$150 \times 17 = 2550$$

$$250 \times 11 = 2750$$

$$\frac{6050}{43} = 140.7 \quad \frac{\text{Total}}{\text{Total Frequency}}$$

Perimeter: the total distance around the outside of a shape.

Units include: mm^2, cm^2, m^2 .

Area: the amount of space inside a shape. Units include: mm^2, cm^2, m^2 .

Volume: a measure of the amount of space inside a solid shape.

Volume of a prism = area of cross-section \times length.

Units: mm^3, cm^3, m^3 etc.

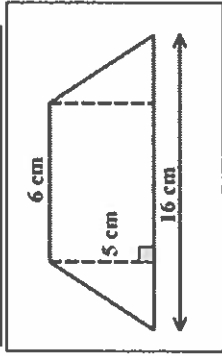
Surface area: the total area of all the faces of the solid. To find the surface area of a 3D solid, sketch the net and work out the areas of the faces.

Parallelogram: a parallelogram has two pairs of parallel sides.

Compound Shape: a shape made up of a combination of other known shapes put together.

Net: a pattern that you can cut and fold to make a model of a 3D shape.

Area of a trapezium



$$\frac{(a + b)}{2} \times h$$

$$A = \frac{16 + 6}{2} \times 5$$

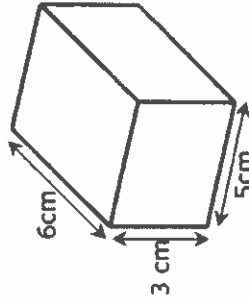
"Half the sum of the parallel side, times the height between them."

Volume of a Cuboid

$$V = Length \times Width \times Height$$

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

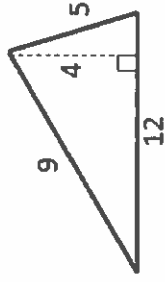
You can also use the Volume of a Prism formula for a cube/cuboid.



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

Area of a triangle

$$\frac{\text{Base} \times \text{Height}}{2}$$



$$A = \frac{12 \times 4}{2} = 24 \text{ cm}^2$$

Area of a parallelogram

Area = Base \times Perpendicular Height (not the slant height)



$$= 3 \times 7 = 21 \text{ cm}^2$$

The total area of all the faces of a cube/cuboid. Work out the area of all the surfaces and add them together. The shape of the surface can be a rectangle, trapezium or triangle.

Area of front and back

$$= 3 \times 5 \times 2$$

$$= 30 \text{ cm}^2$$

Area of left and right

$$= 3 \times 6 \times 2$$

$$= 36 \text{ cm}^2$$

Area of top and bottom

$$= 5 \times 6 \times 2$$

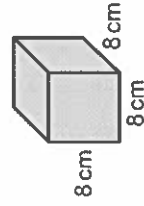
$$= 60 \text{ cm}^2$$

Surface area = $30 + 36 + 60$

$$= 126 \text{ cm}^2$$

Surface Area of Cubes

Work out area of one surface and multiply by 6 because all the faces are the same





Maths Knowledge Organiser: Summer 1: Graphs – Ratio and proportion

By the end of this half-term, you should be able to:

Chapter No. 9 – Graphs: (Real life and straight line)

Key objectives:

- Use input/output diagrams;
- Draw, label and scale axes;
- Use axes and coordinates to specify points in all four quadrants in 2D;
- Identify points with given coordinates and coordinates of a given point in all four quadrants;
- Work out time intervals for graph scales;
- Interpret graphs with negative values on axes;
- Find the gradient of a straight line from real-life graphs;

Chapter No. 11 – Ratio and proportion

Key objectives:

- Understand and express the division of a quantity into a of number parts as a ratio;
- Write ratios in their simplest form;
- Share a quantity in a given ratio including three-part ratios;
- Understand and use proportion as equality of ratios;
- Solve word problems involving direct and inverse proportion;
- Work out which product is the better buy;
- Scale up recipes;

Keywords (Graphs)

Axes: a fixed reference line on a grid to help show the position of coordinates.
Convert: Change a value or expression from one form to another.

Gradient: the rate of change, how steep a line is at any point.

Midpoint: the point halfway along a line or between two coordinates.

Conversion graph: a graph which converts between two variables.

Real - life graph: this is a graph that represents a situation that we would see in real life.

Preparing for Assessment

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Core Knowledge

What you need to know:

Linear graphs

Linear graphs are straight line graphs. We substitute the x value into the equation to get the y value. Once we have both we can then plot the coordinates and draw the graph.

Draw the graph of $y = 2x - 1$.

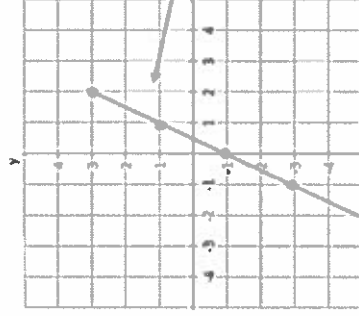
To do this we multiply the x value by 2 and then subtract 1 to get the y value.

$$y = 2x - 1$$

x	-2	-1	0	1	2
y	-5	-3	-1	1	3

Multiply this value by 2 and then subtract 1 to get the y value.

$y = 2x - 1$ From the equation of the line, the gradient of the line is the number in front of x, which is 2 and the line cuts the y-axis at $y = -1$.



Don't forget to draw a straight line through all of the coordinates you have plotted.

Notice this graph has a gradient of 2 (the y values go up by 2 each time) and a y-intercept of -1 (the graph cuts through the y axis at -1)

Intercept: where two graphs cross. y-intercept: Where a graph crosses the y-axis.

Keys words (Ratio & proportion)

Ratio: relationship between two or more numbers.

Part: this is the numeric value '1' of, would be equivalent to.

Simplify: divide all parts of a ratio by the same number.

Equivalent: equal in value.

Convert: change from one form to another.

Scale: the ratio of the length in a drawing to the length of the real thing.

Proportion: a name we give to a statement that two ratios are equal.

Exchange rate: the value of one currency for the purpose of conversion to another.

Core Knowledge

Example:1

There are 15 males and 12 females in a group. What is the ratio of males to females? Give your example in its simplest form.

So, the ratio of males to females is 15:12. However, both sides of the ratio can be divided by 3.

Dividing 15 and 12 by 3 gives 5:4.

5:4 is the ratio in its simplest form. 5:4 and 15:12 are equivalent ratios.

Example: 2

Share £20 between 2 people in a ratio of 3:1.

A ratio of 3 + 1 = 4 parts, so the money needs to be divided into 4 parts.

One part of the ratio = $20 \div 4 = £5$

If 1 person is getting 3 parts, they will have $3 \times 5 = £15$.

The other person will have 1 part, £5.

Example:3

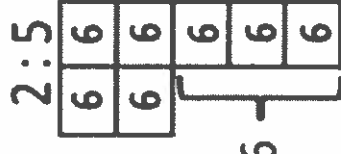
Joy and Martin share some money in a ratio of 2:5. Martin gets £18 more than Joy.

How much money do they each get?

Joy : Martin $18 \div 3 = 6$

£12 : £30

=12 =30



Example:4

Cake recipe for 6 people.
3 eggs
300g flour
150g sugar

What would you need for 8 people? $\div 3 \times 4$

People	6	2	8
eggs	3	1	4
flour	300g	100g	400g
sugar	150g	50g	200g



By the end of this half-term, you should be able to:

Chapter No. 12 – Right-angled triangles

- Identify the hypotenuse in a right-angle triangle.
- Use Pythagoras' theorem to find the hypotenuse and shorter sides.
- Use Pythagoras' theorem to solve 3D problems.
- Use trigonometry to find lengths and angles in right angled triangles.
- Use right angled trigonometry to solve 3D problems.
- Recall exact trigonometric values.

Chapter No. 13 – Probability

- Mark events and/or probabilities on a probability scale of 0 to 1;
- Write probabilities in words or fractions, decimals and percentages;
- Find the probability of an event happening using theoretical probability;
- Use theoretical models to include outcomes using dice, spinners, coins;
- List all outcomes for single events systematically;
- Use and draw sample space diagrams;

Keywords:

- **Hypotenuse:** The longest side in a right- angled triangle
- **Opposite:** The side facing the angle in a right-angled triangle.
- **Adjacent:** The side next to the angle given in a right-angled triangle.
- **Square number:** The result when you multiply a number by itself.
- **Inverse operation:** The operation that reverses the effect of another operation.
- **Sine, Cosine, Tangent:** Trigonometric ratios, relating to buttons on the calculator.

Preparing for Assessment

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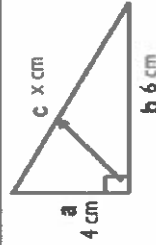
Core Knowledge

What you need to know:

Pythagoras' Theorem - hypotenuse

You should always label the hypotenuse first.

This is the side facing the right angle.



This is surd form. Sometimes you will be asked to leave your answer like this.

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

- 1) Substitute your values into the formulae:
 $4^2 + 6^2 = x^2$
 $16 + 36 = x^2$
 $52 = x^2$
- 2) Work out the values that you can.
 $52 = x^2$
- 3) Now use inverse operations to isolate x.
 $52 = x^2$
 $(\sqrt{\quad})(\sqrt{\quad})$
 $\sqrt{52} = x$

$$7.211102551 \text{ cm} = x \text{ or } 7.21 \text{ to } 3 \text{ s.f}$$

Pythagoras' Theorem – Shorter Sides

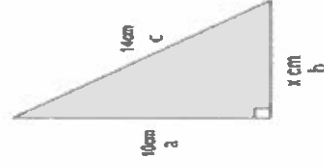
$$a^2 + b^2 = c^2$$

Sometimes you are asked to calculate the shorter sides, see below.

- 1) Substitute your values into the formulae:
 $10^2 + x^2 = 14^2$
- 2) Work out the values that you can.
 $100 + x^2 = 196$
- 3) Now use inverse operations to isolate x.
 $100 + x^2 = 196$
 $(-100) \quad (-100)$
 $x^2 = 96$
 $(\sqrt{\quad})(\sqrt{\quad})$
 $\sqrt{96} = x$

You need to get the numbers on one side, the x on it's own. An extra step is needed.

$$x = 9.797958971 \text{ cm or } 9.80 \text{ cm to } 3 \text{ s.f}$$



• **Probability:** The likelihood/chance of something happening

• **Probability notation:** P(A) refers to the probability that event A will occur.

• **Theoretical Probability:** Number of favourable outcomes divided by total number of possible outcome.

• **Relative Frequency:** Number of successful trials divided by the total number of trials

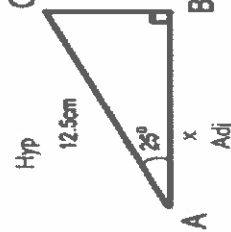
• **Expected Outcomes:** To find the number of expected outcomes, multiply the probability by the number of trials

• **Exhaustive:** Outcomes are exhaustive if they cover the entire range of possible outcomes. The probabilities of these adds up to 1

What you need to know:

Trigonometry – Finding a side 1

Calculate the length of AB.



$\cos(25) = \frac{x}{12.5}$

$\cos(25) \times 12.5 = x$

$x = 11.32884734 \text{ cm}$

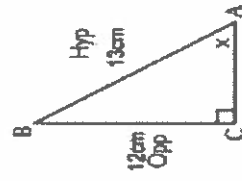
Don't round your answer, you get no marks for this!

The inverse of dividing by 12.5 is multiplying.

SOH CAH TOA
 SINE = $\frac{\text{OPP}}{\text{HYP}}$ COSINE = $\frac{\text{ADJ}}{\text{HYP}}$ TANGENT = $\frac{\text{OPP}}{\text{ADJ}}$

- Step 1 – Label the sides you need as O, A or H.
- Step 2 – Use this to decide which trig ratio to use.
- Step 3 – Substitute the given values into the formula.
- Step 4 – Use inverse operations to rearrange & isolate x.

Trigonometry – Finding an angle
 Calculate the size of angle BAC.



$\sin(x) = \frac{12}{13}$

$x = \sin^{-1}\left(\frac{12}{13}\right)$

$x = 67.38013505^\circ$

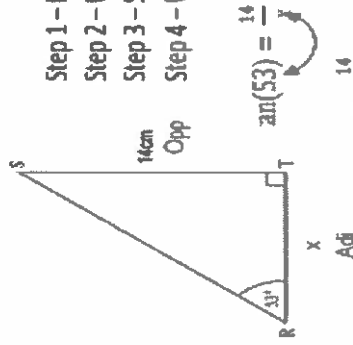
I have not labelled the third side as it has no information on and I am not trying to calculate it.

The inverse of sin, cos and tan are \sin^{-1} , \cos^{-1} , \tan^{-1} . They are found by pressing shift sin on your calculator.

- Step 1 – Label the sides you need as O, A or H.
- Step 2 – Use this to decide which trig ratio to use.
- Step 3 – Substitute the given values into the formula.
- Step 4 – Use inverses to rearrange & isolate x.

Trigonometry – Finding a side 2

Calculate the length of RT.



$\tan(33) = \frac{14}{x}$
 $x = \frac{14}{\tan 33}$

$x = 10.5497567 \text{ cm}$

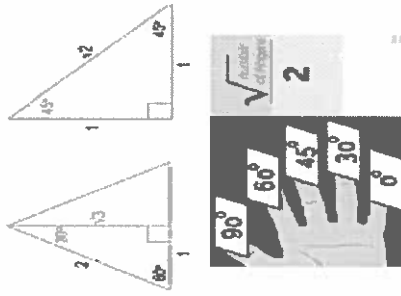
When the unknown value is on the bottom of the fraction the x and tan(33) swap places. This is because you have multiplied the LHS by x and the divided the RHS by tan(33).

- Step 1 – Label the sides you need as O, A or H.
- Step 2 – Use this to decide which trig ratio to use.
- Step 3 – Substitute the given values into the formula.
- Step 4 – Use inverse operations to rearrange & isolate x.

Trigonometry – Exact values

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

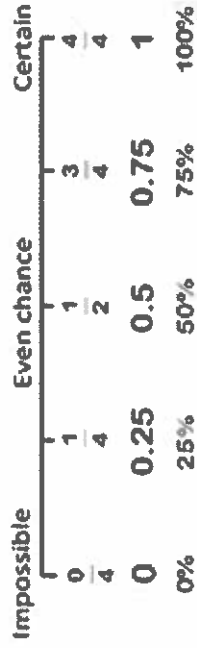
For your exam you will need to learn the following values. (Use the hand trick or triangles to help you learn them)



Theoretical Probability

Examples

Probability scale:



There are only red counters, blue counters, white counters and black counters in a bag.

Colour	Red	Blue	Black	White
No. of counters	9	3	5	2

- 1) What is the probability that a blue counter is chosen? $\frac{3}{19} = \frac{\text{number of blue}}{\text{total number of counters}}$
- 2) What is the probability that red is not chosen? $\frac{10}{19} = \frac{\text{number of all other colours}}{\text{total number of counters}}$

- 3) There are only red counters, blue counters, white counters and black counters in a bag.

Colour	Red	Blue	Black	White
No. of counters	9	$3x$	$x-5$	$2x$

A counter is chosen at random, the probability it is red is $\frac{9}{100}$. Work out the probability is black.

$$9 + 3x + x - 5 + 2x = 100$$

$$6x + 4 = 100$$

$$x = 16$$

$$\text{Number of black counters} = 16 - 5$$

$$= 11$$

$$\text{Probability of choosing black} = \frac{11}{100}$$

1) Relative frequency Examples

A spinner is spun, it has four colours on it.

The relative frequencies of each colour are recorded.

The relative frequency of red and black are the same

- a) What is the relative frequency of red?

$$1 - (0.2 + 0.3) = 0.5$$

$$x = \frac{0.5}{2} = 0.25$$

- b) If the spinner is spun 300 times, how many times do you expect it to land on white?

$$0.3 \times 300 = 90$$

Colour	red	blue	white	black
Prob	x	0.2	0.3	x

Science

Physics 3 – Particle model of matter

Summary- Position in the Curriculum

The particle model is widely used to predict the behaviour of solids, liquids and gases and this has many applications in everyday life. It helps us to explain a wide range of observations and engineers use these principles when designing vessels to withstand high pressures and temperatures, such as submarines and spacecraft. It also explains why it is difficult to make a good cup of tea high up a mountain!

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Density	It is the mass per unit volume of a substance	The density of a material is defined by the equation: density = mass/volume $\rho = m/V$ density, ρ , in kilograms per metre cubed, kg/m ³ mass, m , in kilograms, kg volume, V , in metres cubed, m ³	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Internal energy	Internal energy is the total kinetic energy and potential energy of all the particles (atoms and molecules) that make up a system.	The particle model can be used to explain the different states of matter and the differences in density. When substances change state (melt, freeze, boil, evaporate, condense or sublimate), mass is conserved. Changes of state are physical changes which differ from chemical changes because the material recovers its original properties if the change is reversed.	1. Describe how the equipment in Figure 1 can be used to find the density of the irregular shaped object.
The specific latent heat	The specific latent heat of a substance is the amount of energy required to change the state of one kilogram of the substance with no change in temperature.	Heating changes the energy stored within the system by increasing the energy of the particles that make up the system. This either raises the temperature of the system or produces a change of state Specific latent heat of fusion – change of state from solid to liquid Specific latent heat of vaporisation – change of state from liquid to vapour	2. A plumber uses a blowtorch to melt a 0.5 kg bar of soft solder whilst making solder joints. The amount of energy supplied to melt the bar of soft solder is 22 500J. Calculate the latent heat of fusion of soft solder
Pressure	Force per unit cross-sectional area for a force acting on a surface at right angles to the surface. The unit is the pascal (Pa) or N/m ²	Energy for a change of state = mass x specific latent heat $E = m L$ energy, E , in joules, J mass, m , in kilograms, kg specific latent heat, L , in joules per kilogram, J/kg	2. An ice cube at 0°C is placed in a beaker of water to cool the water down. Describe the energy changes of the particles of the ice and the water that takes place.
Temperature	A measure of the kinetic energy of particles	The molecules of a gas are in constant random motion. Changing the temperature of a gas, held at constant volume, changes the pressure exerted by the gas.	4. Describe how a gas causes pressure on the wall of the container it is in.
Melting point	Temperature at which a pure substance melts or freezes (solidifies)	A heating curve or a cooling curve shows the temperature change of a substance over time, including changes of state. The changes of state are shown by a horizontal line as there are no temperature changes during a change of state	5. Explain using the kinetic theory of matter, why liquids and solids are much denser than gases.

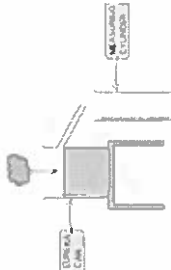
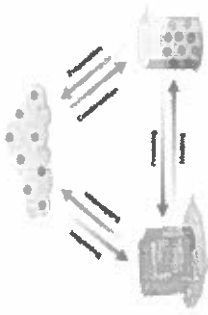
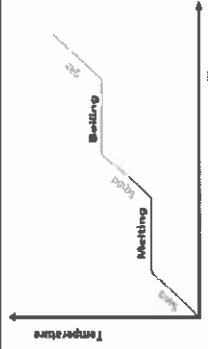
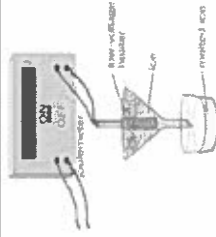
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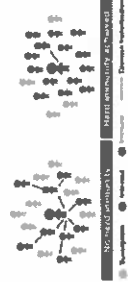
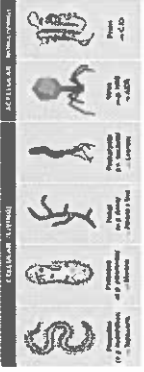
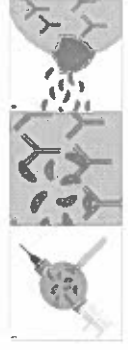
Fig 1

Biology B3- Infection and response

Summary- Position in the Curriculum

Pathogens are microorganisms that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They produce toxins that damage tissues. This topic covers the causes and effects of communicable diseases, the body's defense mechanisms against pathogens, and how diseases can be treated and prevented. It explores bacterial, viral, fungal, and protist diseases, the immune system, vaccination, and the use of drugs to treat disease.

	<u>Definitions</u>	<u>Core Knowledge</u>	<u>Preparing for Assessment</u>
Pathogen	A microorganism that causes disease	Types of pathogens: Bacteria, viruses, fungi, and protists. Pathogens cause disease through direct damage to cells or by producing toxins. Examples of Diseases are: bacterial- tuberculosis, salmonella, viral- influenza, HIV/AIDS, measles, fungal: athlete's foot, ringworm, protist: malaria.	Revision and self-study questions are below. Answer 1 per week for Self-Study. You can draw on your notes, this organiser, your memory and own research.
Communicable Disease	An infectious disease transmissible by direct contact with an affected individual or their discharges.	Good hygiene through regular hand washing, sanitisation, and safe food practices can prevent spreading of the communicable diseases. Other methods include quarantine and isolation, that is limiting contact with infected individuals. By vector control organisms that transmit diseases can be managed or eliminated (e.g. mosquitoes for malaria).	1. Give examples of diseases caused by bacteria, viruses, fungi, and protists. What are the potential consequences of antibiotic resistance? Explain the importance of hygiene in preventing the spread of communicable diseases.
Immune System	The body's defense against infectious organisms and other invaders.	First line of defense: skin, mucus, and stomach acid prevent pathogen entry. Second line of defense: white blood cells (phagocytes) engulf and destroy pathogens. Third line of defense: lymphocytes produce antibodies specific to antigens on pathogens. Memory cells: retain information about pathogens for faster response upon re-infection.	2. Explain how the body's first line of defense works to prevent infection. What are the roles of white blood cells in defending the body against pathogens?
Vaccination	The administration of a vaccine to stimulate an immune response for protection against specific diseases.	Vaccines introduce a harmless form of the pathogen to stimulate an immune response without causing the disease. They provide immunity, help achieve herd immunity, reduce spread of infectious diseases.	3. How do vaccines help protect against disease?
Herd Immunity	Resistance to the spread of a contagious disease within a population because a high percentage of individuals are immune, typically through vaccination		4. What is herd immunity and why is it important?
Antibiotic, antiviral	A type of antimicrobial drug used to treat bacterial infections. A type of medication used specifically for treating viral infections.	<p>Antibiotics: Treat bacterial infections but are ineffective against viruses. Antivirals: Treat viral infections by inhibiting virus development. Painkillers: Relieve symptoms but do not kill pathogens.</p> <p>Traditionally drugs were extracted from plants and microorganisms. Most new drugs are synthesised by chemists. However, the starting point may still be a chemical extracted from a plant.</p>	5. Discuss how antibiotics work and why they are not effective against viruses.



Physics 4 – Atomic structure

Summary- Position in the Curriculum

Ionising radiation is hazardous but can be very useful. Although radioactivity was discovered over a century ago, it took many nuclear physicists several decades to understand the structure of atoms, nuclear forces and stability. Early researchers suffered from their exposure to ionising radiation. Today radioactive materials are widely used in medicine, industry, agriculture and electrical power generation.


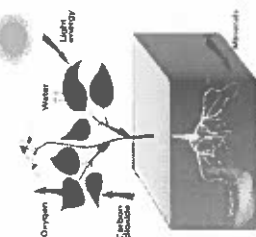
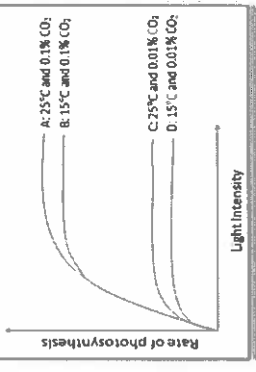
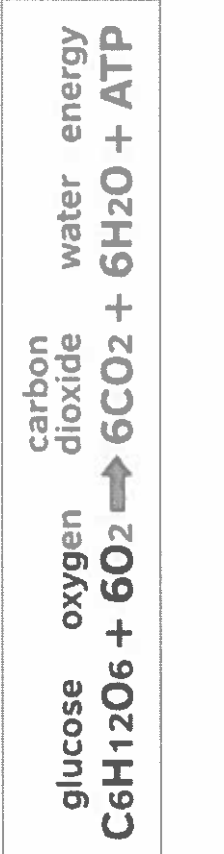
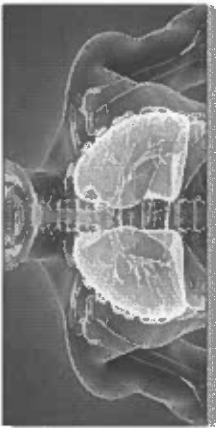
Terminology	Definitions	Core Knowledge	Preparing for Assessment
Isotopes	Atoms with the same number of protons and different numbers of neutrons	In an atom the number of electrons is equal to the number of protons in the nucleus. Atoms have no overall electrical charge. The number of protons in an atom of an element is called its atomic number . The total number of protons and neutrons in an atom is called its mass number .	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Activity	The number of unstable atoms that decay per second in a radioactive source. Activity is measured in becquerel (Bq)	Some atomic nuclei are unstable. The nucleus gives out radiation as it changes to become more stable. This is a random process called radioactive decay .	1. Describe the differences between the plum pudding model of the atom and the nuclear model of the atom.
Half-life	Average time taken for the number of nuclei of the isotope (or mass of the isotope) in a sample to halve	The nuclear radiation emitted may be: • an alpha particle (α) – this consists of two neutrons and two protons; it is the same as a helium nucleus • a beta particle (β) – a high-speed electron ejected from the nucleus as a neutron turns into a proton • a gamma ray (γ) – electromagnetic radiation from the nucleus • a neutron (n)	2 The bone contains traces of carbon-14, a radioactive isotope of carbon. Only 1/4 of the C-14 is left not decayed in the bone. The half-life of C-14 is 5730 years. Calculate the age
Irradiated	An object that has been exposed to ionising radiation, but it does not become radioactive.	Alpha decay causes both the mass and charge of the nucleus to decrease. Beta decay does not cause the mass of the nucleus to change but does cause the charge of the nucleus to increase. The emission of a gamma ray does not cause the mass or the charge of the nucleus to change.	3 Complete the alpha decay equation ${}_{95}^{242}\text{Am} \longrightarrow$
Radioactive Contamination	The unwanted presence of materials containing radioactive atoms on other materials	Alpha, beta and gamma radiation ionise substances they pass through. Ionisation in a living cell can damage or kill the cell. Damage to the genes in a cell can be passed on if the cell generates more cells.	4 Explain why ionising radiation is dangerous. Explain how you would use a Geiger counter to find the range of the radiation from a source of alpha.
Count rate	The number of counts per second detected by a Geiger counter	Radioactive contamination is the unwanted presence of materials containing radioactive atoms on other materials. The hazard from contamination is due to the decay of the contaminating atoms. The type of radiation emitted affects the level of hazard.	5 Explain why the mass of a He nucleus is 4 times the mass of a hydrogen nucleus and its charge is only twice as much as the charge of a H nucleus.

Image	Image	Image	Image
<p>ACTIVITY HAS DROPPED BY HALF OF ITS ORIGINAL VALUE</p> <p>ACTIVITY HAS DROPPED BY A QUARTER OF ITS ORIGINAL VALUE</p> <p>1 HALF-LIFE OF T</p> <p>2 HALF-LIVES OF $2T$</p>	<p>α</p> <p>β</p> <p>γ</p> <p>Paper Aluminium Lead</p>	<p>MASS NUMBER STAYS THE SAME</p> <p>MASS NUMBER DECREASES BY 4</p> <p>ATOMIC NUMBER INCREASES BY 1</p> <p>ATOMIC NUMBER DECREASES BY 2</p>	<p>MASS NUMBER STAYS THE SAME</p> <p>MASS NUMBER DECREASES BY 4</p> <p>ATOMIC NUMBER INCREASES BY 1</p> <p>ATOMIC NUMBER DECREASES BY 2</p>

AQA B4 Bioenergetics Knowledge Organiser

Summary- Position in the Curriculum

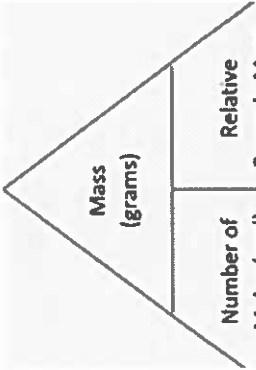
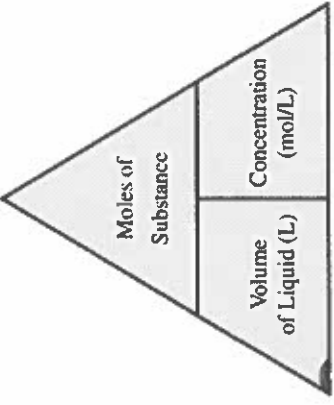
In Bioenergetics we explore how plants harness the Sun's energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere. Both animals and plants use this oxygen in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
<p>Photosynthesis</p>	<p>Photosynthesis is a chemical reaction which takes place in plants. It converts carbon dioxide and water into glucose and oxygen. It uses light energy to power the chemical reaction, which is absorbed by the green pigment chlorophyll.</p>	<p>Plants acquire the carbon dioxide via diffusion through the stomata of their leaves. The water is absorbed from the soil through the roots and transported to the cells carrying out photosynthesis, via the xylem.</p> <div style="text-align: center;">  </div> <p>The glucose made in photosynthesis is used for respiration, stored as starch, fat or oils, used to produce cellulose or used to produce amino acids for protein synthesis.</p>	<p>Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.</p> <ol style="list-style-type: none"> Describe the process of photosynthesis with word and balanced symbolic equations.
<p>limiting factor</p>	<p>A limiting factor is something which stops the photosynthesis reaction from occurring at a faster rate. Temperature, light intensity and carbon dioxide level are all limiting factors.</p>	<p>Increasing the temperature of the surroundings will increase the rate of reaction, but only up to around 45°C. At around this temperature, the enzymes which catalyse the reaction become denatured.</p> <p>Increasing the light intensity will increase the rate of reaction because there is more energy to carry out more reactions.</p> <p>Increasing the carbon dioxide concentration will also increase the rate of reaction because there are more reactants available.</p>	<ol style="list-style-type: none"> Describe how commercial farmers improve the environmental conditions to maximise photosynthesis and ensure they make a profit.
<p>Respiration</p>	<p>Respiration is the chemical reaction which occurs inside the mitochondria of all living cells to release energy for living functions and processes.</p>	<p>Subatomic Particles and Atomic Structure: The atom comprises protons with positive charges and neutrons with no charge in the nucleus, and electrons with negative charges in orbits. The number of protons determines an element's atomic number.</p> <p>Respiration can be either aerobic (using oxygen) or anaerobic (without using oxygen).</p> <p>In anaerobic respiration, the glucose is not completely oxidised. This means that there is less energy released than in aerobic respiration.</p>	<ol style="list-style-type: none"> Photosynthesis is affected by limiting factors. Describe what is meant by the term 'limiting factor'?
<p>Metabolism</p>	<p>Metabolism is the combination of all the reactions in a cell or in the body</p>	<p>Energy released during respiration is used during metabolic processes to synthesise new molecules:</p> <p>Glucose is converted to starch, glycogen and cellulose.</p> <p>Glycerol and three fatty acids are joined to form a lipid molecule.</p> <p>Glucose and nitrate ions are joined to form amino acids.</p>	<ol style="list-style-type: none"> Describe the process of respiration with word and balanced symbolic equations Describe the importance of metabolism.
<div style="text-align: center;">  </div>	<div style="text-align: center;">  </div>	<div style="text-align: center;">  </div>	<div style="text-align: center;">  </div>

Chemistry – Quantitative Chemistry

Summary- Position in the Curriculum

Quantitative chemistry allows chemists to calculate the quantities of reactants and products in chemical reactions. This helps in determining the yield of reactions, monitoring purity, and ensuring the efficient use of resources. Understanding these calculations is fundamental for various applications in laboratory and industrial settings.

<u>Terminology</u>	<u>Definitions</u>	<u>Core Knowledge</u>	<u>Preparing for Assessment</u>
Mole	The amount of substance that contains the same number of entities as there are atoms in 12 grams of carbon-12.	Mass Changes: When a gas is a reactant or product, the total mass may appear to change if the gas escapes or is absorbed from the surroundings.	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Relative Formula Mass (Mr)	The sum of the relative atomic masses of the atoms in the formula of a compound.	Calculations with Moles: Determine the mass of a substance using its molar mass (mass of one mole). Molar mass is equivalent to the relative formula mass expressed in grams.	1. Define and calculate the relative atomic mass and relative formula mass.
Concentration	The amount of a substance (solute) present in a certain volume of solution.	Balanced Equations and Moles: Use the coefficients in balanced equations to relate the moles of reactants to moles of products.	2. Explain the law of conservation of mass and apply it to chemical reactions
Limiting Reactant	The reactant that is completely consumed in a reaction, thus determining the maximum amount of product formed.	Limiting Reactants: Identify the reactant that limits the amount of product formed. Calculate the remaining amounts of other reactants.	3. Understand and calculate percentage yield and its significance in industrial chemistry.
Percentage Yield	The ratio of the actual yield to the theoretical yield, expressed as a percentage.	Concentration of Solutions: Calculated as the amount of solute divided by the volume of the solution (mol/dm ³). Important for reactions in solution.	4. Explain and use the mole concept to calculate the number of particles in a given mass.
Avogadro's Constant	Number of atoms, molecules, or ions in one mole of a substance 6.022X10 ²³	Conservation of Mass: In a chemical reaction, the total mass of the products equals the total mass of the reactants. No atoms are lost or gained, only rearranged.	5. Determine the limiting reactant in a chemical reaction and calculate the amount of product formed.
Image	Image	Image	Image
		MgCl_2 $(1 \times 24) + (2 \times 35.5)$ $24 + 71$ $= 95$	$\text{Percent Yield} = \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100$

Chemistry – Chemical Changes

Summary- Position in the Curriculum

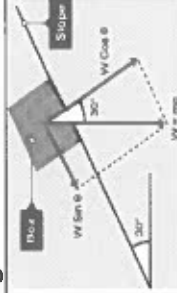
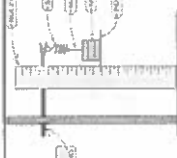
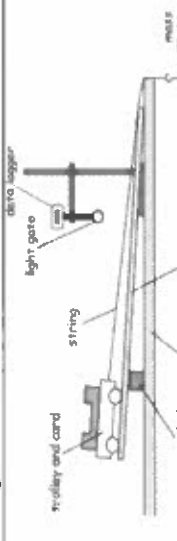
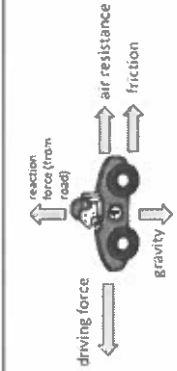
Understanding chemical changes is crucial in chemistry as it involves the study of reactions and how substances transform into different substances. This knowledge is fundamental in predicting reaction outcomes, developing new materials, and extracting valuable resources. It also provides insights into biochemical processes and industrial applications.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Reactivity Series	A series of metals arranged in order of their reactivity from highest to lowest.	Neutralisation and Salt Production: Acids react with bases to form salts and water. For example, sulfuric acid reacts with sodium hydroxide to produce sodium sulphate and water.	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Oxidation	The process in which a substance gains oxygen or loses electrons.	Soluble Salts: Soluble salts can be prepared by reacting acids with solid insoluble substances like metals, metal oxides, hydroxides, or carbonates.	1. Explain the reactivity series and predict the outcomes of metal reactions.
Electrolysis	A process that uses electricity to cause a chemical change, usually the decomposition of a compound into its elements.	The Process of Electrolysis: Electrolysis involves passing an electric current through a substance to cause a chemical change. It is used to decompose ionic compounds.	2. Describe oxidation and reduction in terms of oxygen and electrons and Explain the reactivity series and predict the outcomes of metal reactions
Displacement Reaction	A reaction in which a more reactive element displaces a less reactive element from its compound.	Electrolysis of Molten Ionic Compounds: Molten ionic compounds can be electrolyzed to produce elements. For example, electrolyzing molten sodium chloride produces sodium and chlorine.	3. Explain the process of electrolysis and its applications in extracting metals.
Neutralisation	A chemical reaction in which an acid and a base react to form a salt and water.	Extraction of Metals: Electrolysis is used to extract metals that are too reactive to be extracted by reduction with carbon, such as aluminium.	4. Predict the products of electrolysis of molten and aqueous ionic compounds.
Salt	A compound formed when the hydrogen ion in an acid is replaced by a metal ion or another positive ion.	Electrolysis of Aqueous Solutions: Electrolysis of aqueous solutions involves the discharge of ions depending on their reactivity. For example, electrolyzing brine produces hydrogen, chlorine, and sodium hydroxide.	5. Explain the process of making salts and provide examples.
Image	Image	Image	Image

Physics 4 – Forces

Summary- Position in the Curriculum

Engineers analyse forces when designing a great variety of machines and instruments, from road bridges and fairground rides to atomic force microscopes. Anything mechanical can be analysed in this way. Recent developments in artificial limbs use the analysis of forces to make movement possible.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Vector	A vector is a physical quantity, such as displacement or velocity, that has a magnitude and a direction (unlike a scalar which has magnitude only)	The weight of an object may be considered to act at a single point referred to as the object's 'centre of mass'. Weight = mass x gravitational field strength $W = m \times g$ $W =$ weight in Newtons, N , $m =$ mass in Kg and $g =$ gravitational field strength, N/Kg When a force causes an object to move through a distance work is done on the object. Work done = force x distance $W = F \times S$ 1 Joule – 1 Newton-metre	Revision and self-study questions are below. Answer 1 per week for Self-Study. You can draw on your notes, this organiser, your memory and your own research.
A free-body diagram	A diagram that shows the forces acting on an object without any other objects or forces shown	A force that stretches (or compresses) a spring does work and elastic potential energy is stored in the spring. Provided the spring is not inelastically deformed , the work done on the spring and the elastic potential energy (Ee) stored are equal. Force (F) = Spring constant (k) x extension(e) $Ee = \frac{1}{2} \times k \times e^2$	1. A Parachutist of mass 70 kg supported by a parachute of mass 20 kg reaches a constant speed. Explain why?
Conservation of momentum	In a closed system, the total momentum before an event is equal to the total momentum after the event.	Average acceleration can be calculated using: acceleration = change in velocity/time $a = \Delta v/t$ a=acceleration, m/s^2 Δv =change in velocity, m/s $t =$ time, s An object that slows down is decelerating . Uniform acceleration is calculated using: $(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$	2. When an aeroplane is at cruising altitude, its engine produces a force of 25000N towards North. A wind blows with a force of 5000N due East. Draw a vector diagram to calculate the resultant force and its direction.
Inertia	The tendency of an object to stay at rest or to continue in uniform motion	Newton's laws 1st law - If the resultant force acting on an object is zero and: • the object is stationary, the object remains stationary • the object is moving, the object continues to move at the same speed and in the same direction. So, the object continues to move at the same velocity.	3. A car is travelling along a straight road. The driver suddenly observes that the road ahead is flooded and applies the brakes. Describe what happens to the car and the brakes.
Terminal velocity	The velocity reached by an object when the drag force on it is equal and opposite to the force making it move	2nd law -resultant force = mass x acceleration $F = m \times a$ force, F , in newtons, N mass, m , in kilograms, kg acceleration, a , in metres per second squared, m/s^2 3rd law -Whenever two objects interact, the forces they exert on each other are equal and opposite	4. Calculate the extension of a guitar string pulled by a force of 13N. The spring constant of the guitar string is 20000 N/m
Stopping distance	The distance travelled by the vehicle in the time it takes for the driver to think and brake	Momentum is defined by the equation: momentum = mass x velocity $p = m \times v$ momentum, p , in kilograms metre per second, $kg \text{ m/s}$ mass, m , in kilograms, kg velocity, v , in metres per second, m/s	5. Write experimental methods to investigate how easily a spring stretches by hanging weights and how steepness of a runway affects a trolley's motion.
Image 	Image 	Image 	Image 

Chemistry – Energy Changes

Summary- Position in the Curriculum

Energy changes are an essential part of chemical reactions. Understanding how energy is transferred during chemical reactions helps in predicting the feasibility of reactions, designing energy-efficient processes, and developing new technologies. Exothermic reactions release energy to the surroundings, while endothermic reactions absorb energy.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Exothermic Reaction	A chemical reaction that releases energy to the surroundings, usually in the form of heat.	Energy Level Diagrams: These show the relative energies of reactants and products, the activation energy, and the overall energy change. They help in identifying whether a reaction is exothermic or endothermic	Revision and self-study questions are below. Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Endothermic Reaction	A chemical reaction that absorbs energy from the surroundings.	Energy Transfer: Energy is conserved in chemical reactions. The total energy of the reactants is equal to the total energy of the products plus any energy transferred to the surroundings.	1. Draw and interpret reaction profiles for exothermic and endothermic reactions.
Activation Energy	The minimum amount of energy required for reactants to undergo a chemical reaction.	Activation Energy: The minimum energy needed for a reaction to occur. Represented as the peak of the energy curve in a reaction profile.	2. Explain the concept of activation energy and its role in chemical reactions.
Reaction Profile	A diagram showing the energy changes during the course of a reaction, indicating the activation energy and the overall energy change.	Bond Energy Calculations: Calculate the energy needed to break bonds in the reactants and the energy released when bonds are formed in the products. The difference gives the overall energy change of the reaction.	3. Calculate energy changes in reactions using bond energies.
Bond Energy	The amount of energy needed to break one mole of a particular bond in a gaseous molecule.	Exothermic Reactions: More energy is released from forming new bonds than is needed to break existing bonds.	4. Evaluate the uses and applications of exothermic and endothermic reactions given appropriate information.
Catalyst	A substance that increases the rate of a chemical reaction without being consumed in the process	Endothermic Reactions: More energy is needed to break existing bonds than is released from forming new bonds.	5. Distinguish between exothermic and endothermic reactions based on temperature changes.

Image	Image	Image	Image
<p>Potential Energy vs. Reaction Progress for an Exothermic reaction.</p>	<p>Potential Energy vs. Reaction Progress for an Endothermic reaction.</p>	<p>Energy vs. Reaction Coordinate comparing catalyzed and uncatalyzed reaction paths.</p>	<p>Bond energy diagram for the combustion of methane: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$</p>

History

Year 10: Paper 1 Knowledge Organiser: Term 1.1-2.1 Crime, policing and punishment c.1250-present day, and the historic environment of Whitechapel c.1870-1900

	Nature of Crime	Law enforcement	Punishments
1.1 Medieval era c.1250-1500	<ul style="list-style-type: none"> • ANGL0 SAXON • Crime against person, property & authority. • AFTER THE 1066 NORMAN CONQUEST • Crimes against the King not the individual. • Poaching and outlaws • LATER MEDIEVAL KINGS: • Bigger towns = more crime. • Statute of Labourers and heresy laws. • High Treason. <p><u>Case studies</u></p> <ul style="list-style-type: none"> • The influence of the Church on crime and punishment. • Church sanctuary • Church Courts • Benefit of the Clergy • Trial by Ordeal • The end of the Saxon Wergild 	<ul style="list-style-type: none"> • King had ultimate responsibility for the law • ANGL0 SAXON: Trial by Ordeal and Jury. Religious beliefs. The hue and cry. Tithings. Collective Responsibility. • AFTER THE 1066 NORMAN CONQUEST: Castles. Feudal system. Poaching. Murdrum fine. Tithings. Hue and Cry. Forest Laws. Trial by Combat. Fewer equal rights for women. Church courts. • LATER MEDIEVAL KINGS: Justices of the Peace appointed by the king. King more in control. More centralised. Wards. Parish Constables. Sheriffs. Church and Royal courts. Coroners. • Courts dealt with different crimes. Royal, Manor and Church courts had specific roles. • Juries usually knew defendants and were reluctant to convict people. Also, punishments were very harsh. • Justice of the Peace's ran local hundred courts 	<ul style="list-style-type: none"> • Fines: collected by the King, Church or Lord of the Manor • Public humiliation: cucking stool, stocks, pillory • Prison: used to hold debtors and those awaiting trial. Prisoners had to pay the gaoler for food and blankets. • Execution: hanging was used for murder and serious theft • Hanging, Drawing and Quartering was used for treason • Burning Alive was used for heresy and female killers You could avoid death if you: ran, hid in a cathedral, had powerful friends/knew jurors, bought a pardon, were pregnant, a clergyman, became an approver or joined the army.
1.1 Early Modern era c.1500-1700	<ul style="list-style-type: none"> • Growing population: caused falling wages and rising prices. • Poverty drives a lot of crime. • Vagrancy became common. People feared vagrants. • Moral Crimes: Strict Christians known as Puritans influenced what was judged to be a crime. People were punished for drinking, swearing, sex outside marriage, homosexuality, not going to Church. • Witchcraft: people believed witches were possessed by the Devil and had magical powers. Accusations peaked in the late 16th century. • Smuggling: illegal import of goods to avoid paying tax • Highway Robbery: armed gangs who help people up on the roads 	<ul style="list-style-type: none"> • Watchmen: began to be employed to patrol towns at night • Justice of the Peace's dealt with more petty crime. • Sheriffs became less important • Assizes were courts that dealt with the most serious crimes in each county. • Petty sessions dealt with minor crimes, took over a lot of the work the manor court had done. • Church courts enforced church rules, they declined after 1660. • Local people still largely policed themselves. Wealthier people often took jobs in law enforcement and abused their position. 	<ul style="list-style-type: none"> • Humiliation and Physical: public confession, stocks, pillory, scold's bridle, cucking and ducking stool, whipping, branding. • Prisons were uncommon, but still used for debtors. • Bridewells were places where criminals were forced to work and punished if they refused. • The Bloody Code created many new offences punishable by death. Poaching and illegal fishing are examples. It was meant to terrify people into obeying the law. • Hangings actually decreased as many judges and juries were unwilling to enforce the brutal Bloody Code and execute minor criminals. • Transportation sent criminals to America <p>CASE STUDY The Gunpowder Plotters KEY INDIVIDUAL Matthew Hopkins</p>

	Nature of Crime	Law enforcement	Punishments
1.2 Industrial era c.1700-1900	<ul style="list-style-type: none"> Industrialisation saw cities grow massively. Opportunistic crime such as petty theft was common. Prostitution was the most common crime women were charged with Radical Thinkers argued that poverty and crime were linked Conservative thinkers blamed crime on people's bad habits and choices. They thought that criminals could be identified by their physical features and that criminals were lazy drunks. The Public were fascinated by violent crime in novels, newspapers and Penny Dreadfuls 	<ul style="list-style-type: none"> Bow Street Runners were the first police force. Set up in London in 1750s. Men were paid to patrol the streets. Robert Peel was asked to set up the Metropolitan Police in 1829. It was a force 3000 uniformed men. Laws such as the Rural Constabulary Act of 1839 allowed other counties to create their own police force. A national police force began to be created after 1856 when set standards were placed on police forces. Crime fell after 1850 as the police dealt with drunkenness, theft and illegal gambling. Technology including photographs and fingerprints helped 	<ul style="list-style-type: none"> Executions were brought inside prison walls in the 1780s. The New Drop made hangings quicker, as a drop quickly broke the condemned's neck. Bloody Code is ended more people opposed execution. From 1837 only murder and attempted murder could be punished by hanging. Holloway Prison for women. Transportation sent criminals to Australia to do hard labour. Few returned to England. Prisons were reformed: John Howard and Elizabeth Fry campaigned to improve conditions. Prison numbers increased. Introduction of the silent system and pointless work (treadmill). CASE STUDY Pentonville Prison – strengths, weaknesses of the separate system. KEY INDIVIDUAL Robert Peel – Penal Reform and creation of the Met Police.

1.2 Modern era c.1900-present day	<ul style="list-style-type: none"> Crime rates rose: 1920-55 because of economic problems. It continued to rise after 1955 with the increased recording of crime and the creation of many new crimes. Black Market: illegal buying and selling of goods during WW2 Car Crime: speeding, not wearing a seatbelt, drink-driving Drug crime: production, consumption and selling Cyber Crime: fraud, phishing, sharing illegal content Hate Crime: discrimination/abuse based on race, religion, gender, sexuality Football Hooliganism: planned violence and vandalism at matches 1871 misuse of Drugs Act classifies illegal drugs. Terrorism: extremist groups like the IRA, terror attacks by Islamic extremists, far right and racist groups. 1968 Race Relations Act makes racist discrimination illegal 	<ul style="list-style-type: none"> Views of the police changed in the late 20th century. Trust in the police fell. Better training was given to officers. Different types of officers were employed to deal with specific crimes, forensics, traffic, fraud Firearms: are only used by 5% of police. Development of the police force in 1829 and CID 1842. 1856 Police Act. Pepper spray, truncheons and Tasers are used more frequently. Technology: DNA, blood groups and fingerprints all identify suspects. Computers, radios and CCTV assist police. Crown courts were established to deal with the most serious crime. Magistrates' courts deal with more minor offences. Juries are more representative but trials are expensive. Juvenile courts were introduced in 1908. A move towards crime prevention. Neighbourhood Watch. Specialisation in the police force- Fraud Squad, drug units, dog handling units, special branch. Police Training College (1947) Impact of Science and Technology. 	<ul style="list-style-type: none"> Corporal punishment was widely used, whipping and the birch were seen as cheaper and more effective than prison. Phased out in the mid 20th century. Capital punishment was abolished in the 1960s. Some people argue for it to return, other that it is barbaric. Rehabilitation sought to restore criminals to society. More education, paid work. Borstals and young offenders institutions Prison populations grew. More short-sentences. Prisons are overcrowded. Alternatives to prison: probation, fines, community service, electronic tags, parole. Victims are better supported and can make impact statements are considered when sentencing happens. Borstals prison for adolescents 1908 Non-custodial alternatives to prison- ASBO, Community Service, treatment programmes, tagging. Age of Criminal Responsibility increased. CASE STUDY Conscientious Objectors during the World Wars KEY INDIVIDUAL Derek Bentley Case.
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Time line of key developments in Whitechapel

- 1829 Metropolitan Police created by Robert Peel
- 1873 Sarah Fisher found guilty of killing her baby through exposure to cold weather whilst begging outside in November
- 1875 Henry Wainwright executed murdering Harriet Lane. Henry chopped up her body and buried it under a warehouse
- 1877 The Trial of the Detectives. Several senior detectives were found guilty of taking bribes from criminals.
- 1878 CID set up. Central Investigation Division replaced the detectives who had been taking bribes. Based at Scotland Yard
- 1878 Brawls between Christians and Jews in Whitechapel.
- 1881 First Peabody Estate opens in Whitechapel
- 1883 Government study of Whitechapel finds out that out of 1100 families, 870 lived in one room
- 1885 Charles Booth publishes, 'Life and Labour of the People'
- 1885 Fenian bombings at Houses of Parliament
- 1887 'Bloody Sunday' at Trafalgar Square
- August, 1888 The Whitechapel Murders: On the 30th September 1888 the 'double event' occurred. Jack murders Elizabeth Stride and Catherine Eddowes
- Nov. 1888 Sir Charles Warren resigns

Key issue 1: housing for poor people

1. Poor quality: worst slums called rookeries The Old Nichol, was a rookery in Whitechapel. 2. Lodging Houses: At a 'doss house' 4d a night for a bed of straw in a room with 60-80 other people. 2d a night to lean against a rope which was tied from one end of the room to the other. 3. Overcrowded: Often families of 10 shared one room. 4. Dirt and disease: Poor sanitation. Chamber pots were emptied in the street. Typhoid fever and cholera spread easily. Most children were physically and mentally underdeveloped. Half of all children dies before 5 years old.

Key issue 2: attempts to improve housing

1. Peabody Estates-- flats for poor people built by American philanthropist George Peabody. Whitechapel Peabody Estate opened in 1881. 2. Boundary Estate: The Old Nichol was knocked down in 1899. In it's place was built the first council estate, the Boundary Estate.

Key issue 3: Jobs and employment in Whitechapel

1. Charles Booth: social reformer who investigated poverty in Whitechapel. Found that 35% of people lived in serious poverty. Produced colour coded maps in his book called Labour and Life of the People. . Poorest areas were shaded black. 2. Low pay: 'sweated trades'. Like matchmaking and tailoring paid 10d a day. Dock work was casual 3. Poor conditions: match girls got 'phossy jaw', many Dockers were injured and could no longer work. 4. Workhouse: food and a bed were given in return for days hard work. 5. Prostitution: women sold themselves for 3d. A pint of milk cost 2d.

Key issue 4: the effects of immigration

1. Immigrants: Thousands of Irish and Jewish immigrants from Eastern Europe arrived from 1870. 2. Overcrowding and low wages: Many Jews and found work as tailors in Whitechapel. This pushed down wages and increased overcrowding. Led to fighting with locals. 3. Political Ideas: Irish and Jews were blamed for bringing socialism and anarchism and Fenian attacks

Key issue 5: crime in Whitechapel

1. Alcohol: Drink was cheap and drunkenness common, cries of "Murder!" were "not unusual There was much more crime happening because people were drinking. 2. Prostitution: October 1888, estimated that there were about 1200 prostitutes in Whitechapel 3. Rookeries: had many narrow alleys and courtyards with hiding places. Police feared entering rookeries. 4. Gangs: the Demanders ran a protection racket. They demanded money from shops and smashed the shop if payment was refused. The Rollers robbed drunks and prostitutes The Lurkers hid in dark places then attacked and robbed people.

Key issue 6: The police in Whitechapel- H Division

1. H-Division: The Met's headquarters were called Scotland Yard. H Division was the area covering Whitechapel. 2. Few police: at peak numbers H Division has 575 officers -- 1 policeman for every 300 people. 3. Alcohol: PC Crow was sacked after being found lying down drunk and asleep, for the 4th time. Of the Met's first 1,000 recruits, 200 were sacked for drunkenness. 4. Low pay: in 1890 a policeman earned 24 shillings a week. This works out as £6,000 per year today. Criminals could bribe the police.




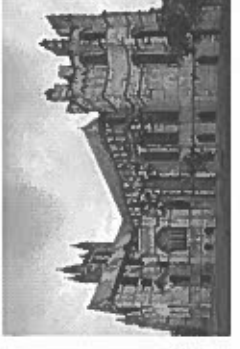
Key issue 7: police problems	<p>1. Bloody Sunday: Sir Charles Warren, leader of the Metropolitan Police ordered a peaceful protest in Trafalgar Square to be broken up with violence. This led to lack of trust in the police. 2. Lack of co-operation: Between City of London Police and Metropolitan Police. Due to Warren giving poor orders 3. Whitechapel Vigilance Committee: set up by George Lusk to patrol the streets because they had no confidence in the police. Offered a reward for information. 4. Warren's Orders: On the night of the 'double event' Warren ordered the message 'the Jews are the men who will not be blamed for nothing' to be rubbed off the wall in Goulston Street</p>
Key issue 8: the role of the media	<p>1. Sensationalism: 'Penny dreadfuls' like the Weekly Illustrated News exaggerated the murders to sell papers. This led to panic and lots of letters to the police from members of the public with 'information' about the murders. These were often useless and wasted the police's time 2. Punch and Pall Mall Gazette: criticised the government and police for not catching Jack. Sympathetic to the poor. 3. The Times: read by the rich. Criticised the 'undeserving poor' for causing crime through laziness.</p>

Independent review questions. Suggested activities and questions...	
Time period Medieval era c.1250-1500 Term 1.1	<p>1) Define each of the following terms and give one example of each: Crimes against the person, property and authority</p> <p>2) Give 3 reasons why ordinary people hated the forest laws</p> <p>3) Law enforcement in the Middle Ages was mainly the responsibility of the community'. Give reasons to support and challenge this view.</p> <p>4) List at least two ways in which law enforcement differed in the later medieval period from the Norman period.</p> <p>5) Give three similarities between Anglo-Saxon, Norman and later medieval punishments.</p> <p>6) Give three ways in which the Church courts were used in the 13th century.</p>
Early Modern era c.1500-1700 Term1.1	<p>1) explain why there was an increase in charges of treason AND heresy under the Tudors.</p> <p>2) Give 3 reasons why vagrancy became a crime in early modern England.</p> <p>3) List three ways local communities were responsible for enforcing the law in early modern England.</p> <p>4) outline the purposes of punishment for crimes during the early modern period.</p> <p>5) Explain why the Gunpowder plotters were hanged, drawn and quartered.</p> <p>6) Give three ways in which the English Civil War helped to lead to the witch-hunts of 1645-47.</p>
Industrial era c.1700-1900 Term 1.2	<p>1) Describe two different attitudes to highwaymen in 18th century society. Give two reasons for their decline in the 19th century.</p> <p>2) What were the authorities trying to achieve by giving the Tolpuddle Martyrs such harsh sentences?</p> <p>3) Explain why the work of the Fielding Brothers was a significant advance in policing.</p> <p>4) Describe how attitudes towards punishment changed during the period 1750-1900.</p> <p>5) give three examples of how the design of Pentonville Prison supported the separate system.</p> <p>6) Give three reasons why the Metropolitan Police force managed to reduce the crime rate.</p>
Modern era c.1900-present day Term 1.2	<p>1) Give three examples of 'new' crimes that are actually 'old' crimes using different means.</p> <p>2) Explain why a. driving offenses and b. racial discrimination became crimes in the 20th century.</p> <p>3) Give 5 examples of science and technology that has improved policing in this century.</p> <p>4) Give five examples of changes to punishment for criminals since 1900.</p> <p>5) Give 2 similarities and 2 differences in the treatment of conscientious objectors during the first and Second World Wars.</p> <p>6) Explain why the Derek Bentley case was so controversial.</p>
The Historic environment: Whitechapel c.1870-1900 Term 2.1	<p>1) Give reasons why a. theft and b. assault were very common crimes in Whitechapel c1870-c.1900.</p> <p>2) Give at least 3 reasons why Irish and Eastern European Jewish immigrants were feared by the other residents of Whitechapel.</p> <p>3) List 3 factors that made catching criminals in Whitechapel difficult for the police.</p> <p>4) Give one way in which the media a. helped and b. Hindered the police investigation into the Whitechapel murders.</p> <p>5) Why were the police never able to catch Jack the Ripper?</p>

History-Year 10-Term 2.2

Summary- Position in the Curriculum




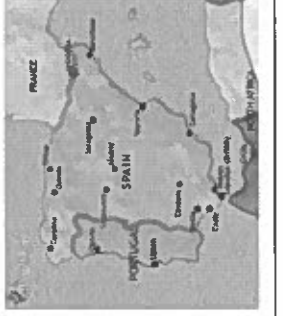
Elizabethan England comprises a critical part of the Edexcel GCSE, acting as it's 'depth study', this is when a relatively short period of history, in this case the early life of just one Monarch, is studied in detail. The Elizabethan period is a fascinating one; it was a time of existential threat to Britain from the Spanish Armada, major religious turmoil following the Reformation under Elizabeth's father Henry VIII and one of cultural splendour, culminating in Shakespeare's early mass fame. In a subject traditionally dominated by the study of men, it is fascinating to examine a country lead for so many decades by a Queen who not only remained unmarried and childless but as her reign grew, attained the status of a near deity. Few monarchs have as diverse, dramatic or impressive a story to tell as Elizabeth and perhaps none have better defined a singular period of English history, than her.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Privy Council	Nobles who advised Elizabeth and monitored Parliament	Elizabeth's government comprised of the Court, Privy Council, Parliament, Justices of the Peace and Lord Lieutenants, Elizabeth worked had to maintain power balances between key individuals within these groups, resisting pressure from Parliament to marry, refusing to favour one noble for marriage over another, eventually turning Dudley down, and expanding the influence of Protestant's nobles.	1. Explain two of the problems Elizabeth faced on becoming Queen. 2. Explain two features of Elizabethan government
Militia	Raised and maintained by the Lord Lieutenants, these were citizens who could be armed if needed	Much of Elizabeth's success was built on her careful cultivation of her status as 'The Virgin Queen', by refusing to marry and through her presentation in the symbols of virginity; pearls, bows and white paint and her 'processions' in which attendees believed that touching her could heal them, she created a near statuesque cult of personality around herself, becoming a virtual Virgin Mary figure, to Protestants looking for a replacement to the traditionally Catholic icon of the Virgin Mary. In this way she made her perceived weakness as a woman, into a uniquely female strength.	3. Explain two features of Elizabethan society
Puritan	Strict Protestants who did not believe that Elizabeth and the Church of England were radical enough	Social structures in Elizabethan England's countryside depended largely on blood, with the nobility holding power, followed by the gentry, farmers and tenant farmers, and then the landless labourers and poor, this was an extension of the Medieval Feudal System, under which around 90% of the country lived. In growing towns and cities, powerful guilds of merchants and professional workers were increasingly changing this antiquated system and redefining social and economic structures. Poverty and inequality in Elizabethan England was acute, however, naval trade and the move towards cities were making Elizabethans wealthy.	4. Explain the challenges Elizabeth faced from abroad 1558-68
Catholics	Followers of the Pope in Rome and historic Christian authorities	Elizabeth faced opposition from Catholics at home and abroad but maintained the Reformation, leading the Church of England and eschewing the Pope, her 1559 religious settlement offered Catholics and Protestants a compromise on communal worship but ultimately left Catholic nobles plotting against her, even though it avoided the religious civil wars of similar European states.	5. Outline the differences in Catholic, Protestant and Puritan beliefs
Gentry	Smaller landowners within the traditional rural feudal system	In 1569 the Northern Earls rebelled against a Protestant Archbishop in Durham, Ridolfi attempted the same in 1571 and in 1583 the Throckmorton plot orchestrated by Phillip II, the Pope and a French Duke were foiled. In 1586 the Babington plotters including Mary Queen of Scots, were executed. These plots were primarily driven by the desire to return England to Catholicism and hinged on foreign support plus that of Mary Queen of Scots, who would have been married to a successful Catholic plotter in each case.	
			

History-Year 10- 3.1

Summary- Position in the Curriculum

Disinherited after her mother Anne Boleyn, (Henry VIII's second wife) was executed, Elizabeth was brought back into the line of succession by her father, only in his final years. Even then she stood behind not only her younger brother Edward VI but also her older sister Mary I, in terms of succession. She outlived both and both died childless; at 25 Elizabeth became Queen. The country she inherited was not one which welcomed the notion of an unmarried female monarch, it was also aggressively polarised between Catholics and Protestants, and on the brink of war with Catholic European powers such as Spain, Elizabeth faced revolts by her nobles, interminable attempts to force her to marry and bare children, and assassination plots from within her own family (Mary Queen of Scots) yet maintained her rule until her death in 1603, sovereign for 44 years.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Earls	Nobles who governed areas of England	Mary Queen of Scots was a cousin of Elizabeth's who was heir to Scotland's throne, Mary had an infant son James with her second husband. When controversy over her third marriage caused her to flee Scotland, Elizabeth imprisoned Mary. Mary's continued communications with Catholic plotters seeking to assassinate Elizabeth led to her eventual execution in 1587.	1. Explain why Mary Queen of Scots was imprisoned in England in 1568
Galleon	A large Spanish war ship, often raided crossing the Atlantic.	England's relations were strained with Spain as England was Protestant, and supported the Dutch rebels with the 1585 Treaty of Nonsuch. English Privateers such as Drake stole from Spanish Galleons and Elizabeth was complicit in this. Elizabeth's older sister Mary I had been married to Spain's King Phillip II who resented his loss of influence over England when she died childless.	2. Explain how and why relations between England and Spain declined 1560-70
The Duke of Medina Sidonia	The incompetent Spanish noble placed in charge of the Armada	Elizabethan England was characterised by huge innovations in seafaring and the growth of piracy and privateering, hoping to rival Spanish imperial gains in the Americas Elizabeth actively encouraged nobles such as Drake and Raleigh to trade in new products such as tobacco with the Americas, raid bullion from Spanish galleons and settle the Americas also, Raleigh famously named Virginia after the Queen herself.	3. Explain the impact of the Northern Revolt and its defeat, on Elizabeth's authority
Privateer	A licenced pirate who shared treasure from Spanish ships with the Queen	The Armada comprised of 130 warships, in 1588 it left bound for the Spanish Netherlands where it hoped to protect and support the passage of 30,000 Spanish troops by barge down the Thames. Desperate to make this appointment The Duke of Medina Sidonia elected to avoid sinking the English fleet as he sailed past them in port on the South Coast, Drake followed Spanish ships and with fire ships, broke their crescent formation at Gravelines, sailing North the Armada ran out of provisions and many were shipwrecked in Scotland and Ireland. This was the crowning moments in Elizabeth's reign.	4. Explain the role of privateering and characters such as Raleigh and Drake, in the Elizabethan era
Armada	A large group of war ships, most famously sent by Spain against in England in 1588	Elizabethans enjoyed themselves at large community events, fairs, inns, theatres, all drew huge numbers who revelled in collective drinking, dancing and singing. Blood sports such as bear baiting and dog fighting were common, while nobles would hunt on their estates. Theatre in particular reached its zenith as the work of Shakespeare drew up to 10% of London's population across the river to the Globe, weekly. Plays in the Renaissance era were often humorous and raunchy, as well as critical of society itself. Nobles and the Queen used events such as theatre shows to present themselves to the public also, looking on from raised galleries. Supposedly, even Drake refused to rush his game of bowls on being told of the Armada's arrival.	5. Explain the nature of leisure and education pursuits in Elizabethan England
			


Geography

Geography – Ecosystems (GCSE)

Summary - Position in the Curriculum

Ecosystems form part of The Living World topic of AQA GCSE Geography course in year 10 which forms part of paper 1. This topic is important as it begins with identifying the key features of small-scale ecosystems before focusing on the characteristics of global ecosystems which you need to learn for your GCSE exam. This topic includes 2 case studies including tropical rainforests in Malaysia and tundra environments in Svalbard in the Arctic Ocean.

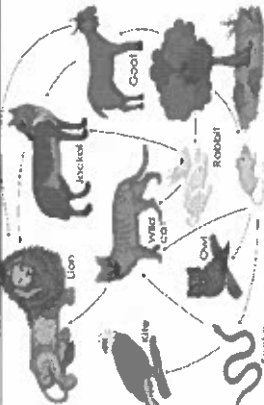
Terminology	Definitions	Core Knowledge	Preparing for Assessment
Ecosystem	A community of plants and animals that interact with each other and their physical environment	Learn the main aspects of this topic.	Revision and self-study questions are below.
Producers	An organism or plant that is able to absorb energy from the sun through photosynthesis	Use the following statements to help you learn core knowledge for the questions on the right-hand side ↘.	Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Consumers	Organism that eats herbivores and/or plant matter	An ecosystem is a system in which organisms interact with each other and with their environment e.g. forest, pond	1. Create a fact file about a small-scale ecosystem in the UK e.g. Epping Forest
Decomposers	Organisms such as bacteria or fungi break down plant and animal matter	Ecosystems are composed of biotic factors (these are living e.g. plants and animals) and abiotic factors (these are non-living e.g. air and water)	2. Describe the features of a small-scale ecosystem in the UK
Food chain	Connections between different organisms (plants and animals) that rely upon one another as their source of food	Food chains are useful in explaining the basic principles behind ecosystems. They show only one species at a particular trophic level.	3. Draw and label a food chain for a small-scale ecosystem e.g. freshwater pond and a large-scale ecosystem e.g. tropical rainforest
Food web	A complex hierarchy of plants and animals relying on each other for food	A food web shows the connections between producers and consumers in a more detailed way, there is more than one producer unlike a food chain.	4. Draw and label a simple food web for a fresh water pond. How could humans interrupt the food chain?
Nutrient cycling	On-going recycling of nutrients between living organisms and their environment	Nutrients are taken up when animals eat plants and then returned to the soil when animals die and the body is broken down by decomposers.	5. Explain why tropical rainforests have a high rate of decomposition and a large biomass
Biomass	The mass of living biological organisms in a given area or ecosystem at a given time	The most productive biomes – which have the greatest biomass- grow in climates that are hot and wet.	6. Describe the global distribution of tropical rainforests, tundra and desert ecosystems
Biome	A large geographical area of distinctive plant and animal groups, which are adapted to that particular environment e.g. tropical rainforest, tundra	Human activity can have many impacts on ecosystems which can have serious knock-on effects	7. Explain how humans negatively impact small scale and large-scale ecosystems



ECOSYSTEM

Energy flow: Producer → Primary consumer → Secondary consumer → Tertiary consumer

Feeding relationships: Producer → Herbivore → Omnivore → Carnivore



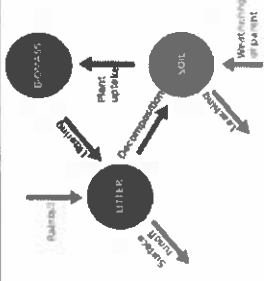
FOOD WEB

Producers: Grass, Tree, Insects

Primary consumers: Rabbit, Squirrel, Fox, Owl


Secondary consumers: Snake, Owl

Tertiary consumers: Lion



NUTRIENT CYCLING

Plants uptake nutrients from the soil. Decomposers break down dead matter, returning nutrients to the soil.



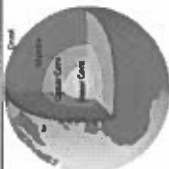
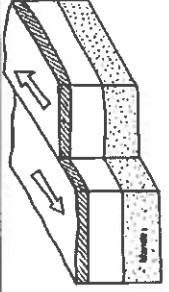
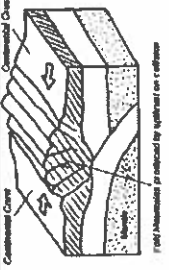
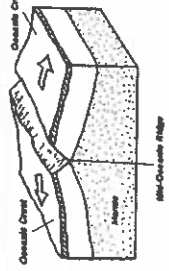

GLOBAL DISTRIBUTION OF BIOMES

Geography – Tectonic Hazards (GCSE)

Summary - Position in the Curriculum

Tectonics is the first topic of AQA GCSE Geography course and is part of the Natural Hazards unit of work. This topic is important as it begins with the basic layers of the Earth structure, tectonic plates and the 4 distinct plate boundaries which you need to learn for your GCSE exam. This topic has two main example earthquakes which we call Case Studies in Geography. It is imperative that we memorise the core facts in the Chile and Nepal Case Studies.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Plate Boundary	The margin or boundary between two tectonic plates.	Learn the main aspects of this topic.	Revision and self-study questions are below.
Natural Hazard	A natural hazard is a natural event or process which poses a threat to human life or property.	Use the following statements to help you learn core knowledge for the questions on the right-hand side ↘.	Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Tectonic Plate	A rigid segment of the Earth's Crust which can 'float' across the heavier, semi-molten rock below. Continental plates are less dense, but thicker than ocean plates.	People live in areas of the world where natural hazards occur due to reasons such as: jobs, family, poverty, resources.	1. Explain the dangers of natural hazards on people & the environment.
Earth Structure	The four distinct layers of the Earth.	Tectonic plates move due to the circular movement of magma in the mantle.	2. Explain how tectonic plates move due to convection cell in the mantle.
Convection Cell	Differences in temperature lead to the formation of areas of high and low pressure; they become linked together by flows of warmer and cooler magma.	Destructive and constructive plate boundaries have two natural hazards: earthquakes and volcanoes.	3. Explain why there are volcanoes and earthquakes in destructive and constructive plate boundaries.
Conservative	Plates slide past each other. Pressure builds up until they move with a 'jerk' causing earthquakes.	LIC's experience higher deaths and damage due to reasons such as: poorly constructed buildings, lack of infrastructure, lack of warning systems.	4. Explain why poorer countries (LIC's) are more vulnerable to deaths and destruction than richer countries (HIC's) during an earthquake.
Collision	Two plates collide (crash) and are crushed against each other. They are pushed upwards, forming new mountains. Earthquakes happen in this plate boundary when the plates collide.	Chile: HIC, 500 deaths, 8.8 magnitude Nepal: LIC, 9,000 deaths, 7.9 magnitude	5. Compare and contrast the earthquakes of Chile and Nepal.
Constructive	The plates are moving apart. Volcanic eruptions occur when magma from the mantle below spreads out and harden, forming new rock. Earthquakes and also occur in this plate boundary. A constructive plate boundary can often be in the bottom of the ocean.	Prepare Predict Protect Monitor / manage	6. Explain how PPPM can help countries reduce the effects of a natural hazard.
Destructive	One plate slides beneath another as they collide (crash). The bottom plate crumbles, creating new mountains and volcanoes. The oceanic plate slides beneath the continental plate as it is denser (heavier) because it carries the weight of the water of the ocean on top.	Nepal: Roads repaired, homeless rehoused, stricter building controls, tourism re-boosted, Chile: 200,000 houses re-built, economy strengthened due to copper exports.	7. What is the difference between Chile and Nepal long-term responses?

Layers of the Earth	Conservative plate boundary	Collision plate boundary	Constructive plate boundary	Destructive plate boundary
				

Geography – Weather Hazards (GCSE)

Summary - Position in the Curriculum


Weather Hazards is the second topic of the AQA GCSE Geography course and is part of the Natural Hazards unit of work. This topic is important as it begins with what the difference is between weather and climate and then moves onto Tropical Storms which you need to learn for your GCSE exam. This topic has two main example earthquakes which we call Case Studies in Geography. It is imperative that we memorise the core facts in the Typhoon Haiyan and 'The Beast from the East' Case Studies.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Tropical Storms	An area of low pressure with winds moving in a spiral around the calm central point called the 'eye' of the storm. Winds are powerful and rainfall is heavy. This includes Hurricanes, Cyclones and Typhoons.	Learn the main aspects of this topic.	Revision and self-study questions are below.
High Pressure	Cool (cold) air from above sinks down towards the ground. This is when there is greater pressure in the air.	Use the following statements to help you learn core knowledge for the questions on the right-hand side ↴.	Answer 1 per week for Self-Study, you can draw on your notes, this organiser, your memory and your own research.
Low Pressure	Warm (hot) air from below rises up towards the sky. This is when there is less pressure in the air.	Hot air is less dense (lighter). Cold air is denser (heavier).	1. Why does cold air sink and hot air rise?
Weather	Is the hour-to-hour, day-to-day state of the atmosphere. It includes temperature, sunshine, precipitation and wind. It is short-term and is often localised.	Weather is the day-to-day, hour-to-hour state of the atmosphere whilst, climate is the average weather over 30 years.	2. What is the difference between weather and climate?
Extreme Weather	When a weather event is significantly different from the average or usual weather pattern, and is especially severe or unseasonal. E.g. Heatwave in UK.	Coriolis Effect deflects an object on its path.	3. Explain the Coriolis Effect.
Storm Surge	When a storm creates strong waves and a rise in sea level, leading to coastal flooding.	Some parts of the Earth such as the Equator receive more solar radiation than other parts.	4. Explain insolation.
Insolation	The amount of solar radiation (sunlight) an area receives over a specified period of time.	High levels of insolation create warm rising air, this creates low pressure, evaporation & condensation takes place forming cumulonimbus clouds. Thunder & lightning may occur with heavy rain. An eye is creating when high pressure descends from the above the cloud.	5. Explain how a Tropical Storm forms?
Climate	The average weather conditions for a place taken over a period of time, usually 30 years. It is the expected, rather than the actual, conditions for a place. It is a long-term and is often applied to sizeable parts of the globe.	Over 6.300 people died. Storm surge killed most people. Low lying land got flooded. Shops got looted. Tacloban Airport got damaged.	6. Explain what happened in Typhoon Haiyan?
Coriolis Effect	The deflection, or bending of the wind due to the rotational spin of the Earth.	Severe & significantly unusual weather.	7. What is extreme weather?



Structure of Tropical Storm	Global Atmospheric Circulation	Storm Surge

MFL

Summary- Position in the Curriculum: KS4 starts with the module about free time activities. It builds on what pupils can say sports and TV watching which is covered in KS3. They lean to talk about what they do online using a range of tenses and discuss pros.

Key Vocabulary	Key Phrases	Key verbs	Key Questions for self-study
appli(cation) (f) app célèbre famous commentaire (m) comment console (f) console e-mail (m) email fan (mf) fan, supporter image (f) image, picture influence (f) influence influenceur (m) influencer jeu (m) game lien (m) link médias (mpl) media membre (m) member mot de passe (m) password passion (f) passion populaire popular portable (m) mobile phone réseau (m) network risque (m) risk sécurité (f) security, safety site (m) site streaming (m) streaming succès (m) success	je regarde des clips sur TikTok je partage des photos/des selfies je télécharge des chansons je parle avec mon ami j'envoie des messages à mes copains et copines j'achète des vêtements sur eBay/Vinted Je regarde des clips de musique J'adore télécharger la musique Je préfère regarder des films en streaming parce qu'il y a plus de risques Avec le net, c'est plus facile à être en contact c'est plus facile pour rencontrer des amis c'est gratuit	s'amuser to enjoy oneself télécharger to download gagner to win, to earn envoyer to send partager to share charger to load, charge Time phrases: hier - yesterday la semaine dernière – last week il y a cinq ans – 5 years ago quand j'étais petite – when I was young Perfect tense: regular -er verbs with avoir: j'ai acheté tu as regardé / lu il a / nous avons fait ils ont dansé / chanté / joué vous avez partagé / bu irregular past participles lu – read bu - drank dû – had to pu – could cru – thought voulu - wanted pris – took compris – understood *remember MOST verbs use AVOIR however, 13 verbs use ETRE. je suis allé(e) nous sommes allé(e)s	1. Qu'est-ce que tu aimes faire en ligne? 2. Quel type de vidéos est-ce que tu préfères regarder? 3. Parle-moi de ce que tu as fait récemment sur les réseaux sociaux. 4. Je pense qu'il est important d'avoir son portable au collège. Qu'en penses-tu ? 5. Quels sont les avantages de l'internet?
High Frequency words: aujourd'hui ce matin cet après-midi ce soir demain demain matin demain après-midi demain soir d'abord, ensuite, après, puis, plus tard, enfin		Photo description (PALMs) People-Location-Activities Décris-moi la photo.	
Expressing opinions and reasons: C'était ... amusant / cher / ennuyeux / formidable / génial / nul / parfait / passionnant / sympa / formidable / parfait. agréable nice, pleasant malsain unhealthy dangereux dangerours rapide fast, quick		Tricky Pronunciation and Phonics Final consonants -n, -s, -t and -x are usually silent Liaison before a vowel	
Follow-on questions: Q1.J' aime regarder des vidéos sur Youtube et toi? Q2.Que penses-tu des dangers des réseaux sociaux?		Writing: Ecris un email sur ta passion pour les jeux vidéos/ réseaux sociaux...etc.	
		Practice online	

Summary- Position in the Curriculum: Pupils continue to build on what they can say about their hobbies. They practice the use a combination of common tenses and well-justified personal opinions.




Key Vocabulary	Key Phrases	Key verbs	Key Questions for self-study
membre (m) member résultat (m) result but (m) goal, aim, purpose activité (f) activity événement (m) event souvenir (m) souvenir, memory succès (m) success énergie (f) energy équipe (f) team terrain (m) pitch exercice (m) exercise équipement (m) equipment neige (f) snow club (m) club passion (f) passion match (m) match stade (m) stadium joueur (m) player loisir (m) leisure danse (f) dance vélo (m) bike, cycling basket (m) basketball fauteuil roulant (m) wheelchair handball (m) handball natation (f) swimming	je ne pratique pas de sport je fais de longues promenades Je joue au foot. Je fais du vélo / de la danse. écouter du rap / de la musique avec mes écouteurs on va faire de la natation. je vais jouer au tennis. je vais regarder la télé avec ma famille. je vais visiter un château avec mes parents. je vais faire une promenade* avec le chien. tour de France (m) The Tour de France je participe au club de lecture je préfère lire mes amis font du sport il ne fait jamais de ... Les concerts étaient gratuits. J'attends les prochains jeux avec impatience C'est important pour nous. Avec mon équipe ensuite – next soudain – suddenly toujours – always souvent – often donc - therefore pour – in order to + inf surtout – above all peu - little néanmoins – nevertheless cependant – however	jouer (à/de) to play (+ noun) danser to dance faire la fête to party, have fun gagner to win, to earn LE PRÉSENT: Time phrases: Tous les jours (everyday), chaque jour (everyday), chaque matin (every morning), parfois (sometimes), etc. Regular Verbs 1) ER verbs: take off the –ER and add the endings 2) IR verbs: take off the –IR and add the endings 3) RE verbs: take off the –RE and add the endings Examples: parler finir vendre Je parle Je finis Je vends Il/Elle parle Il/Elle finit Il/Elle vend Nous parlons Nous finissons Nous vendons Vous parlez Vous finissez Vous vendez Il/Elles parlent Il/Elles finissent Il/Elles vendent Irregular Verbs As in every French tense there are always irregular verbs. These verbs do not follow the rules. You just have to learn them off! être (to be), avoir (to have), aller (to go) faire (to do/make) THE FUTURE: ALLER + INFINITIVE Time phrases: Demain (tomorrow), la semaine prochaine (next week). Je vais I'm going tu vas you're going il/elle/on va he/she's/we're going je vais jouer de la guitare	1. Qu'est-ce que tu fais comme sport? 2. Qu'est-ce que tu aimes regarder à la télé ? 3. Qu'est-ce que tu as fait, le week-end dernier ? C'était comment ? 4. Quel club au collège est-ce que tu préfères ? 5. Si tu étais riche, qu'est-ce que tu voudrais faire comme sport ?
		Décris la photo 	
		Follow-on questions: Q1. Qu'est-ce que tu aimes lire? Q2. Que penses-tu de la lecture en ligne? Writing: Write an email to your French penpal about your hobbies.	
Expressing opinions and reasons: je pense que – I think that... je trouve que – I find that.....j ça me permet ça me donne à mon avis – in my opinion je m'intéresse (à) – I am interested in.... Ça va être super-intéressant.	Tricky Pronunciation and Phonics The letter é Final consonants -n, -s, -t and -x are usually silent Liaison before a vowel	Practice online 	

Summary- Position in the Curriculum: Pupils learn to discuss family relationships, friends, friendship and their role models. They develop their knowledge of adjectival agreements, emphatic pronouns and reflexive verbs.



Key Vocabulary	Key Phrases	Key verbs	Key Questions for self-study
enfant (mf) homme (m) jeune (m) femme (f) relation(f) qualité (f) fille (f) fils (m) modèle (m) voisin (m) frère (m) sortie (f) mariage (m) tradition (f) idéal identité (f) sœur (f) patient mari (m) garçon (m) calme handicapé belle-mère (f) demi-frère (m) demi-sœur (f)	L'amitié est la clé du bonheur : je (ne) m'entends (pas) (assez / très) bien avec On s'ennuie / On s'amuse (bien) On ne se dispute jamais. Il est important d'avoir un ami proche. un bon ami est quelqu'un qui ... apprécie les mêmes choses que moi. partage quelques intérêts avec moi, J'ai besoin d'amis dans le monde réel beaucoup d'amis en ligne. Mes meilleurs amis sont fiers de moi Quand je suis triste, mon meilleur ami..... J'admire ... parce qu'il est Il/Elle est connu(e) pour ... C'est une personne qui ... Il/Elle lutte pour/contre ... Un bon modèle est quelqu'un qui ... aide les gens et inspire les autres. Un bon modèle, c'est ... Je l'admire parce qu'il/elle est intelligent(e) / créatif/créative C'est un vrai modèle pour moi. C'est agaçant quand mes amis	s'entendre (avec) to get on (with) respecter to respect, follow inspirer to inspire se marier to get married s'amuser to enjoy oneself Adjectival agreement for regular adjectives (e.g., patient); some different patterns (stupide, fidèle, travailleur, actif, gentil); some irregular adjectives (vieux) No change (sympa) Direct object pronouns: me, te, le, la, nous, vous, les Ils m'invitent. Ils se donnent des cadeaux. Elle se lève tôt. Il s'occupe du chien. Use both direct object and indirect object relative clauses, e.g. un ami c'est quelqu'un qui est là pour moi une amie c'est quelqu'un que j'aide • Use the imperfect tense to describe something you regularly used to do in the past, e.g. j'allais au terrain de jeux avec mon frère et ma soeur • Use clauses with 'si' to make your sentences more interesting, e.g. si j'ai le temps j'irai au cinéma avec mes amis ce weekend. Si je pouvais, je fêterais mon anniversaire dans le sud de la France.	1. Tu t'entends bien avec ta famille ? 2. Tu peux décrire un membre de ta famille ? 3. Qu'est-ce-que tu vas faire avec tes amis le week-end prochain ? 4. Penses-tu te marier dans le futur ? 5. Comment serait ta famille idéale ?
High Frequency words: tout le temps la plupart du temps rarement, de temps en temps toujours, d'habitude, en général d'ici dix ans	Expressing opinions and reasons: À mon avis, ...l'amitié, le respect ... Ils/Elles sont ...amusant(e)(s), fidèle, sérieux/sérieuse(s), actif(s)/active(s), gentil(s)/gentille(s)*, bon(s)/bonne(s), génial/géniaux /génial(e)(s), fier(s)/fière(s), vieux/vieille(s)/vieux, beau(x)/belle(s)/bel, nouveau(x)/nouvelle(s)/nouvel	Photo description (PALMs) Décris la photo Sur la photo, il y a: un (jeune) homme / une (jeune) femme / un garçon / une fille / des enfants / trois amis.	Follow-on questions: Q1. Quelle est la personne que tu admires le plus et pourquoi? Q2. Qu'est-ce tu voudrais faire plus tards ? Writing: Write an article for a French magazine about friendship and the person you admire the most.
		Tricky Pronunciation and Phonics vieux / vieil / vieille Check the vowel combination les fiançailles (f) Check the accent on 'ç'	Practice online



Summary- Position in the Curriculum: In Module 2, pupils learn to write about family celebrations using the perfect, present and near future tenses. They develop their understanding and use of adverbs.

Key Vocabulary	Key Phrases	Key verbs	Key Questions for self-study
<p>Les fêtes Festivals</p> <p>Noël Christmas</p> <p>la veille de Noël Christmas Eve</p> <p>Pâques Easter</p> <p>Divali Diwali</p> <p>Hanoukka Hanukkah</p> <p>Aid-el-Fitr Eid al-Fitr</p> <p>la Chandeleur Candlemas</p> <p>le Nouvel An New Year</p> <p>la fête nationale Bastille Day</p> <p>le jour férié public holiday</p> <p>le jour de l'An New Year's Day</p> <p>On est chrétiens. We are Christian.</p> <p>On est juifs. We are Jewish.</p> <p>On est musulmans. We are Muslim.</p> <p>Les repas de fêtes</p> <p>Un repas special A special meal.</p> <p>de la dinde rôtie roast turkey</p> <p>des légumes vegetables</p> <p>des crêpes crepes</p> <p>des choses sucrées sweet things</p> <p>la mairie town hall.</p> <p>Félicitations! Congratulations!</p>	<p>Chez moi/nous, on fête (Noël)On prépare... on décore le sapin de Noël</p> <p>on s'offre des cadeaux</p> <p>Ma fête préférée est ...</p> <p>C'est mon/ma/mes ... qui prépare(nt)</p> <p>Après le repas, on ...</p> <p>C'était mon quatorzième anniversaire ...</p> <p>J'ai invité ... à un barbecue/une fête</p> <p>Pour fêter mon prochain anniversaire,</p> <p>On va / est allés / va aller ...</p> <p>chez mon (nouveau) voisin / lui / nous / eux</p> <p>On mange / a mangé / va manger ...</p> <p>un grand repas/des pizzas/un gâteau</p> <p>Je reçois / ai reçu / vais recevoir des cartes beaucoup de cadeaux</p> <p>On danse / a dansé / va danser ...</p> <p>On change / a chanté / va chanter ...</p> <p>ensemble, avec toute la famille</p> <p>les (cinquante) ans de mariage de ...</p> <p>J'ai préparé des plats</p> <p>On a loué un restaurant</p> <p>Je vais porter des vêtements spéciaux</p> <p>Je vais prendre des photos</p> <p>toutes sortes de bonnes choses</p>	<p>fêter – faire la fête – inviter-</p> <p>LE PRÉSENT:</p> <p>Je bois/mange/prends ...</p> <p>I drink/eat/have</p> <p>D'habitude, on fête</p> <p>Normalement, je vais chez ...</p> <p>D'habitude, elles louent un restaurant et elles font des gâteaux</p> <p>THE FUTURE:</p> <p>Time phrases: La semaine prochaine, ...</p> <p>Samedi prochain, ...</p> <p>je vais ... I'm going to ...</p> <p>je vais/on va fêter ...</p> <p>L'année prochaine, il va fêter la naissance de sa fille.</p> <p>Dans huit jours, vous allez acheter un cadeau et je vais préparer un grand repas.</p> <p>PAST TENSE:</p> <p>Time phrases:</p> <p>Il y a (trois) mois, j'ai fêté</p> <p>J'ai invité mes amis</p> <p>J'ai reçu beaucoup de ...</p> <p>Je suis allé(e) au mariage de.....</p> <p>Hier, ils ont reçu beaucoup de cadeaux et un grand gâteau.</p> <p>Le mois dernier, tu as dansé et tu as chanté avec tes cousins.</p> <p>Je viens de fêter ... I have just celebrated</p>	<p>1. Quelle est ta fête préférée? Pourquoi?</p> <p>2. Normalement, qu'est-ce que tu fais pour fêter ton anniversaire?</p> <p>3. Que vas-tu faire pour ton prochain anniversaire ?</p> <p>4. Quelle était la dernière célébration a laquelle tu as participé ?</p> <p>5. Si tu avais le choix, comment aimerais-tu passer ta prochaine célébration en famille?</p> <p>Photo description (PALMs)</p> <p>Décris la photo</p>  <p>Follow-on questions:</p> <p>Q1: Parle-moi d'une fête que tu as célébrée avec des ami(e)s.</p> <p>Q2: Que penses-tu du mariage?</p> <p>Writing:</p> <p>Write an article about your favourite family celebration for a French school website.</p>
<p>High Frequency words: en revanche on the other hand - ensuite next, then - jusqu'à until - parfois sometimes sauf except - si if - sinon if not - tôt early - vite quickly - la moitié de half of - traditionnellement*, évidemment*, sérieusement, uniquement, probablement, certainement, directement, extrêmement</p> <p>Expressing opinions and reasons:</p> <p>Je pense que ... A mon avis ... Je crois que ...</p> <p>C'était ... It was ... génial -amusant-nul-marrant -sympa - ennuyeux-intéressant-passionnant - paresseux - magnifique - important -C'était une excellente soirée!</p>	<p>Tricky Pronunciation and Phonics</p> <p>è / ê / ai / ai (père, j'aime, vêtements)</p> <p>œ / open eu (sœur, heure)</p> <p>ch pronounced as 'sh' (chapeau)</p>	<p></p> <p></p> <p>Practice online</p>	


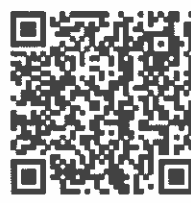
Summary- Position in the Curriculum: In this module, pupils build on their knowledge of school subjects, hobbies and infinitive structures to talk about school rules, school trips and extra-curricular activities. They also deepen their knowledge of the French education system.

Key Vocabulary	Key Phrases	Key verbs	Key Questions for self-study
<p>Par exemple – for example</p> <p>Les matières – the subjects</p> <p>un cours a lesson</p> <p>Les maths - Maths</p> <p>Les sciences - Sciences</p> <p>Les arts plastiques - Art</p> <p>Les langues - Languages</p> <p>La chimie - chemistry</p> <p>La biologie - biology</p> <p>La physique - physics</p> <p>La religion - RE</p> <p>La technologie - CDT</p> <p>La géographie - geography</p> <p>Le dessin - art</p> <p>Le théâtre - drama</p> <p>Le français - French</p> <p>Le latin - Latin</p> <p>L'espagnol - Spanish</p> <p>L'allemand - German</p> <p>L'anglais - English</p> <p>Le sport - Games</p> <p>L'EPS - PE</p> <p>L'histoire – History</p> <p>Un club ... - a club</p> <p>Une équipe... - a team</p> <p>L'emploi du temps timetable</p>	<p>Mon collège est</p> <p>L' uniforme scolaire est</p> <p>Il y a (huit) cours par jour.</p> <p>La récré commence à ...</p> <p>Mes cours finissent à</p> <p>Je suis fort(e) en ...</p> <p>Je suis faible en ...</p> <p>Le/La prof est ...</p> <p>bon(ne)/marrant(e)</p> <p>sévère/impatient(e)</p> <p>un peu sévère.</p> <p>Ma matière préférée est ...</p> <p>Je (ne) suis (pas) doué(e) en ...</p> <p>On a trop de devoirs.</p> <p>Je suis fort(e)/faible/doué(e) en ...</p> <p>L' uniforme coûte cher.</p> <p>Tout le monde se ressemble.</p> <p>C' est pratique et confortable.</p> <p>Il est interdit d' utiliser son portable</p> <p>Il est interdit de manquer les cours.</p> <p>c' est/ce n' est pas dangereux</p> <p>c' est/ce n' est pas important</p> <p>il faut respecter les autres</p> <p>Ce que j' aime et ce que je n' aime pas</p> <p>Je suis fier/ fière de moi.</p> <p>En général, les profs sont gentils</p> <p>Je suis membre du club</p>	<p>étudier (to study)</p> <p>apprendre (to learn)</p> <p>faire (to do)</p> <p>J' ai ... I have</p> <p>Je suis ... I am</p> <p>ils/elles sont(they are)</p> <p>Je vais étudier</p> <p>J' apprend</p> <p>J' ai appris</p> <p>J' étudie – I study</p> <p>J' ai étudié – I studied</p> <p>J' étudierai – I will study</p> <p>J' étudieras – I would study</p> <p>J' étudiais – I used to study</p> <p>Je vais étudier – I am going to study</p> <p>J' ai visité</p> <p>J' ai choisi = I choose</p> <p>J' apprendrai</p> <p>Il faut + infinitive</p> <p>Il ne faut pas + infinitive</p> <p>Il est interdit de + infinitive</p> <p>Il faut porter l' uniforme scolaire.</p> <p>Il est interdit de porter des bijoux</p> <p>Après avoir fini le cours</p>	<p>1. Qu' est-ce que tu penses de ton collège ?</p> <p>2. Quelles matières étudies-tu? Et quelle est ta matière préférée?</p> <p>3. Comment sont les professeurs?</p> <p>4. Qu' est-ce que tu penses de ton collège ?</p> <p>5. Comment serait ton collège idéal ?</p> <p>Photo description (PALMs)</p> <p>Your description must cover: • people • location • activity.</p> <p>Décris-moi la photo</p>
<p>High Frequency words:</p> <p>Et – and</p> <p>Aussi – also</p> <p>En plus – as well</p> <p>Mais – but</p> <p>Cependant – however</p> <p>C' est – It is</p> <p>C' était – It was</p> <p>Ce sera – It will be</p> <p>Ce serait – It would be</p>	<p>Expressing opinions and reasons: Je trouve ça ... I think that's ...</p> <p>juste/logique fair/logical facile/difficile easy/difficult utile/inutile useful/useless intéressant/ennuyeux interesting/boring</p> <p>C' était... - It was Sympa – nice Agréable – pleasant Ennuyeux – boring Super – super Chouette – cool</p> <p>Parreux(euse) – lazy Barbant(e) – boring Animé(e) - lively</p>	<p>Follow up questions:</p> <ul style="list-style-type: none"> Q1. Les événements sportifs sont amusants. Qu' en penses-tu ? Q2. Parle-moi d' un événement sportif que tu as egardé récemment. <p>Writing:</p> <p>Write an article about your school life for a French school website.</p>	<p>Online practice:</p>  






Term: 3



Summary- Position in the Curriculum: In this part of module 3, pupils build on their knowledge of holidays, talk about school trips and extracurricular activities. They also deepen their knowledge of the French Speaking world. Pupils learn to discuss their dream school using the conditional.

Key Vocabulary	Key Phrases	Key verbs	Key Questions for self-study
<p>A l'école primaire et maintenant beaucoup de temps libre lots of free time</p> <p>beaucoup d'amis lots of friends</p> <p>trop de devoirs too much homework</p> <p>J'allais ... I used to go ...</p> <p>Je vais ... I go ...</p> <p>au ciné-club to film club</p> <p>au club d'échecs to chess club</p> <p>au zoo to the zoo</p> <p>à la piscine to the swimming pool</p> <p>J'étais ... I was/used to be ...</p> <p>dans une chorale in a choir</p> <p>délégué de classe class representative</p> <p>membre de l'équipe de basket</p> <p>timide shy</p> <p>de la natation swimming</p> <p>tous les vendredis every Friday</p> <p>la pause de déjeuner lunch break</p> <p>la cantine Canteen</p> <p>A l'école maternelle – In primary school</p>	<p>En échange</p> <p>Les sorties scolaires sont une bonne/mauvaise idée parce que/qu' ...</p> <p>School trips are a good/bad idea because ...</p> <p>on se fait de nouveaux amis you make new friends</p> <p>on s'amuse ensemble you have a laugh together</p> <p>you have a laugh together c'est trop cher/ennuyeux</p> <p>Ce que j'aime et ce que je n'aime pas</p> <p>What I like and what I don't like</p> <p>Je suis fier/fière de moi. I am proud of myself.</p> <p>Mon/Ma correspondant(e) anglais(e) est arrivé(e)</p> <p>My English exchange partner arrived</p> <p>Les élèves et leurs profs sont arrivés (en car). J'ai été content(e) de rencontrer X.</p> <p>On a passé le premier week-end en famille.</p> <p>L'horaire – the timetable</p> <p>Les vacances – the holidays</p> <p>La cantine et la nourriture – The canteen and the food</p> <p>J'ai marqué des buts – I scored goals</p> <p>C'était mieux/pire que le collège</p>	<p>voyager to travel</p> <p>participer to take part</p> <p>réussir to succeed, pass</p> <p>s'amuser to have fun</p> <p>se reposer to rest</p> <p>travailler to work</p> <p>mériter to deserve</p>	<p>1. Les clubs au collège sont importants. Quel est ton avis ?</p> <p>2. Comment était ton école primaire ?</p> <p>3. Parle-moi d'un voyage scolaire que tu as déjà fait ? et pourquoi faire un échange scolaire?</p> <p>4. Comment serait ton collège idéal?</p> <p>5. Que ferais-tu si tu étais le directeur?</p>
	<p>Present tense vs Imperfect tense</p> <p>J'avais ... I had/used to have</p> <p>J'ai ... I have ...</p> <p>J'allais ... I used to go ...</p> <p>Je vais ... I go ...</p> <p>J'étais ... I was/used to be ...</p> <p>Je faisais ... I used to do/go ...</p> <p>Je fais ... I do/go ...</p> <p>Je vais étudier</p> <p>J'apprends</p> <p>J'ai appris</p> <p>J'apprendrai</p> <p>J'ai visité</p> <p>Je voudrais améliorer</p> <p>Je changerais... - I would change</p> <p>Je lisais des histoires</p> <p>Je chantais avec mes amis</p> <p>si + imperfect tense+ conditional</p> <p>Si j'étais le directeur, je voudrais</p> <p>Si j'avais le choix, je voudrais</p>		
	<p>High Frequency words: <u>dont</u> of which <u>at the moment, currently</u> parmi</p> <p>instead of <u>bientôt</u> soon <u>à cause de ça</u> because of that <u>y compris</u></p> <p>including <u>trop (de)</u> too (much/many) <u>plein de</u> lots of <u>tout(e)/tous/toutes</u></p> <p>all tout(e) seul(e) <u>all alone</u> <u>toute l'école</u> the whole school</p>		
	<p>Expressing opinions and reasons: C'est ... facile/difficile easy/difficult utile/inutile useful/useless</p> <p>fascinant/passionnant fascinating/exciting</p> <p>Je trouve ça ... I find that ... raisonnable/logique reasonable, sensible/logical juste/injuste fair/unfair</p> <p>ridicule/frustrant ridiculous/frustrating Je (ne) suis (pas) d'accord avec toi. I (don't) agree with you</p>		
			<p>Photo description (PALMs)</p> <p>• people • location • activity.</p> <p>Décris-moi la photo.</p>  <p>Follow-on questions:</p> <p>Q1. Je pense qu'il est important d'étudier les sciences. Et toi ?</p> <p>Q2. Que penses-tu des règles au collège ?</p> <p>Writing: Write a blog about a school trip you have done recently.</p> <p>Practice online:</p> 

Summary- Position in the Curriculum: Pupils build on their knowledge from year 8 and 9 of food and drinks vocabulary to talk about meals and mealtimes, using the partitive article (du, de la, de l', des) and en. They learn to use modal verbs (devoir, vouloir, pouvoir) to discuss mental health and give advice.



Key Vocabulary	Key Phrases	Key Verbs:	Key Questions for Assessment
au déjeuner au goûter au dîner de la viande de la salade de la glace du poisson du saumon du curry du poulet du riz du jus d'orange du lait de l'eau des légumes des pâtes des frites des chips un yaourt une pomme inquiète heureux(euse) triste stressé(e) seul(e)	Pour le petit-déjeuner / A midi / Après les cours, je bois / je mange / je prends ... Quand j'ai soif, je bois du thé. Hier, j'ai acheté du fromage au marché. J'en mange beaucoup, parce que cela a bon goût. Toute ma famille mange de la viande, sauf ma mère. si j'ai le temps, si j'ai faim quelque chose de léger Bien dans ma peau : Je me sens ...assez /un peu / vraiment ... heureux/heureuse, triste, en colère, Écoute un peu de musique. Sois calme / patient. faire une petite promenade. Ne sois pas triste. j'ai mal dormi la nuit dernière j'ai un examen j'ai peur de ne pas réussir mes examens mon meilleur ami a changé de collège ma meilleure copine est victime de harcèlement en ligne j'ai perdu mon petit chat ma sœur a cassé mon portable mes parents m'ont interdit de l'organiser tu dois éviter de passer trop de temps devant des écrans.	boire to drink manger to eat bouger to move dormir to sleep pratiquer to practise Using the partitive article (du, de la, de l', des) and en Je bois de l'eau. J'en mange beaucoup je mange I eat je vais manger I am going to eat j'ai mangé I ate j'ai pris I took j'ai bu I drank j'ai essayé de manger I tried to eat j'ai évité de manger I avoided eating... Grammar: Vous-form imperative Tu-form imperative, including sois and negative form (e.g. Ne pleure pas.) Ne crie / pleure / t'inquiète pas. essaye d'en parler avec Modal verbs + infinitive (devoir, pouvoir, vouloir); Je dois me faire de nouveaux amis à cause de mon travail scolaire Negation: je n'en mange pas trop (il) ne mange jamais de (poisson) Pour être en bonne santé, il faut manger moins de	1. Comment tu te sens aujourd'hui? 2. Qu'est-ce que tu prends au petit-déjeuner? 3. Qu'est-ce que tu as mangé et bu à midi? 4. Manger à la cantine d'Eastbrook est sain, que penses-tu? 5. Si tu étais riche, qu'est-ce tu voudrais faire pour rester en forme ? Photo description (PALMs) Describe the photo. Write four short sentences in French
at lunch for a snack at dinner meat salad ice cream fish salmon curry chicken rice orange juice milk water vegetables pasta chips crisps a yoghurt an apple worry happy sad stressed lonely	High Frequency words: pourtant however en plus moreover à cause de because of surtout especially avec with sans without qui who/which quand when ou or si if	Write about healthy living for an online magazine. 	1. Comment tu te sens aujourd'hui? 2. Qu'est-ce que tu prends au petit-déjeuner? 3. Qu'est-ce que tu as mangé et bu à midi? 4. Manger à la cantine d'Eastbrook est sain, que penses-tu? 5. Si tu étais riche, qu'est-ce tu voudrais faire pour rester en forme ? Photo description (PALMs) Describe the photo. Write four short sentences in French
Expressing opinions and reasons: À ton avis, le plat, il est sain? épicé(e) spicy piquant(e) hot salé(e) salted sucré(e) sugary délicieux (euse) delicious savoureux (euse) tasty goûteux (euse) flavoursome dégoûtant(e) disgusting sain(e) healthy malsain(e) unhealthy ça contient trop de sucre (le poulet) est/c'est bon pour la santé un plat délicieux et sain	Tricky Pronunciation and Phonics Pronouncing -eu Nasal sounds: en, an, em, am ain, in, aim, im	Practice online 	Write about healthy living for an online magazine. 

Summary- Position in the Curriculum: Pupils learn to say what they will do to improve their lives using the simple future tense and more complex sentence structures (pour / afin de / au lieu de / avant de + infinitive). They write and talk about lifestyle changes using three time frames.



Key Vocabulary	Key Phrases	Key verbs	Key Questions for self-study
<p>Je change ma vie : Voici mes résolutions pour améliorer ma vie! Je mangerai mieux. moins de choses sucrées / chocolat. plus de légumes / fruits. Je passerai moins de temps sur les réseaux sociaux. J'irai à des cours de danse Je penserai moins à moi et j'aiderai les autres J'aurai plus de patience avec ma petite sœur / une meilleure attitude à la maison. Je ferai plus d'exercice / de vélo / d'efforts en maths. J'irai à la piscine au moins deux fois par semaine. Je travaillerai plus sérieusement au collège. Je ne ferai pas mes devoirs à la dernière minute! Je serai plus actif/ sympa avec mon demi-frère. Je ne parlerai pas en même temps que la prof. Avant d'aller au lit, ... Je ne regarderai pas mes messages ... Je parlerai avec la nouvelle famille ... J'ai besoin de partir en vacances. Je ferai une liste des pays que je voudrais visiter. Je n'irai pas sur les réseaux sociaux.</p>	<p>Mieux vivre : Pour / Afin de/d' ... être plus en forme / moins fatigué, réduire le stress, ... Au lieu de/d' ... choisir des frites écrire des e-mails, Au lieu de manger du chocolat Quand j'étais petite(e) / jeune / ado, j'habitais ... Ma famille était (pauvre). Je travaillais dans (un hôtel). Je jouais (au tennis / au basket). Maintenant, je suis (politicienne). J'écris (des chansons / des poèmes). Je lutte pour (les droits de travailleurs). A l'avenir, je continuerai à (lutter pour la justice et l'égalité) je chanterai / je jouerai (dans des films). je n'accepterai jamais l'inégalité je n'étais pas heureux/se je n'ai plus peur je ne faisais rien je ne suis plus triste ou en colère je restais tout seul chez moi</p>	<p>The simple future tense: It is relatively easy to produce the French equivalent of I will/I shall. All you do is: INFINITIVE + add the following ENDINGS: je +AI tu +AS il/elle/on +A nous +ONS vous +EZ ils/elles +ONT RE verbs drop the final E and then just add the endings as normal: je prendrai I'll take. j'aiderai les autres jeunes comme moi je changerai leur vie à travers la musique Imperfect tense: (j'étais) membre d'un gang / timide / victime de harcèlement au collège et en ligne j'avais tout le temps peur / beaucoup de problèmes</p> <p>Using more complex sentence structures:</p> <ul style="list-style-type: none"> je voudrais + infinitive Avant de + infinitive Avant d'aller au lit, ... afin de mieux dormir, ... 	<p>1. Tu fais beaucoup de sport au collège ? 2. Les jeunes passent beaucoup de temps sur leurs portables, que penses-tu ? 3. Quand tu étais plus jeune, ta vie était comment? 4. Maintenant, est-ce que ta vie est meilleure? 5. À l'avenir, qu'est-ce que tu feras, pour améliorer ta vie?</p> <p>Photo description (PALMs)</p> <p>Describe the photo. Write four short sentences in French</p> <p>Follow-on questions:</p> 
<p>High Frequency words: chaque jour each day tous les jours every day chaque soir each evening toujours always souvent often quelquefois sometimes de temps en temps from time to time rarement rarely</p> <p>Expressing opinions and reasons: Je me sens fort / optimiste ce serait + adjective selon moi according to me à mon avis in my opinion je dirais que I would say je pense que I think that</p>			<p>Writing: Write to your friend about what you will do in the future to stay healthy.</p>  <p>Practice online</p>

Tricky Pronunciation and Phonics
eu, ou, oi au/eau/closed o/ô

Summary- Position in the Curriculum: In this module, pupils start to talk about their ideal holiday, using conditional tense. They develop their skills to extend their spoken and written responses with added detail (how, where, negation, different tenses and opinions and reasons).

Key Vocabulary	Key Phrases	Key verbs:	Key Questions for self-study											
appli(cation) (f) app billet (m) bank note, ticket plage (f) beach carte (f) card, map, credit caisse (f) checkout, till côte (f) coast concert (m) concert, gig coût (m) cost pays (m) country campagne (f) countryside culturel cultural sortie (f) exit, outing gratuit free inclus included île (f) island plan (m) map, project montagne (f) mountain nature (f) nature endroit (m) place populaire popular spectacle (m) show souvenir (m) souvenir soleil (m) sun touriste (m) tourist vue (f) view monde (m) world	J'aimerais mieux ... des vacances reposantes. Je voudrais voyager pour me reposer me faire de nouveaux amis découvrir une nouvelle culture sortir de la routine. apprendre une nouvelle langue découvrir une belle région vivre une expérience unique s'amuser en famille à la plage faire du sport / se faire plaisir Je voyagerais ... en avion privé / bateau / TGV. Je logerais ...sous une tente Il y aurait des plages de sable blanc et de l'eau claire j'aurais le temps d'admirer le paysage On peut profiter de la nature Je voyagerais/j'irais ... Je regarderais le coucher du soleil. Je ferais des randonnées. L'ambiance / l'accueil était ..	voyager to travel recommander to recommend fermer to close, shut (down) coûter to cost réserver to reserve, book recommander to recommend payer to pay durer to last The conditional is used when you want to say: would could or should do something. Conditional tense in all persons for -ir verbs: Use the future stem (which for most verbs is the INFINITIVE) + imperfect ending	1. Pourquoi voudrais-tu voyager? 2. Quel type de vacances aimerais-tu mieux? 3. Parle-moi d'un voyage que tu as fait récemment 4. Où voudrais-tu passer tes vacances? 5. Où passerais-tu tes vacances idéales?											
	<p>REMINDER OF IMPERFECT ENDINGS?</p> <table border="1"> <tr> <td>je</td> <td>+ AIS</td> <td>nous</td> <td>+ IONS</td> </tr> <tr> <td>tu</td> <td>+ AIS</td> <td>vous</td> <td>+ IEZ</td> </tr> <tr> <td>il/elle/on</td> <td>+ AIT</td> <td>ils/elles</td> <td>+ AIENT</td> </tr> </table> <p>RECAP OF IMPERFECT STRUCTURES:</p> <p>je voudrais / j'aimerais + infinitive; ce serait + adjective</p> <p>Les vacances de rêve Dream holidays</p> <p>Je voudrais/j'aimerais/ je préférerais + infinitive I would like (to)... / I'd prefer (to)...</p> <p>Je rêve de + infinitive I dream of... if I were rich... if I had the choice... I would stay ... I would travel /go... I would go hiking I would have fun with my friends. There would be ... sound and light shows There would be no noise!</p> <p>à la campagne I would have fun with my friends.</p> <p>Je m'amuserais avec mes copains. There would be ...</p> <p>Il y aurait des spectacles son et lumière sound and light shows</p> <p>Il n'y aurait aucun bruit! There would be no noise!</p>	je	+ AIS	nous	+ IONS	tu	+ AIS	vous	+ IEZ	il/elle/on	+ AIT	ils/elles	+ AIENT	<p>Photo description (People, Location, Activity)</p>  <p>Décris la photo :</p> <ul style="list-style-type: none"> • P : • L : • A : <p>Follow-on questions:</p> <p>Q1. Parle-moi d'un pays que tu vas visiter à l'avenir.</p> <p>Q2. Voyager à l'étranger, qu'en penses-tu?</p> <p>Writing : Write to your friend about holidays.</p>  <p>Practice online</p>
je	+ AIS	nous	+ IONS											
tu	+ AIS	vous	+ IEZ											
il/elle/on	+ AIT	ils/elles	+ AIENT											
	<p>High Frequency words:</p> <p>Hier l'année dernière L'année prochaine le dernier soir le week-end dernier Le week-end prochain tous les ans/étés Finalement/enfin franchement toute la journée Puis/ensuite</p>													
	<p>Expressing opinions and reasons: Ce serait would be • formidable tremendous • luxueux luxury • merveilleux wonderful • passionnant exciting • pittoresque picturesque • reposant restful • tranquille quiet</p>													
	<p>Tricky Pronunciation and Phonics</p> <p>h-au/eau/closed o/ô- gn</p>													

Summary- Position in the Curriculum: Pupils develop their knowledge of Identifying positive and negative opinions to review booking holiday accommodation. They practice using the perfect tense of modal verbs to talk about their recent visit to a different country/region.

Key Vocabulary	Key Phrases	Key verbs	Key Questions for self-study
<p>le séjour stay la gîte holiday home un grand lit a double bed un lit simple a single bed une vue sur la mer a sea view un balcon a balcony la climatisation air conditioning une aire de jeux a games area Une ascenseur a lift le Wi-Fi Wi-Fi est inclus/compris is included. à l'étranger abroad la crème solaire sun cream un coup de soleil sun burn la cuisine locale local cuisine l'excursion excursion (trip) le maillot de bain swimwear le temps de weather le vol the flight le voyage the journey l'aéroport the airport le camping campsite Il y a du soleil It is sunny Il fait beau It is nice Il fait mauvais It is bad Il pleut It's raining Il y a des nuages It's cloudy Il faisait gris ...It was grey Il y avait du soleil ...It was sunny</p>	<p>La fête de la mer, qui se passe ..., dure ... Pendant la parade, on voit ... je suis allé(e) à la fête / le carnaval il y avait des bateaux décorés j'ai goûté des plats locaux j'ai dansé avec la parade Je suis allé(e) chez ma tante à Paris. J'ai goûté sept plats avec du riz. C'était délicieux! pendant les grandes vacances, L'été dernier, J'ai passé du temps / mes vacances ... j'ai décidé de ... je suis allé(e) nous avons loué ... Cet été, j'irai ... / je ferai ... / ce sera ... Je n'ai pas encore décidé. Je voudrais payer en espèces / par carte. La piscine était ...fermée(e). La carte d'accès ne marchait pas. Je n'aimerais pas retourner à cet hôtel. Ce sera bientôt les vacances! Qu'est-ce qu'on fera? S'il fait beau / chaud / mauvais / froid, ... j'enregistrerai une chanson. je louerai un vélo. j'organiserai un concert. . je participerai à une expérience virtuelle. je ferai une appli.</p>	<p>pouvoir, devoir, vouloir</p> <p>These are useful verbs that are always followed by an infinitive. They are usually used in the present, imperfect, past tense with a past participle or in the conditional tense.</p> <p>pouvoir – means can/to be able to</p> <ul style="list-style-type: none"> • je peux aller à la fête • je pourrais aller à la fête <p>devoir – means have to/must or on the conditional ought to/should</p> <ul style="list-style-type: none"> • il doit jouer au foot • il devait/a dû jouer au foot • il devrait jouer au foot <p>vouloir – means want/wish</p> <ul style="list-style-type: none"> • on veut boire du café • on voulait/a voulu boire du café - • on voudrait boire du café - <p>J'ai voulu passer une nuit dans cet hôtel.</p> <p>Perfect tense of modals: j'ai voulu jouer Je n'ai pas pu faire de natation car ils ont dû fermer la piscine. J'ai voulu manger au restaurant mais le chef a dû rentrer chez lui. Je n'ai pas pu dormir à cause du bruit</p> <p>Negative expressions : Il n'y avait pas assez de ... Il n'y avait aucun ... Il n'y avait ni ... ni ...</p>	<ol style="list-style-type: none"> 1. Comment as-tu passé les vacances l'année dernière? Le temps était comment ? 2. Tu as déjà été à l'étranger ? Quels pays as-tu visité ? 3. Qu'est-ce que tu vas faire pendant les vacances cette année? 4. Où passais-tu tes vacances quand tu étais plus petit ? Comment c'était ? 5. Si tu avais le choix, comment voudrais-tu passer tes vacances.
<p>High Frequency words: le mieux / pire, c'est / était ... mais cependant par contre de l'autre côté pendant quand où i alors/donc vu que/étant donné que</p>			<p>Photo description (PALMs) People-Activities-Location</p>   <p>Follow-on questions :</p> <ul style="list-style-type: none"> • J'aime aller à la plage. Et toi ? • Que penses-tu des vacances en famille ? <p>Writing : Write a review of a hotel for a website.</p>
<p>Expressing opinions and reasons: c'est stressant (stressful) c'est barbant (boring) c'est une perte de temps (a waste of time) c'est fatigant (tiring) c'était fascinant (it was fascinating) c'était passionnant (it was exciting) c'était inoubliable (it was unforgettable)</p>			<p>Tricky Pronunciation and Phonics -tion ont eau ant ait ais</p>

Computing/IT

The **CPU (Central Processing Unit)** is the hardware component responsible for processing and executing all the instructions inside of a computer. The speed is measured in Hz – so a 2Ghz CPU would process 2 billion instructions/cpu cycles per second.

Factors that affect CPU performance

Clock speed	The higher the clock speed, the faster the rate at which the CPU can execute instructions per second
Number of cores	More cores results in instructions being executed in parallel per core, resulting in faster execution
Cache size	A larger cache size means the CPU can access more temporary stored data which is much faster than if stored in RAM

CPU cycle – (Fetch-Execute Cycle)

Fetch – copy memory address from program counter to the MAR, and copy instruction from the MAR address to the MDR. Increase the program counter to point to next instruction.

Decode – instruction in MDR is decoded by the CU

Execute – the instruction is performed/executed. This could be load data/write data to or from memory, or do a calculation or logic operation (using ALU).

CPU components

Control Unit (CU)	Directs the instructions within the processor
Arithmetic & Logic Unit (ALU)	Responsible for any arithmetic and logic calculations in the processor
Cache	Stores the most frequently accessed instructions from the RAM (faster than RAM, but holds much less data) Small amounts of high-speed memory located within the CPU
Registers	

Von Neumann Architecture (4 main registers)

Memory Address Register (MAR)	stores the memory address of where the next item of data will be taken from
Memory Data Register (MDR)	stores the data found at the address of the MAR
Accumulator	stores the result of arithmetic calculations
Program Counter (PC)	stores the address of the next instruction to be run

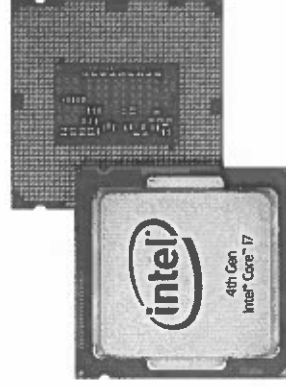
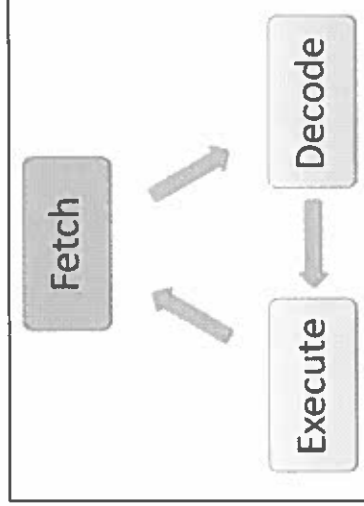
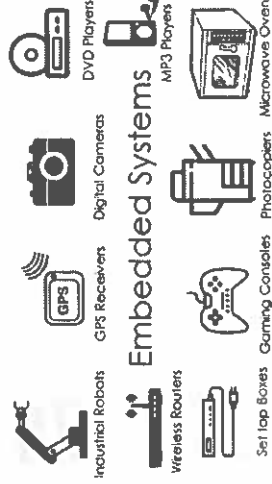
The CPU also contains three buses (lines/wires which connect components together) and these are the Address Bus, Control Bus and the Data Bus.

1.1 Systems Architecture and 1.2 Main memory

Embedded Systems

Embedded Systems – a computer system built into another device. These are dedicated systems produced to be efficient at carrying out its specific task. They tend to contain more ROM than RAM, as they are specialised to carry out limited functions (cheaper to design and build)

Examples include: *Washing machine, MP3 player, Dishwasher*



Read Only Memory (ROM)

The ROM is an internal hardware component which is part of the computer's main memory.

ROM is used to store the BIOS (basic input output system) – instructions needed to turn the computer ON or the "bootup" sequence (bootloader)

ROM is non-volatile memory which means the data is saved/kept by the computer when the power turns off.



Random Access Memory (RAM)

The RAM is another internal hardware component which is part of the computer's main memory.

RAM is used to store any running applications while the computer is ON
The RAM is volatile memory meaning the data in the RAM is deleted/erased when the power turns off.

Difference between RAM and ROM

A computer needs both RAM and ROM to function correctly. However, the ROM in a computer is difficult to upgrade or change, whereas the RAM can be easily upgraded and changed to hold more data.

RAM holds a lot more data than the ROM

Typical RAM is 4GB and typical ROM is 4MB.

Flash memory is non-volatile memory which is used to store data and transfer this between a computer and another device. Flash memory can have its contents edited and changed according to the user's needs, and it can also be electronically programmed.

Examples of flash memory can be found in USBs, sdCards etc

Virtual memory is memory which the computer uses by allocating a section of secondary storage to store running applications. This is only used when the RAM in a computer is full and runs out of capacity.

How it works: CPU move data from RAM into the secondary storage, known as a "paging file", so the CPU can continue with its execution of instructions from RAM. This is copied back into the RAM when it is needed

The virtual memory is slower than the RAM but allows the computer to continue functioning by using part of the HDD or SSD to store some data from the RAM.

Preparing for assessment. 1.1 Systems Architecture and 1.2 Main memory

Subtopic 1.1 - Systems architecture

- Name three factors that can affect the performance of a CPU.
- Describe three actions that take place in the Fetch-Execute cycle.
- What are the four key components of the CPU and what is the main function of each?

Subtopic 1.2.1 Primary storage (memory)

- Describe the purpose of ROM and RAM
- Describe how virtual memory works, in with regards to transfer of data between RAM and HDD when RAM is full?

Binary, Denary and Hexadecimal conversion

Binary → Denary OR Denary → Binary

Write out the binary number under the following headings:

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

Then add the columns where there is a 1

For denary to binary, start from 128 and minus from the number, then see which columns require a 1 to make the number

Hexadecimal is a 4 bit number system used as it is easier to remember than binary (1 character = 4 bits in binary) 0-9 = 0-9 but 10=A up to 15=F

Binary → Hexadecimal OR Hexadecimal → Binary

Separate each 4 digits in binary and then add them up. If its 0-9 then keep it the same but if its 10 or above, convert into the corresponding letter (for hex to binary just do the opposite – separate both characters and then convert into the corresponding number and then use the 4 digit grids to write the binary number.

8	4	2	1	8	4	2	1
1	0	1	1	0	0	1	1

= 11 so turn into B = 3 so keep it as 3
Answer = B3

Examples

Convert 11000101 into denary = $128+64+4+1 = 197$

Convert 225 into hexadecimal = 11100001 which is 12 and 1 (split each half) so answer = C1

SOMETIMES THEY GIVE YOU NUMBERS WITHOUT LEADING 0s e.g. 00111100 is same as 111100

Binary Arithmetic

There are 4 main rules when adding numbers using binary:

$$\begin{array}{r}
 1 \\
 00 + 01 = 01 \\
 00 + 11 = 10 \\
 10 + 11 = 11
 \end{array}$$

The numbers at the top in red have been carried to the next column (e.g. 1+1=2 which is 10 in binary so 1 gets carried) Anything above the original number of bits gives you an OVERFLOW error.

Binary Multiplication (Left shift) and Division (Right shift)

Left shift = multiplying by 2ⁿ

Right shift = dividing by 2ⁿ

where n = number of bits

E.g. Do right shift of 2 on 01101000 means the number is divided by 4, so shift the numbers to the right – Answer = 00011010

How can you double a number by shifting bits?

Double means multiply by 2, so you shift by 1 bit to the left - as 2¹ = 2

1.2 Secondary memory and Data Storage (number systems and arithmetic)

Secondary Storage - Purpose

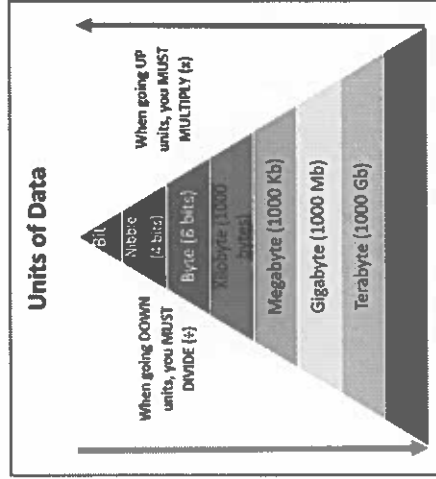
Secondary storage is needed to save data and programs that are needed after the computer is turned off. It is a form of non-volatile memory.

Secondary storage can hold much greater capacity

of memory than main memory, but is slower to access as it is not directly accessible by the CPU.

Factors to consider when considering choice of secondary storage devices:

- Capacity (how much data can be stored)
- Speed (how fast the data can be read/written)
- Portability (is the device easy to move around and take with you)
- Durability (how will it be affected by drops, shocks, water etc)
- Reliability (chances of data always loading correctly)
- Cost (how much is the cost per GB)



Example – Convert 3MB into bits

3MB → 3000KB → 3,000,000B → 24,000,000 bits (3 x 1000 x 1000 x 8 to get the answer)

Secondary Storage – Magnetic

Magnetic memory is a type of secondary storage, which is typically found in Hard Disk Drives (HDDs). Data is stored using magnetic dots, which have a magnetic polarisation, on areas of the disk called sectors, which are found within circular tracks. The data will have a positive or negative polarity, which is read by the read/write head on a moving arm. The disk spins at a fast rate to ensure all the data is read (e.g. 5400 or 7200rpm).

Advantages: largest storage capacity, cheaper to produce than solid state drives

Disadvantages: more likely to be damaged by drop

Secondary Storage – Solid State

Solid State memory is a type of secondary storage, which uses electricity and flash memory to store data. There are no moving parts in a solid-state device, and the data is stored using electrical switches – open switch represents a 1 (keeps charge) and a closed switch represents a 0.

Advantages: fastest type of storage (reading and writing), much more lightweight and less prone to damage than magnetic disks (no moving parts)

Disadvantages: most expensive form of storage (per GB of data)

Secondary Storage – Optical

Optical memory is a type of secondary storage which uses lasers to read and write data. Examples of optical memory include CDs, DVDs and Blu-ray disks. Data can be read by using a laser which reads a series of pits and lands. The laser is shone onto the disk surface, which is reflected, and this represents 0s and 1s.

Advantages: very cheap to produce (good for program distribution), much more lightweight and portable than magnetic disks, unaffected by shocks and water

Disadvantages: limited storage capacity (CDs hold around 700MB and DVDs up to 4.8GB), can also be damaged by scratches or by excessive use over a long period.

Preparing for assessment. 1.2 Secondary memory, Units and Data Storage

Subtopic 1.2.2 Secondary storage

- Explain why computers require secondary storage.
- Identify and describe a range of secondary storage devices and media.

Subtopic 1.2.3 Units

- Why must data be stored in binary format?
- What are the different data units, and how can you move between each?

Subtopic 1.2.4 Data storage (Numbers)

- Explain how to calculate the file sizes for sound, images, and text files.

Images

Bitmap images are made up of a grid of pixels. Each pixel is given a unique binary code depending on its colour. Each colour has a unique and different binary code. The metadata such as height/width/location taken is also stored on the computer.

Image quality depends on **two** main factors:

- **Colour depth** (number of bits used to represent each colour)
- **Pixel Resolution** (total pixels in an image)

The higher the pixel resolution and colour depth, the greater the quality of the image will be. This means that the resulting file size of the image will also be greater (so if less pixel resolution or lower colour depth are used, then the image quality and file size will also reduce as seen above).



Example

An image of **4 bits per pixel** can use a total of **16 colours** ($2^4 = 16$ different bit patterns)

So 0001 could be for black, 0010 could be for white etc

Compression

Compression allows us to reduce the file size of stored data to make it quicker to transfer (takes up less storage space too)

Lossy compression examples – JPEG, MP3, MP4

Lossless compression examples – PNG, GIF

Lossy compression compresses the file size by a considerable amount, so it takes up much less storage space, however the change is irreversible and the quality of the data is lowered significantly

Lossless compression compresses the file size by a smaller amount so file may not be as fast to transfer but the changes are reversible so the original quality of the image is not affected when original file is obtained back.

Sound

Sound is stored in digital format on a computer. The analogue sound is picked up by a microphone, which then uses an ADC (Analogue to Digital Converter) to convert the sound into an electrical analogue sound wave. This is then sampled at regular intervals (sampling frequency) and these values are rounded to nearest whole number. The binary of this number is then stored on the computer.

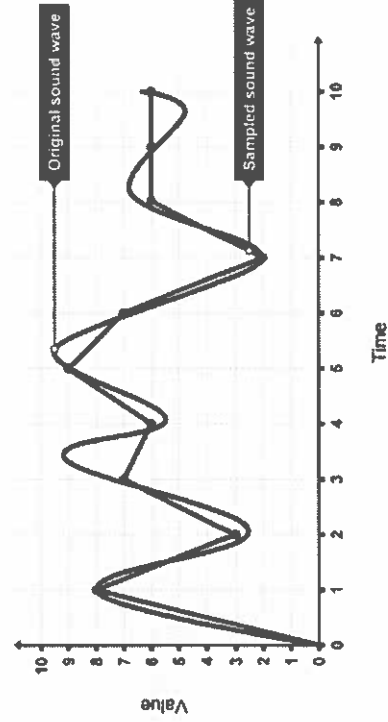
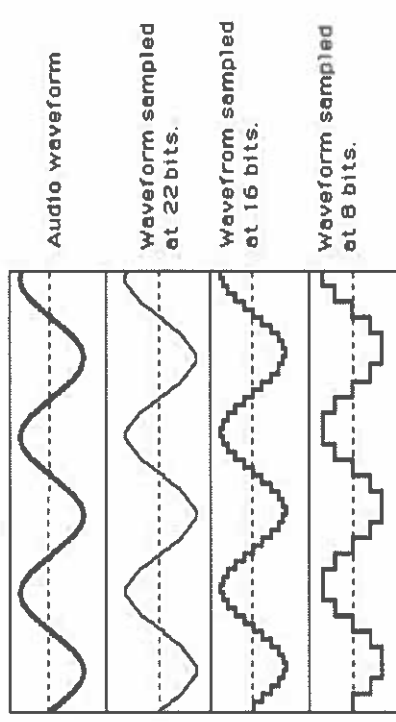
Sound quality depends on **two** main factors:

- **Sample rate** (how many samples of audio are taken each second - measured in Hz)
- **Bit Depth** (number of bits used to store each sample e.g. 16 bit audio)

Increasing any of the above two factors (or the duration of the sound will mean an increase in the file size too and vice versa)

So, if any of these three factors **increase**, the **quality** of the sound file as well as the overall **file size** will also **increase** (and vice versa)

Sound quality and bits.



1.2 Character sets, Images, Sound and Compression

Character Sets

A character set is a predefined set of characters, recognised by a computer's hardware and software.

Three main character sets:

ASCII – 7 bits per character so 128 characters in total

Unicode – more than 8 bits per character

ASCII can be quicker to process, as it uses less bits per character however, it cannot represent as many characters (languages) as Unicode

NOTE: Character sets come in sequences, so if A = 65 (01000001) then B = 66 (01000010) etc

Text file size = bits per character x number of characters

E.g. "hello" will be 7 bits x 5 characters = **35 bits** file size

Calculating File size (bits) for images and sound

Sound file size = sample rate (Hz) x duration (s) x bit depth

Image file size = colour depth (bits) x width (p) x height (p)

Quality of image decreasing



Preparing for assessment. 1.2 Character sets, Images, Sound and Compression

Subtopic 1.2.4 Data storage (Sound)	
Subtopic 1.2.4 Data storage (Characters)	Subtopic 1.2.4 Data storage (Sound)
<ul style="list-style-type: none">• How is the number of characters stored limited by the available bits?• What are the differences between each character set, and what impact do they have?	<ul style="list-style-type: none">• What does "bit depth" represent in audio storage, and how is it measured?
Subtopic 1.2.4 Data storage (Images)	Subtopic 1.2.5 Compression
<ul style="list-style-type: none">• How does changing colour depth and resolution affect image size and quality?	<ul style="list-style-type: none">• Describe the two types of compression and advantages and disadvantages of each type of compression?

Peer-to-Peer network (P2P) and Client-Server Networks

In P2P networks, all devices are EQUAL, connected to every other device (no central location)

Files are stored individually on machines and then share with others. P2P is common when sharing files online, especially when video streaming e.g. Skype

Benefits: Cheaper to set up than Client Server network; Easier to set up and maintain and no expertise required

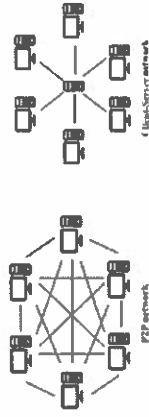
Drawbacks: No centralised location (requires manual back-ups and updating of software). Copying files creates duplicates of files, so harder to keep track of latest versions. Less reliable and data may be lost if one machine fails

A Client-Server network is managed by one main server, and it is connected to all its devices (clients).

Files and software are stored on the server, instead of individual client machines. Clients send requests for data to the server, and the server processes this and responds (client-server relationship). Much more common than P2P networks

Benefits: Easily perform back up of all stored data, Easier to install and manage software, Easier to manage network security, Central location for all files and data

Drawbacks: Expensive to set up and maintain (required expertise and specialists), if server fails, then ALL connected devices will stop working



Local Area Networks (LANs) and Wide Area Networks (WANs)

A LAN covers a small geographical location on a single site e.g. school, office, shop, home and can be connected either by wired (using Ethernet) or wireless (using WiFi) connections. LANs allow sharing of files and hardware (e.g. printers) across all connected devices. Install and update software on all connected computers in one go, instead of one-by-one. User accounts can be stored centrally, so users can log in from any device on the network

A WAN connects multiple LANs spread across multiple geographical locations. WANs are connected by using copper or fibre optic cabling. The organisation does not own all the infrastructure, it hires it from telecommunication companies as it is more expensive to set up a WAN than a LAN. WANs allow further and widespread connectivity e.g. offices within multiple countries. **The internet is the BIGGEST WAN!**

The Cloud

A Cloud host stores the data of another organisation, using its own servers, storage and software, accessible only via the internet.

Similar concept of client-server network where the server is the 'cloud' company.

Benefits: access data from any connected device, easy to increase storage, no need to pay extra for IT staff, provides auto updates and back-ups

Drawbacks: MUST need internet to access, dependency on the cloud host for security and back-ups, often subscription based so more expensive

Network Layers – small sections (divisions) of network functionality. Layers are SELF CONTAINED, so developers can work on one aspect of the network without affecting

1.3 Wired and Wireless Networks

WiFi (Frequency/Channels & Encryption) and Internet

Main standard used for wireless connections – two main radio frequency bands (2.4GHz which has longer coverage but slower transmission speeds or 5GHz which gives less coverage but faster transmission speed.)

Each band is split into numbered channels, each covering a small frequency range (overlapping each other)

Encryption – provides security when accessing a network (passwords/keys required to connect) otherwise unauthorised users may access (examples include WEP, WPA, WPS)

The internet is a worldwide (largest) collection of computer networks.

The World Wide Web (WWW) is a collection of websites hosted on web servers, which we can access using the HTTP protocol. Each website contains a URL (uniform resource locator) which we can access using a Domain Name System (DNS – contains multiple Domain Name Servers). The DNS translates a website's domain name into its IP address, so we don't need to remember IP addresses. When the domain name is valid, and successfully translates to the correct IP address, we can then access the resources/data on that website.

Network Hardware – the following are key parts needed to create a network: Wireless Access Point (WAP), Switch, Router, Hub, NIC, cabling (fibre optic, copper and Ethernet)

Network Protocols – the following are names of protocols commonly used in the TCP/IP stack: **TCP/IP, HTTP/HTTPS, FTP, POP, IMAP, and SMTP**

Packet Switching – used by routers to direct data packets across networks.

- data is split into packets (given headers which contain source and destination IP address) and a number to show order
- Routers direct the packets through the best/fastest route depending on amount of traffic. Each packet can take a different route.
- As they arrive, the packets are rearranged into correct order.
 - If any packets were lost during sending, sends signal back to resend the packet and then sends receipt confirmation when all the packets have arrived.

Star Network Topology

A topology is just a name used to describe how a network has been set up (layout of the network).

Star topology – all the devices are connected to a central switch or server that controls the network.

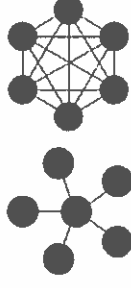
Advantages:

If one device or cable fails, the rest of the network will not be affected.

Easier and simpler to add more devices (just connect to central). Limited or no data collisions as devices have independent connections

Disadvantages:

If wired, then each device requires separate cable/wire so can be expensive with many devices. If the main server/switch fails then the entire network will fail (unable to access any data). Additional cabling required for every device



Mesh Network Topology

In a Mesh topology, there is no central location as each device is directly or indirectly connected to another device. Data is sent across the fastest route from one device to another.

Advantages:

No single point where network can fail (unlike star) – just use another route to send data, easily detect a fault in the network.

Disadvantages:

Not as scalable as star topology, because adding one device means having multiple connections to the other. Each device will need many I/O ports which is not always possible.

Wired vs Wireless comparison (Ethernet vs WiFi and Bluetooth) and Performance

Wired: much more reliable, faster and stable connection (not affected by interference) and also less likely to be affected by hacking. However, wired connections affect portability/movement and are cost more to add additional devices.

Wireless: easier to connect more devices, can move around and costs less vs wired. However, more devices means affected by interference, it is not as fast or stable as a wired (Ethernet) connection and is more prone to be affected by hacking.

Bandwidth – higher bandwidth means better network performance as more data can be transferred at any given time. More users sharing bandwidth can slow down performance.

Connection type – wired connections are more reliable/faster than wireless, but are not as portable and require more cabling to connect more devices.

Number of devices – the more devices connected, the slower the network may perform.

Preparing for assessment. 1.3 Wired and Wireless Networks

Subtopic 1.3.1 Networks and topologies

- What are the characteristics of LANs and WANs, and can you provide common examples of each?
- What tasks are typically performed by each piece of network hardware; Wireless access points, Routers, Switches, NIC ?
- What are the advantages and disadvantages of the Star and Mesh network topologies?

Subtopic 1.3.2 Wired and wireless networks, protocols and layers.

- How does encryption work to secure data across network connections?
- Name four different protocols and explain why each of the different protocols are used?

<p>Network security threats</p> <p>Malware – malicious software which causes damage (e.g. Editing/deleting files) when it is run.</p> <p>Phishing – luring people into giving personal data through email/SMS messages sent from source that looks legitimate.</p> <p>Pharming – redirects network traffic to a fake website which is intended to collect personal/sensitive data.</p> <p>Social Engineering – the art of manipulating people into giving up their personal/sensitive data.</p> <p>Data interception and theft – data sent to another device is intercepted by a 3rd party (unauthorised user).</p> <p>The concept of SQL injection – inserting malicious SQL statements into a database to edit/steal personal data.</p> <p>Poor Network Policy – limited/no security rules to follow so easier for unauthorised users to gain access to data (e.g. no access rights, no back up of data etc).</p> <p>Weak passwords – passwords that do not consist of upper/lower case characters, minimum length requirement, symbols and are not updated regularly.</p> <p>Out of date software – software prone/not protected from the latest threats and malware.</p> <p>Ransomware – prevents access to files and data unless a ransom is paid to the hacker/3rd party.</p> <p>Identifying and Preventing vulnerabilities</p> <p>Penetration testing – testing the vulnerability of a network by paying authorised users (internal or external) to try and find weaknesses to exploit, and then fixing these to improve network security.</p> <p>Physical security – having physical restrictions, such as ID cards, locks and keys to ensure sensitive data cannot be leaked/stolen</p> <p>Network policies – having thorough sets of rules in place to reduce the chances of employees giving accidental or deliberate access to data</p> <p>Anti-malware software – downloading an active program which protects data from malware by blocking malware from entering a system/network or finding and deleting/quarantining the malware to reduce impact</p> <p>Firewalls – monitors incoming and outgoing network traffic to protect against unauthorised connections to/from the internet</p> <p>User access levels – granting different levels of access based on role in company to prevent access to sensitive/personal data</p> <p>Passwords – string of characters used to verify the identity of a person trying to gain access to a system/data (preventing unauthorised access)</p> <p>Encryption – using algorithms to change the form of data sent across a network to make it difficult for unauthorised users to access or recognise, and can only access using the encryption key.</p>	<p>1.4 – 1.6 (System security and Software, Impact of technology)</p> <p>Forms of Network attacks</p> <p>Passive Attack – monitoring data across network and intercepting any sensitive information, they find (through the use of network monitoring hardware and software).</p> <p>Active Attack – attacking a network with malware or other planned attacks.</p> <p>Insider Attack – an insider who exploits their network to steal/expose information.</p> <p>Brute Force Attack – trying to gain access by using many password combinations (using automated software).</p> <p>Denial of Service (DoS) Attack – stopping users from accessing part of a network by flooding the network with many requests.</p> <p>Ethical issues – what is considered “right” or “wrong” by society and people.</p> <ol style="list-style-type: none"> – companies store personal data about us (what is it used for and how secure is it?) – can you trust every company which stores data about you – what can go wrong? <p>Legal issues – what is actually right or wrong in the eyes of the law</p> <ol style="list-style-type: none"> – how can our data be exploited by companies/individuals – The government argues they need access to our personal data to help keep us “safe”? <p>Cultural issues – how groups of people (e.g. beliefs, languages or practices) are affected such as religions, cultures or countries</p> <ol style="list-style-type: none"> – Are people influenced into getting latest technology even when not needed – what about digital divide? – How has technology affected our social interaction with each other and mental wellbeing? <p>Environmental issues – how technology has a positive or negative impact on the environment around us</p> <ol style="list-style-type: none"> – increasing power consumption has negative impact on technology (fossil fuels)... – disposing of devices causes e-waste (sent to Asia and Africa to cut costs) <p>Privacy issues – how “protected” is our data by companies/individuals</p> <ol style="list-style-type: none"> – is all the information we have online “safe” and “secure”? <p>– what can our data be used for?</p>
<p>What is system software?</p> <p>System software is software, which is designed to help a computer run and communicate. It controls the hardware, software and any connected peripheral devices by providing a user interface where all these can interact with each other.</p> <p>Operating System</p> <p>The operating system (OS) is a system software that allows the hardware and software to communicate with each other and run other software (programs)</p> <p>It provides a user interface which allows the user to interact with the computer system (examples include Apple iOS, MAC OS, Android OS, Windows 10...)</p> <p>The OS is responsible for:</p> <ol style="list-style-type: none"> – Memory management/multitasking: allows the computer system to run multiple programs at once, managing how much memory they will each require. Break memory up into fixed size blocks (pages) and allocate enough pages for each program to run (in the RAM). When the program is closed, the pages are freed up for use by another program. – Peripheral management and drivers: allows communication between input/output devices through use of device drivers (instructions on how to control the device). Drivers can be updated to increase performance or to fix bugs. – User management: allows creation of multiple user accounts which can easily be managed by the admin account. Different access levels can be given to each user (e.g. admin/standard) and allows the OS to keep track of who created/edited/deleted files. – File management: allows the user to create files which can be structured into folders and directories to make it easier to locate. Information such as time created, last modified can be seen and the files can be edited/changed/moved/deleted as well as sorted into different categories (e.g. size, type) <p>Utility Software</p> <p>Utility software is software designed to maintain and optimise the running of a computer system, to increase/enhance performance.</p> <p>The main examples of utility software:</p> <ol style="list-style-type: none"> – Encryption software: software designed to use cryptography (keys) to prevent unauthorised access to data. – Defragmentation: physically rearranges and organises the files and storage into continuous regions, for faster disk access (useful after many files are created and deleted leaving gaps on the disk). – Data compression: software designed to reduce the file size of data/files in order to make them faster to transfer across a network and take up less memory on the hard drive. – Anti-virus/malware: software designed to protect data from malware by blocking malware from entering a system/network or finding and deleting/quarantining the malware to reduce impact 	

Preparing for assessment. 1.4 – 1.6 (System security and Software, Impact of technology)

Subtopic 1.4.1 Threats to computer systems and networks	Subtopic 1.5.1 Operating systems
<ul style="list-style-type: none">• What are the different forms of attacks on devices and systems, and how is each attack used?	<ul style="list-style-type: none">• Describe the functions of an operating system?
Subtopic 1.4.2 Identifying and preventing vulnerabilities	Subtopic 1.6.1 Ethical, legal, cultural and environmental impact
<ul style="list-style-type: none">• What methods can be used to remove vulnerabilities in devices and systems?	<ul style="list-style-type: none">• How does technology introduce ethical, legal, cultural, environmental, and privacy issues?
Subtopic 1.5.2 Utility software	
<ul style="list-style-type: none">• Explain the purpose of encryption, defragmentation, and data compression software?	

Summary- Position in the Curriculum


Unit 2 introduces learners to a broad working knowledge of databases, spreadsheets, automated documents and images and enables learners to apply their knowledge and understanding to solve problems in vocational settings. An assignment brief will be provided by WJEC which will include a scenario and several tasks available via the WJEC Secure Website.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Brief: A set of instructions or guidelines explaining what needs to be done for a project.		Requirements Analysis: Understanding the needs and objectives of a specified brief is essential.	1. Discuss the key considerations when planning and designing an image for a specified brief. How do these considerations impact the overall success of the project?
Success Criteria: The goals or standards that determine if a project has been done well.		Success Criteria: Identifying benchmarks for a successful image ensures the project meets its goals.	2. Compare and contrast different image file types (PNG, TIFF, JPEG) in terms of their suitability for various purposes such as web use, printing, and photo storage.
Annotations: Notes or comments added to a design or text to explain or highlight important information.		Design Planning: Creating initial sketches and layouts with detailed annotations helps in visualising the final product.	3. Evaluate the importance of selecting the appropriate software for creating and modifying vector and raster images. How does the choice of software influence the final outcome?
Copyright: A law that gives the creator of original work exclusive rights to its use and distribution.		Image Sources: Images can be self-taken using a camera or scanner, or sourced from third parties such as the internet or other secondary sources.	4. Explain the process and significance of using standard and advanced tools to create and modify images. Provide examples of scenarios where advanced tools would be particularly beneficial.
Vector Image: An image made of paths (lines and shapes) that can be resized without losing quality.		Image Qualities: Key qualities of an image include its size, format, and limitations to editing.	5. Analyse the methods and best practices for storing and outputting images in a format that is fit for purpose. Why is version control important, and how does testing file types for fitness for purpose enhance the final product?
Raster Image: An image made of pixels (small dots) that can lose quality if resized too much.		Copyright and Intellectual Property: Addressing copyright issues and correctly referencing image sources is crucial.	
RGB: A colour model used for digital screens that mixes red, green, and blue light to create other colours.			
CMYK: A colour model used for printing that mixes cyan, magenta, yellow, and black inks to create other colours.			
Layers: Different levels of an image that can be edited separately in graphic design software.			
Version Control: A way of saving different stages of a project so you can go back to earlier versions if needed.			

Photopea

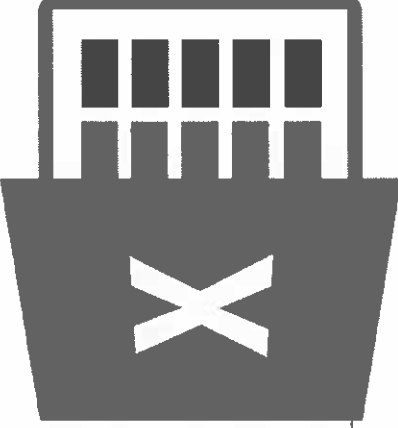
Summary- Position in the Curriculum

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Terminology	Definitions	Core Knowledge	Preparing for Assessment
<p>Database - A structured collection of data stored electronically, organised for easy access, management, and updating.</p> <p>Entity - A distinct object in a database that represents a real-world object, such as a person, place, or event.</p> <p>Primary Key - A unique identifier for a record in a table, ensuring each record is distinct.</p> <p>Foreign Key - A field in one table that links to the primary key in another table, establishing a relationship between the tables.</p> <p>Validation Rule - A set of criteria that data must meet to be accepted into a field, ensuring data integrity and reducing errors.</p> <p>Query - A request for data retrieval from a database, which can filter, sort, and display specific information based on given criteria.</p> <p>Form - A user interface element that allows users to enter and edit data in a database in an organised and user-friendly way.</p> <p>Report - A formatted and organised presentation of data retrieved from a database, often used for analysis and decision-making.</p> <p>Data Redundancy - The unnecessary duplication of data in a database, which can lead to inconsistencies and increased storage requirements</p>	<p>Planning and Designing a Database Analyse Requirements: Understand client brief, identify success criteria. Identify Entities: Determine entities for the database. Design Database: Structure: Tables, relationships, forms, queries, reports. Fields: Primary/foreign keys, data types, field properties, validation rules. Justification: Explain field types and validation rules.</p> <p>Creating and Modifying a Database Tables and Fields: Create/add tables, fields, primary keys, data types. Validation: Apply validation rules and error messages. Relationships: Link tables using key fields. Data Handling: Import CSV data, add/edit/delete records. Testing: Ensure data is error-free and database functions correctly.</p> <p>Interrogating a Database Queries: Use query builder for various criteria, wildcards, parameters, and calculations. Reports: Produce and customize reports from queries.</p> <p>Creating User Interfaces Forms: Simplify data entry/navigation, include relevant fields and validation. Layout: Enhance with business images. Features: Add controls for user-friendly navigation, use VB/macros.</p> <p>Testing and Evaluating a Database Test Plan: Include valid, extreme, and erroneous data. Testing Methods: Provide reasons for chosen methods. Evidence: Document test results (pass/fail), evaluate successes/failures, suggest improvements.</p>	<ol style="list-style-type: none"> 1. Why is accurately identifying entities in a client brief crucial for database design? What are the consequences of overlooking key entities? 2. Evaluate the role of primary and foreign keys in database relationships. How do they enhance data integrity and reduce redundancy? 3. Discuss the process and importance of applying validation rules in a database. How do they ensure data accuracy? 4. How do query builders facilitate data retrieval in databases? Explain the different types of queries and their uses. 5. Examine the role of user interfaces, such as forms, in simplifying data entry and navigation. How do design enhancements improve user experience? 	

Summary- Position in the Curriculum

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Terminology	Definitions	Core Knowledge	Preparing for Assessment
<p>Spreadsheet A digital tool used to organise, calculate, and analyse data in tabular form, with rows and columns.</p>	<p>Planning, creating, modifying and using spreadsheets</p>	<p>1. Discuss the importance of planning and designing a spreadsheet before starting data entry. How does effective planning impact the functionality and usability of the final spreadsheet?</p>	
<p>Worksheet A single page within a spreadsheet file where data is entered and manipulated.</p>	<p>Analyse client requirements and set success criteria. Design the structure, including worksheets, navigation, and tools.</p>	<p>2. Evaluate the role of data validation and conditional formatting in ensuring data accuracy and integrity in a spreadsheet. Provide examples of how these features can be used.</p>	
<p>Formula An expression used in a spreadsheet to perform calculations on data, e.g., =SUM(A1:A10).</p>	<p>Import data from CSV files. Format with fonts, borders, titles, colours, and merged cells. Use form controls (buttons, checkboxes, dropdowns). Define print areas and create navigation menus.</p>	<p>3. How do formulas and functions enhance the capability of spreadsheets? Compare the use of basic functions like SUM with complex functions such as VLOOKUP and IF in terms of their application and benefits.</p>	
<p>Function A predefined formula in a spreadsheet for common calculations, such as SUM, AVERAGE, or VLOOKUP.</p>	<p>Apply formats (currency, %, decimals). Use conditional formatting and date/time functions. Implement validation controls and checks for accurate data entry.</p>	<p>4. Examine the process and advantages of creating and formatting charts and graphs in a spreadsheet. How do these visual tools assist in data analysis and decision-making?</p>	
<p>Data Validation Rules applied to cells to ensure that entered data meets specific criteria, e.g., dropdown lists or numeric ranges.</p>	<p>Use basic formulae (+, -, *, /) and functions (SUM, AVERAGE, MAX, MIN). Apply complex functions (IF, VLOOKUP, SUMIF) and macros for automation.</p>	<p>5. Analyse the significance of testing and evaluating spreadsheets. What methods can be used to ensure a spreadsheet is functioning correctly, and how can improvements be identified and implemented?</p>	
<p>Conditional Formatting A feature that changes the appearance of cells based on their values, such as highlighting cells that meet certain conditions.</p>	<p>Sort and filter data. Create and format charts/graphs with titles and labels for decision-making.</p>		
<p>Cell Reference An identifier for a cell in a spreadsheet, which can be relative (e.g., A1) or absolute (e.g., \$A\$1).</p>	<p>Test different data and formula changes to explore outcomes.</p>		
<p>Pivot Table A data summarisation tool that allows users to group, filter, and analyse large datasets dynamically.</p>	<p>Create a test plan with various data types. Justify testing methods, provide evidence, and suggest improvements.</p>		

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Terminology	Definitions	Preparing for Assessment
<p>1. Automated Document A document that uses data from a source to generate personalised or standardised content automatically, reducing manual data entry.</p> <p>2. Data Source A structured repository, such as a spreadsheet or database, where information is stored and used for merging into documents.</p> <p>3. Merge The process of combining data from a source with a document template to create personalised or bulk documents.</p> <p>4. Field A placeholder in a document where specific data, such as names or addresses, will be inserted during the merge process.</p> <p>5. Template A pre-designed document structure that includes placeholders for data fields, used as the basis for creating multiple documents.</p> <p>6. Data Linking The method of connecting a data source to a document template, allowing automatic insertion of data into designated fields.</p> <p>7. Personalisation Customising documents with specific data for individual recipients, such as inserting names or addresses, to make each document unique.</p>	<p>Core Knowledge</p> <p>2.3.1 Planning and Designing an Automated Document Effective planning and design ensure the document meets its intended purpose, is user-friendly, and integrates seamlessly with automation features. This step helps avoid issues during the data merging process and ensures the final document is well-structured and efficient.</p> <p>2.3.2 Creating a Data Source and Linking It to a Standard Document A well-structured data source is crucial for accurate and efficient data merging. Linking the data source to the standard document automates data entry, reducing manual effort and minimizing errors in the final output.</p> <p>2.3.3 Structuring the Content of the Standard Document and Inserting Fields Properly structuring the document content and correctly inserting fields ensures that automated data is placed in the right locations. This organization helps maintain consistency and professionalism in the final documents, making them more effective and easier to read.</p> <p>Merging and Outputting Final Documents Reason: Merging the data with the standard document produces personalised and accurate final outputs. Outputting the documents in the desired format ensures they are ready for distribution or use, meeting the needs of the end users and fulfilling the document's purpose.</p>	<p>1. Discuss the significance of planning and designing an automated document. How does careful planning influence the effectiveness and efficiency of the document generation process?</p> <p>2. Evaluate the role of a well-structured data source in the automation of document creation. What are the key elements of a data source that impact the accuracy and efficiency of the document merging process?</p> <p>3. How does structuring the content of a standard document and correctly inserting fields contribute to the success of automated document generation? Provide examples of common field types and their purposes.</p> <p>4. Analyse the process of merging data with a standard document. What are the challenges associated with this process, and how can they be addressed to ensure high-quality final documents?</p> <p>5. Examine the different output formats available for finalised automated documents. How do different formats affect the usability and distribution of the documents? Discuss the considerations for selecting an appropriate output format.</p>

Summary- Position in the Curriculum

Unit 2 introduces learners to a broad working knowledge of databases, spreadsheets, automated documents and images and enables learners to apply their knowledge and understanding to solve problems in vocational settings. An assignment brief will be provided by WJEC which will include a scenario and several tasks available via the WJEC Secure Website.

Terminology

Definitions

Core Knowledge

Preparing for Assessment


No new learning.

Term will be used to finish improve and upload assessment to WJEC.

Summary- Position in the Curriculum

This unit allows learners to explore the wide range of uses of hardware, application and specialist software in society. They will investigate how information technology is used in a range of contexts, including business and organisations, education and home use.

This unit is externally assessed through a written examination. Duration: 1 hour 20 minutes Number of marks: 80 Format: Questions requiring objective responses, short and extended answers, based around applied situations. Learners will be required to use stimulus material to respond to questions.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
<p>1. Risk The potential for harm or loss that could affect the confidentiality, integrity, or availability of information.</p>	<p>Risks to Information Held on Computers - Threats that could compromise the security and integrity of data stored on computers.</p>	<p>1. Discuss the various risks to information held on computers. How can understanding these risks help individuals and organisations improve their information security measures?</p>	
<p>2. Data Loss The situation where information is unintentionally or accidentally deleted or made inaccessible, often leading to significant operational and financial impacts.</p>	<p>Understanding these risks is crucial for identifying potential vulnerabilities and implementing appropriate security measures to protect information from being compromised or misused.</p>	<p>2. Evaluate the potential impacts of data loss, theft, or manipulation on both individuals and businesses. What are the long-term consequences, and how can they be mitigated?</p>	
<p>3. Data Theft The illegal acquisition of information by unauthorized individuals, typically for malicious purposes such as identity theft or fraud.</p>	<p>The Impact of Data Loss, Theft, or Manipulation - Consequences arising from the loss, theft, or unauthorized alteration of data. Recognising the impact on individuals and businesses helps to emphasise the importance of safeguarding data and reinforces the need for effective security measures to mitigate these risks.</p>	<p>3. Analyse the effectiveness of different methods used to protect information on computers. Which methods are most effective in combating specific types of threats and why?</p>	
<p>4. Encryption The process of converting data into a coded format to prevent unauthorized access, which can only be deciphered by someone with the correct decryption key.</p>	<p>Methods Used to Protect Information Techniques and tools employed to safeguard data from risks. Implementing protective methods is essential for preventing unauthorized access, data breaches, and other security threats, ensuring that information remains confidential and intact.</p>	<p>4. Examine how moral and ethical issues influence computer users and the wider impact on society. How can addressing these issues contribute to responsible technology use?</p>	
<p>5. Firewall A security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules to prevent unauthorized access to or from a private network.</p>	<p>How Moral and Ethical Issues Affect Computer Users - Considerations of right and wrong that influence how individuals and organizations use computer technology. Addressing moral and ethical issues ensures responsible use of technology, respects privacy, and promotes fair practices, which helps maintain trust and integrity in digital interactions.</p>	<p>5. How can organisations balance the need for data protection with the necessity of accessibility and usability? Discuss strategies for achieving this balance while maintaining robust security.</p>	
<p>6. Antivirus Software A program designed to detect, prevent, and remove malware from a computer system to protect against threats like viruses, worms, and trojans.</p>			
<p>7. Privacy The right of individuals to control access to their personal information and ensure it is not disclosed without their consent.</p>			

Notes

	Monday	Tuesday	Wednesday	Thursday	Friday
Form					
P1					
P2					
P3					
P4					
P5					