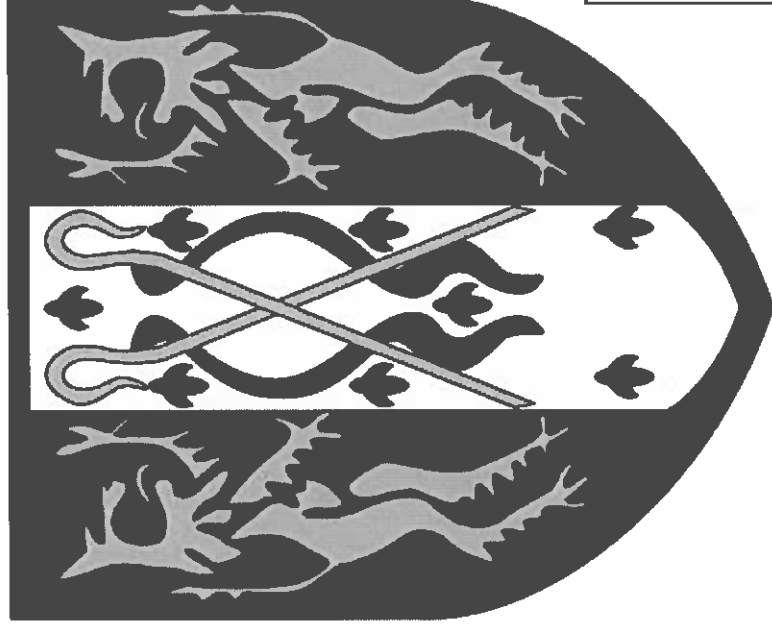


Year 9 Knowledge Organiser

Core



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English

English – Year 9 – HT1 – Of Mice and Men

Summary- Position in the Curriculum

Written in 1937, 'Of Mice and Men' tells the story of George Milton and Lennie Small, two displaced migrant ranch workers, who move from place to place in California in search of new job opportunities during the Great Depression in the United States. The novella is studied within its context, a key skill required in English; students relate factors such as the Great Depression, racism and segregation, prejudice and discrimination, and women's rights to their study and understanding of the text. In doing so, students engage with the characteristics of tolerance and respect, building upon work from Year 8, such as the study of 'Noughts and Crosses,' and also preparing students for the Inequality and Discrimination Unit in HT3.

<u>Terminology</u>	<u>Definitions</u>	<u>Core Knowledge</u>	<u>Preparing for Assessment</u>
Segregation	The action or state of setting someone or something apart.	Steinbeck cared about social justice and in the text highlights the prejudice and discrimination experienced by marginalised groups due to race, gender, age and disability.	1. What do we learn about the relationship between George and Lennie in Chapter One?
Hierarchy	A system in which members of an organisation or society are ranked according to status.	'Of Mice and Men' is written using an omniscient narrator but gives very little insight in to the internal thoughts and feelings of characters, leaving the reader to interpret.	2. Curley and Slim both have authority on the ranch, but they achieve respect in different ways. Why do the men on the ranch respect them?
Inevitable	Certain to happen and unavoidable.	In the novel, every character has a dream but none of the characters achieve them. Steinbeck is commenting on the impossibility of the American Dream.	3. What are the main events of Chapter Three and how do they link to previous events? And what predictions can you make for the rest of the novel?
Cyclical Structure	There is a sense of things happening in an order and then being repeated.	The theme of loneliness is at the heart of the novel. All characters, except George and Lennie, experience and suffer from loneliness. By the end of the novel, George is lonely too.	4. What do we learn about Crook's life in Chapter Four and how does this reflect the experiences of African Americans during the time the novel was set?
Foreshadowing	An indication of what is to come later in the text.	Steinbeck makes frequent references to animals and nature , both literally and figuratively. Steinbeck explores the contrasts of Nature Vs Man by comparing characters to animals.	5. In what ways was Curley's wife's fate predictable? And does your opinion of her change in this chapter?

Key Quotations:

"Guys like us, that work on ranches, are the loneliest guys in the world."

"A girl was standing there looking in. She had full-rouged lips and wide-spaced eyes, heavily made up."

"And the meanness and the plannings and the discontent were all gone from her face."

"We gonna get a little place."

Rabbits



Itinerant Worker



John Steinbeck



The American Dream



Film: Lennie and George



English – Year 9 – HT2 – 19th Century Fiction

Summary- Position in the Curriculum

Students will explore a range of 19th Century fiction extracts. In doing so they will build upon their contextual knowledge of the Victorian era established when studying *Sherlock Holmes* in Year 8, knowledge they can take to their study of *Jekyll and Hyde* in Year 10. Students will not only explore the context, but will spotlight individual writers and their common themes and stylistic features, increasing their confidence in reading 19th Century extracts which is a requirement of GCSE English Language. They will develop their own creative writing abilities by recreating the styles and 'voices' of these Victorian writers.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Recreative Writing	Studying the style of a writer and then 'copying' that style in your own writing.	The 19 th Century is considered to be the Golden Age of the novel – it was during the Victorian era that the novel became the leading literary genre in English.	1. Choose three of the 19 th Century writers listed below and create <i>Writer Profile Cards</i> , including biographical information, novels, themes and style.
Broadside	A form of newspaper that reported crimes: included a summary, picture and song.	Charles Dickens is one the most famous 19 th Century writers, writing novels such as <i>Oliver Twist</i> and <i>A Christmas Carol</i> . His novels often focused on social concerns, particularly poverty.	2. Research the Victorian era: schools, crime, technology, London and the divide between the rich and poor.
Ragged School	Charitable organisations provided free schooling for destitute children.	Many Victorian novel focused on crime and punishment – the Victorians had an appetite for crime stories and read <i>Broadside</i> s and <i>Penny Dreadfuls</i> about real-life crimes.	3. Imagine you have been sent to a Victorian workhouse – write a series of diary entries documenting a typical week.
Aesthetic Movement	Writers who aimed to produce art that was beautiful rather than having deeper meaning.	In 1880 a law made it compulsory for all children aged 5 to 10 to attend school. Education often featured in Victorian novels, such as <i>Jane Eyre</i> and <i>Hard Times</i> .	4. Write a description of a setting of your choice in the style of one of the 19 th Century writers you have studied.
Poor Laws	Introduced in 1834, a law which involved sending the poor to workhouses, which some saw as similar to prisons.	Oscar Wilde was an Irish writer who was part of the aesthetic movement and promoted the idea of 'art for art's sake' – art need not have a moral or didactic purpose and should be judged for whether it is beautiful or not and produces revelry.	5. Research Victorian criminal cases and write your own <i>Broadside</i> : remember to summarise the case, do a drawing and write a song about the crime that can be sung in the pub!

Writers in the unit:

Charles Dickens * Edgar Allan Poe * Charlotte Bronte * Oscar Wilde * Joseph Conrad * R. L. Stevenson * Fyodor Dostoevsky * H.G. Wells

Queen Victoria	Charles Dickens	Victorian School	The Poor Laws	Treasure Island
				

English – Year 9 – HT3 – Inequality and Discrimination

Summary- Position in the Curriculum

The unit uses non-fiction and fiction texts to ignite social engagement in students and discourage apathy, allowing students to engage with historical and contemporary social issues including trade unions and the 'Black Lives Matter' movement. We introduce GCSE Language Paper 2 skills, although the link to GCSE is implicit. The extracts span a range of forms, genres, time periods and cultures and allow students to develop their skills of understanding and critical reading. Students develop their ability to make critical comparisons of texts with a focus on synthesis and comparison of techniques. The thematic connection between the extracts provides a springboard for character education, particularly social responsibility, and provides stimulus for spoken responses, namely debates and structured responses, and written responses including argumentative writing in various forms.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Discrimination	Making prejudicial assumptions based on characteristics, such as gender, class or race.	Having a protected characteristic means that you have a right not to be treated less favourably by reason of that characteristic, for example age, gender or race.	1. <i>What forms of discrimination exist in the 21st Century and how is this discrimination experienced?</i>
Inequality	A lack of fair treatment or opportunities for people.	Fiction and non-fiction texts have historically been used to expose prejudice and discrimination in society and as vehicles to fight for equality.	2. <i>What are the similarities and differences between fiction and non-fiction texts in terms of style and form?</i>
Bias	Prejudice for or against one person or group.	Writers can draw upon a vast repertoire of persuasive devices to increase the impact of their arguments, with different techniques creating opposing effects.	3. <i>Why does Solomon Northrup use indirect speech and create a clinical tone when documenting his experiences of being an enslaved man?</i>
Indirect speech	When the main points of a person's speech are reported rather than written in full.	Some forms of art and media still represent groups in society in biased and negative ways, particularly the working classes, but there has been a shift towards more positive representation.	4. <i>How do John Pilger and Tony Parsons employ different persuasive devices and styles when sharing their views about homelessness?</i>
Representation	The description or portrayal of a person or group of people.	Trade unions are groups of employees who join together to maintain and improve their conditions of employment.	5. <i>Why do trade unions encourage strike action?</i>

Key Texts:

12 Years A Slave (Solomon Northrup) * *The Hate U Give* (Angie Thomas) * *Crongton Knights* (Alex Wheatle) * *The Man With No Name* (Tony Parsons) * *Beggars of Britain* (John Pilger) * *Road to Wigan Pier* (George Orwell)

Solomon Northrup	Trade Union Strikes	Persuasive Methods	Representation	Film: The Hate U Give
				

English – Year 9 – HT4 – Unseen Poetry

Summary- Position in the Curriculum

This unit uses a range of poems from across genres, time periods and cultures to develop a student's ability to respond to a poem independently. The lessons encourage students to look at the 'bigger picture' of the poem before honing in on the micro details, ensuring that they can analyse within the context of the meaning of the poem. They will utilise their prior knowledge of poetic conventions and their ability to engage critically with how these have been used – but they are taught the skills and strategies to approach and respond to an unseen poem without teacher explanation. Students are also taught comparison skills, making links and connections between poems using what/how/why skills. As with the *Inequality and Discrimination* unit, the thematic link of the poems provides various opportunities for explicit character education teaching.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Rhyme Scheme	The pattern of rhyme within a poem, identified using a letter system.	The writer is not always the speaker; although poems can be autobiographical, poets often utilise a narrative persona and write in character.	1. What are the differences between poetry and prose - and what language and structural methods are specific to poetry?
Rhythm	The flow or movement of a line or series of lines.	Although not all poems require a storyline , some do – and poets have to be 'expert packers of suitcases' to develop a narrative within the conventional confines of poetry.	2. Who is the speaker in a poem? Does it have to be the writer? What is an autobiographical poem? What is a narrative persona?
Enjambment	When one line runs in to another with no punctuation	A poem can express a range of emotions, and writers select vocabulary carefully to create mood and tone .	3. How do poems introduce and develop narratives and storylines?
Imagery	Language used to engage our senses. The descriptions are vivid and engage us with sights, sounds, smells, taste and touch.	The structure of a poem is not accidental and will have an effect on the overall mood. For example, a poem about chaos and disorder may not follow a rhyme scheme and line and stanza/verse lengths might vary.	4. How do you identify tone of voice and themes in poetry? Can you identify turning points (volts) and changes in mood?
Narrative persona	A created character who is the speaker in a poem.	Analysing language devices shouldn't be technique spotting – you should consider the effects of the writer's choices.	5. What are the effects of a poet's decisions about rhyme scheme, stanza length and line length? How has a writer used imagery and symbolism in a poem and what are the effects on the reader?

Poets in the unit:

Sylvia Plath * Tony Harrison * Robert Browning * William Shakespeare * Simon Armitage * Wilfred Owen * Maya Angelou * Thomas Hardy * John Agard * William Butler Yeats *

Maya Angelou	Rhyme Scheme	Poetry VS Prose	Poet Laureate	Imagery
	I do not like green eggs and ham. A I do not like them Sam I am. A I do not like them in a house. B I do not like them with a goat. B I do not like them in a room. C I do not like them with a mouse. C			

English – Year 9 – HT5 – Reading Short Stories

Summary- Position in the Curriculum

Short stories can usually be read in one sitting. Their concise length means that certain story elements are emphasised and used in specific ways. In this unit, short stories are used to explore the writer's use of structure. A range of twentieth/twenty-first century stories are analysed with a focus on organisation and construction, and these stories are also used as source material for re-creative writing. Although the structure of short stories is the main focus of this unit, we also look at genre, narrative point of view, characterisation and themes and motifs. In HT6, students will take inspiration from the stories studied in this unit when they write their own short story.

<u>Terminology</u>	<u>Definitions</u>	<u>Core Knowledge</u>	<u>Preparing for Assessment</u>
Genre	The category of story, for example sci-fi, drama, romance, comedy etc.	Many stories are structured following these narrative stages: exposition, development, complication, climax, resolution/denouement.	1. Choose a character from one of the stories. What do we learn about them through their looks, actions, speech, thoughts/feelings and effects on others?
Characterisation	The creation or construction of a fictional character.	A writer selects a narrative perspective, for example 3 rd person omniscient, 1 st person limited, retrospective first person. Different perspectives have advantages and disadvantages.	2. Choose a description of a setting from one of the stories. How does the writer use the senses to help the reader picture the scene?
Structure	How the text is organised and the way the story is ordered and shaped.	Direct characterisation involves a writer explicitly telling a reader what a character is like: <i>Mr. Ramsay – he is absorbed in himself, he is tyrannical, he is unjust...</i>	3. Create a reverse plan of one of the stories you have read, making notes about the exposition, development, complication, climax and resolution.
Point of view	The narrator's position in relation to the story being told.	Indirect characterisation involves a writer implicitly revealing and showing what a character is like: <i>He dragged the last smoke from his cigarette and then, with calloused hands and forefinger, crushed out the glowing end.</i>	4. Re-write the ending of the one the stories you have read so that it is completely different. For example, if it is a resolved ending, can you turn it to a cliff hanger?
Theme	A message conveyed by a text that has relevance and meaning beyond the individual text.	Writers can end stories in a variety of ways. Possible methods include cliff-hanger, twist, ambiguous, moral and resolved/cyclical.	5. Draw a setting and character from one of the short stories and annotate your picture with quotations from the story.

Writers studied:

Stephen King * Shirley Jackson * William DeMille * Angela Carter * Raymond Bradbury * Ira Sher * Samuel Beckett * Yuri Nagibin

The Lawnmower Man	The Lottery	Ruthless	The Werewolf	All Summer in a Day
				

English – Year 9- Writing Short Stories

Summary- Position in the Curriculum

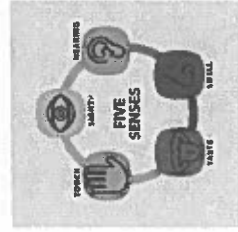
This unit focuses on the application of the learning from the previous Half Term (HT5). Students will work towards writing either the opening to a short story, or a whole short story, after having studied several short stories in the last half term. They will build upon their knowledge of creative writing, which is a large focus of our year 7 curriculum, and has been interwoven in to the teaching in year 8 and 9. This unit also pairs particularly well with the creative re-writing tasks that pupils will have completed when they studied extracts from 19th century texts in Half Term Two (HT2). It is essentially a chance for students to consolidate their knowledge; and to produce succinct and interesting piece of 'flash fiction'.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Plot	The sequence of events within a piece of fiction, these are cleverly arranged by a writer.	Writers consider all aspects of the characters they create. Characters are well developed when careful choices about their costume, dialogue, actions, the use of props, setting and their names are made.	1. How might a character be developed by making a character profile?
Dialogue	A conversation between two people within a piece of writing.	Writers use dialogue to provide an insight in to their characters as we learn more about them from not just what they say, but how they say it.	2. How should dialogue be structured correctly? How can dialogue be used to develop relationships between characters in a text?
Sensory Imagery	Language used to describe the 5 senses; sight, touch, hearing, smell and taste.	A good piece of creative writing employs a variety of language devices to help the reader imagine what is going on. Sensory imagery offers an effective way to bring a setting to life.	3. How can descriptions of sight, touch, hearing, smell and taste be used to bring a setting/character to life?
Metaphor	The process of comparing one unlike thing to another.	Readers are able to picture stories in their minds-eye when aspects of what is described are compared to things they are familiar with. Using word association is a great way to create precise metaphors. Colour imagery is a useful tool too.	4. How do writers craft precise metaphors? How can language devices such as colour imagery be used effectively in a piece of writing?
Editing	The process whereby a writer amends and carefully adapts their writing to make it more succinct and interesting.	All writers draft and re-draft their work. The process of reviewing a piece of fiction to check that it makes sense, has a good sense of pace and paints a clear picture for the reader is a fundamental part of good creative writing.	5. How does a writer structure their text, building from the exposition to the denouement? How can I summarise the plot of my story in 6 words (using Ernest Hemingway as inspiration)?
Key Quotations: "A short story should be just enough to read in one sitting"- Edgar Allen Poe "Short stories offer their readers a slice of life"- Anton Chekhov "It is a writer's job to trot along behind his characters with a paper and pencil trying to keep up long enough to put down what he says and does."- William Faulkner "Must have a definite design... it must have a plot"- Somerset Maugham			

Plot (Freytag's Pyramid)



Sensory Imagery



Ernest Hemingway



Genre



Editing



Maths



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

1.1 – Straight line graphs

- Compare gradients
- Compare intercepts
- Understand and use $y = mx + c$
- Find the equation of a line from a graph
- Interpret gradient and intercepts of real-life graphs

1.2 – Forming & solving equations

- Solve inequalities with negative numbers
- Solve equations with unknowns on both sides
- Solve inequalities with unknowns on both sides
- Substitute into formulae and equations
- Rearrange formulae

1.3 – Testing conjectures

- Use factors, multiples and primes
- Reason true, false, always & sometimes
- Make conjectures with number/algebra
- Expand binomials
- Explore the 100 grid

Keywords

Gradient: the steepness of a line.

Intercept: where two lines cross.

The **y-intercept:** where the line meets the y-axis.

Parallel: two lines that never meet with the same gradient.

Co-ordinate: a set of values that show an exact position on a graph.

Linear: linear graphs (straight line) – linear common difference by addition/subtraction.

Asymptote: a straight line that a graph will never meet.

Reciprocal: a pair of numbers that multiply together to give 1.

Perpendicular: two lines that meet at a right angle.

Preparing for Assessment

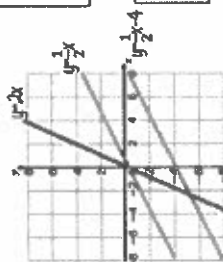
- Login to **Maths Watch** and complete your independent tasks each week. Attempt all questions and aim to get at least 80% correct. Remember, you can watch the videoclip attached to each question to help you understand the topic better.
- Use '**Read, Cover, Write, Check**' to test your understanding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

Core Knowledge

Compare Gradients

$$y = mx + c$$

The coefficient of x (the number in front of x) tells us the gradient of the line



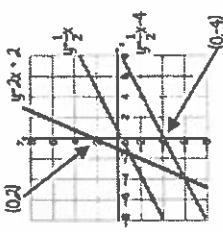
The greater the gradient – the steeper the line

Parallel lines have the same gradient

Compare Intercepts

$$y = mx + c$$

The value of c is the point at which the line crosses the y-axis. Y Intercept



The coordinate of a y intercept will always be (0,c)

Lines with the same y-intercept cross in the same place

$$y = mx + c$$

The coefficient of x (the number in front of x) tells us the gradient of the line

$$y = mx + c$$

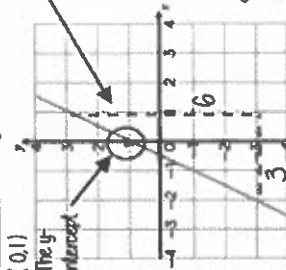
The value of c is the point at which the line crosses the y-axis. Y Intercept

y and x are coordinates

The equation of a line can be rearranged. Eg $y = c + mx$

$c = y - mx$
Identify which coefficient you are identifying or comparing

Find the equation from a graph



$$y = 2x + 1$$

The direction of the line indicates a positive gradient

Negative gradients

Solve equations with brackets

R

$2x + 4$	$2x + 4$	$2x + 4$
30		

$$3(2x + 4) = 30$$

Expand the brackets

Inequality: an inequality compares who values showing if one is greater than, less than or equal to another.

Variable: a quantity that may change within the context of the problem.

Rearrange: Change the order.

Inverse operation: the operation that reverses the action.

Substitute: replace a variable with a numerical value.

Solve: find a numerical value that satisfies an equation.

Multiples: found by multiplying any number by positive integers.

Factor: integers that multiply together to get another number.

Prime: an integer with only 2 factors.

HCF: highest common factor (biggest factor two or more numbers share).

LCM: lowest common multiple (the first time the times table of two or more numbers match).

Binomial: a polynomial with two terms.

Quadratic: a polynomial with four terms (often simplified to three terms).

Expanding binomials

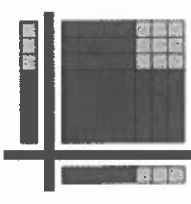
$$2(x + 2) \equiv 2x + 4$$



Algebra tiles can represent a binomial expansion has two terms



$$(x + 3)(x + 3) \equiv x^2 + 6x + 9$$



The order of the binomial has no impact on the outcome
e.g. $(x + 3)(3 + x)$

This is a quadratic. It has four terms which simplified to three terms

Rearranging Formulae (two step)

In an equation (find x) In a formula (make x the subject)

$$\begin{aligned} 4x - 3 &= 9 \\ +3 &+3 \\ 4x &= 12 \\ \div 4 &\div 4 \\ x &= 3 \end{aligned}$$

$$\begin{aligned} xy - s &= a \\ +s &+s \\ xy &= a + s \\ \div y &\div y \\ x &= \frac{a + s}{y} \end{aligned}$$

The steps are the same for solving and rearranging

Rearranging is often needed when using $y = mx + c$

e.g. Find the gradient of the line $2y - 4x = 9$
Make y the subject first $y = \frac{4x + 9}{2}$ Gradient = $\frac{4}{2} = 2$

Equations with unknown on both sides

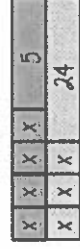
$$4x + 5 = 3x + 24$$

$$-3x \quad -3x$$

$$x + 5 = 24$$

$$-5 \quad -5$$

$$x = 19$$





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

2.1 – Three dimensional shapes

- Name 2D & 3D shapes
- Recognise prisms
- Sketch and recognise nets
- Draw plans and elevations
- Find areas of 2D shapes
- Find surface area for cubes, cuboids, triangular prisms and cylinders
- Find the volume of 3D shapes

2.2 – Constructions & congruency

- Draw and measure angles
- Construct scale drawings
- Find locus of distance from points & lines
- Construct perpendiculars from points, lines & angles
- Identify congruence
- Identify congruent triangles

Keywords

2D: two dimensions to the shape e.g. length and width.

3D: three dimensions to the shape e.g. length, width and height.

Vertex: a point where two or more line segments meet.

Edge: a line on the boundary joining two vertices.

Face: a flat surface on a solid object.

Cross-section: a view inside a solid shape made by cutting through it.

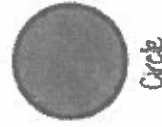
Plan: a drawing of something when drawn from above (birds eye view).

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

Name 2D & 3D shapes



Circle



Square



Rectangle



Triangle



Rhombus



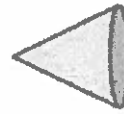
Trapezium



Parallelogram



Hexagon



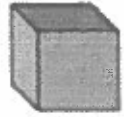
Cone



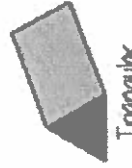
Cylinder



Sphere



Cube



Triangular Prism



Tetrahedron



Cuboid



Square based Pyramid

Surface area

Sketching nets first helps you visualise all the sides that will form the overall surface area



Surface area - cylinders

The area of the circle

$$\pi \times \text{radius}^2$$



Perspective: a way to give illustration of a 3D shape when drawn on a flat surface.

Protractor: piece of equipment used to measure and draw angles.

Locus: set of points with a common property.

Equidistant: the same distance.

Discorectangle: (a stadium) – a rectangle with semi circles at either end.

Perpendicular: lines that meet at 90° .

Arc: part of a curve.

Bisector: a line that divides something into two equal parts.

Congruent: the same shape and size.

Construct a perpendicular from a point

a point

Point

Line



Use a compass and draw an arc that cuts the line. Use the point to place the compass



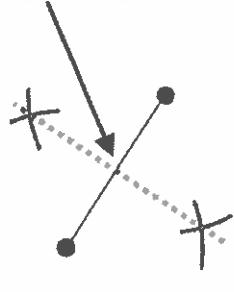
Keep the compass the same distance and now use your new points to make new intersecting arcs



Connecting the arcs makes the bisector

If P is a point on the line the steps are the same

Locus equidistant from two points



Also a perpendicular bisector
Because if the points are joined, this new line intersects it at a 90°



Join the intersections with a ruler.

Keep the compass the same size and draw two arcs from each point





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

3.1 – Numbers

- Identify integers, real and rational numbers
- Work with directed number
- Solve problems with number
- Find HCF/ LCM
- Add, subtract, multiply & divide fractions
- Write numbers in standard form

3.2 – Using percentages

- Use FDP equivalence
- Calculate percentage increase and decrease
- Express percentage change
- Solve reverse percentage problems
- Solve percentage problems (calculator and non-calculator problems)

3.3 – Maths & money

- Solve problems with bills and bank statements
- Calculate simple interest
- Calculate compound interest
- Calculate wages and taxes
- Solve problems with exchange rates
- Solve unit pricing problems

Keywords

Integer: a whole number that is positive or negative.

Rational: a number that can be made by dividing two integers.

Irrational: a number that cannot be made by dividing two integers.

Inverse operation: the operation that reverses the action.

Product: the result of a multiplication.

Percent: parts per 100 – written using the % symbol.

Decimal: a number in our base 10 number system. Numbers to the right of the decimal place are called decimals.

Fraction: a fraction represents how many parts of a whole value you have.

Equivalent: of equal value.

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

Integers, real and rational numbers

Rational – root word: ratio

Real numbers: $\frac{2}{3}$ stems from $2:1$ ($\frac{2}{3}$ of the whole)

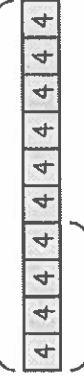
Irrational numbers: $\sqrt{2}$ the solution is a decimal that never ends and does not repeat.

The square root of a negative is not a real number and cannot be found

Reverse Percentages

40% of my number is 16
What am I thinking of?

Original Number (100%)



$$\begin{aligned} 40\% &= 16 \\ 10\% &= 4 \\ 100\% &= 40 \end{aligned}$$

Try to scale down to 10% or 1% and then scale back up to 100%

140% of my number is 84
What is the original number?

Original Number (100%)



$$\begin{aligned} 140\% &= 84 \\ 10\% &= 6 \\ 100\% &= 60 \end{aligned}$$

Simple Interest

For each year of investment the interest remains the same.

$$\text{Principal amount} \times \text{Interest Rate} \times \text{Years}$$

Reduce: to make smaller in value.

Growth: to increase/ to grow.

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

Profit: the income minus any expenses/ costs.

Credit: money being placed into a bank account.

Debit: money that leaves a bank account.

Balance: the amount of money in a bank account.

Expense: a cost/ outgoing.

Deposit: an initial payment (often a way of securing an item you will later pay for).

Multiplier: a number you are multiplying by. (Multiplier more than 1 = increasing, less than 1 = decreasing).

Per Annum: each year.

Currency: the type of money a country uses.

Unitary: one – the cost of one.

Unit Pricing

4 Oranges
£1

5 cupcakes
£1.20

$$4 = £1.00 \div 2$$

$$2 = £0.50$$

$$1 = £0.25$$

$$5 = £1.20$$

$$1 = £0.20$$

Cost per Unit

To calculate unit per cost you divide by the cost

Cupcakes are the best value as one item has the cheapest value

There is a directly proportional relationship between the cost and number of units.



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

4.1 – Deduction

- Identify angles in parallel lines
- Solve angle problems
- Make conjectures with angles
- Make conjectures with shapes

4.2 – Rotation & translation

- Identify the order of rotational symmetry
- Rotate a shape about a point on the shape
- Rotate a shape about a point not on a shape
- Translate by a given vector
- Compare rotations and reflections

4.3 – Pythagoras' Theorem

- Use square and cube roots
- Identify & calculate the hypotenuse
- Find a missing side in a right-angled triangle when given any two sides
- Use Pythagoras' theorem on axes
- Explore proofs of Pythagoras' theorem

Keywords

Parallel: two straight lines that never meet with the same gradient.

Perpendicular: two straight lines that meet at 90° .

Transversal: a line that crosses at least two other lines.

Sum: the result of adding two or more numbers.

Conjecture: a statement that might be true but is not proven.

Equation: a statement that says two things are equal.

Polygon: a closed 2D shape made from straight edges.

Counterexample: an example that disproves a statement.

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

Solving angle problems

Angles on a straight line



180°

Vertically opposite angles

Equal

Angles around a point

360°

Link angle facts to algebra



$$2x + 4x = 180^\circ$$

Form an equation

Triangles
Sum of angles is 180°



Isosceles have the same base angles

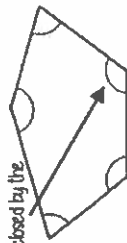
Corresponding angles



Because alternate angles are equal the highlighted angles are the same size

Alternate angles

Interior Angles
The angles enclosed by the polygon



Co-interior angles



Because co-interior angles have a sum of 180° the highlighted angle is 110°

As angles on a line add up to 180° co-interior angles can also be calculated from applying alternate/ corresponding rules first

Solve

$$2x + 4x = 180^\circ$$

$$6x = 180^\circ$$

$$x = 30^\circ$$

State the reason

The sum of angles on a straight line is 180°

(number of sides $- 2$) $\times 180$

Rotate: a rotation is a circular movement.

Symmetry: when two or more parts are identical after a transformation.

Regular: a regular shape has angles and sides of equal lengths.

Invariant: a point that does not move after a transformation.

Vertex: a point two edges meet.

Horizontal: from side to side.

Vertical: from up to down.

Square number: the output of a number multiplied by itself.

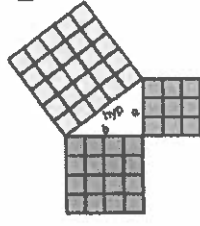
Square root: a value that can be multiplied by itself to give a square number.

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

Opposite: the side opposite the angle of interest

Adjacent: the side next to the angle of interest.

Determine if a triangle is right-angled



If a triangle is right-angled, the sum of the squares of the shorter sides will equal the square of the hypotenuse.

$$a^2 + b^2 = \text{hypotenuse}^2$$

$$\text{eg } a^2 + b^2 = \text{hypotenuse}^2$$

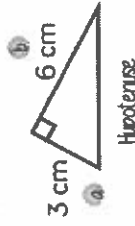
Substituting the numbers into the theorem shows that this is a right-angled triangle

$$3^2 + 4^2 = 5^2$$

$$9 + 16 = 25$$

$$a = 3 \quad b = 4 \quad c = 5$$

Calculate the hypotenuse



Either of the short sides can be labeled a or b

$$a^2 + b^2 = \text{hypotenuse}^2$$

1 Substitute in the values for a and b

$$3^2 + 6^2 = \text{hypotenuse}^2$$

$$9 + 36 = \text{hypotenuse}^2$$

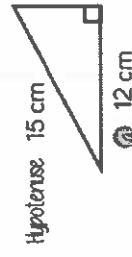
$$45 = \text{hypotenuse}^2$$

2 To find the hypotenuse, square root the sum of the squares of the shorter sides

$$\sqrt{45} = \text{hypotenuse}$$

$$6.71 \text{ cm} = \text{hypotenuse}$$

Calculate missing sides



Either of the short sides can be labeled a or b

$$a^2 + b^2 = \text{hypotenuse}^2$$

$$12^2 + b^2 = 15^2$$

1 Substitute in the values you are given

$$144 + b^2 = 225$$

Rearrange the equation by subtracting the shorter square from the hypotenuse squared

$$b^2 = 111$$

Square root to find the length of the side

$$b = \sqrt{111} = 10.54 \text{ cm}$$

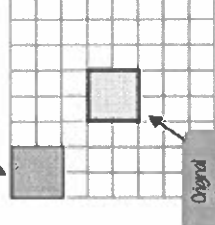
Translation and vector notation

How far left or right to move
Negative value (left)
Positive value (right)

1

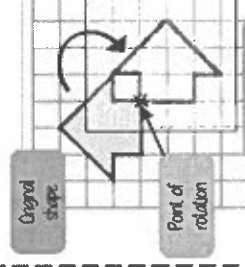
How far up or down to move
Negative value (down)
Positive value (up)

Translation $\begin{pmatrix} -3 \\ 3 \end{pmatrix}$



Every vertex has been translated by the same amount

Rotate from a point (in a shape)



1 Trace the original shape (mark the point of rotation)

2 Keep the point in the same place and turn the tracing paper

3 Draw the new shape



Only clockwise

Principled

Resilient

Open

Understanding

Disciplined



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

5.1 – Enlargement & similarity

- Recognise enlargement and similarity
- Enlarge a shape by a positive/fractional scale factor
- Enlarge a shape from a point
- Work out missing sides and angles in a pair of similar shapes

5.2 – Solving ratio & proportion problems

- Solve problems with direct proportion
- Use conversion graphs
- Solve problems with inverse proportion
- Solve ratio problems
- Solve 'best buy' problems

5.3 – Rates

- Solve speed, distance, time questions
- Use distance time graphs
- Solve density, mass, volume problems
- Solve flow problems & use flow graphs
- Interpret rates of change and their units

Keywords

Similar Shapes: shapes of different sizes that have corresponding sides in equal proportion and identical corresponding angles.

Scale Factor: the multiple describing how much a shape has been enlarged.

Enlarge: to change the size of a shape (enlargement is not always making a shape bigger, can become smaller).

Corresponding: objects (or sides) that appear in the same place in two similar situations.

Image: the picture or visual representation of the shape.

Proportion: a comparison between two numbers.

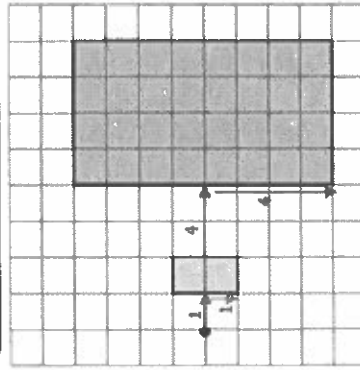
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Core Knowledge

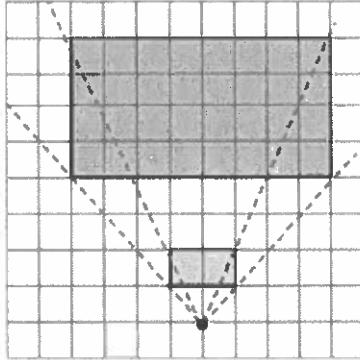
Enlarge a shape from a point

Scaled distances method



Scale the distance between the point of enlargement and each corresponding vertices

Rays method



Multiply the distance from the centre of corresponding vertices by the scale factor along the ray

Best Buys

Have a directly proportional relationship

To calculate best buys you need to be able to compare the cost of one unit of each item.

Rates of change & units

Common rates of change relationships

Revisit your conversions between units of length and capacity



Density, Mass, Volume

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

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

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



$$\text{volume of prism} = \text{Area of cross section} \times \text{Depth}$$

Speed, Distance, Time



Have a directly proportional relationship

$$\div 60$$

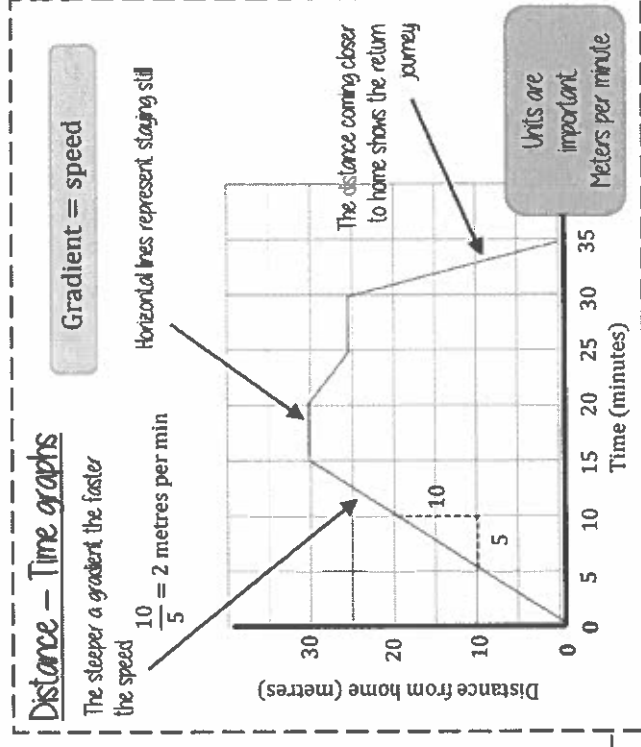
minutes

hours

$$\times 60$$

Before calculations make sure units are the same

Ratio: a ratio shows the relative size of two variables. Direct proportion: as one variable is multiplied by a scale factor the other variable is multiplied by the same scale factor. Inverse proportion: as one variable is multiplied by a scale factor the other is divided by the same scale factor. Convert: change. Mass: a measure of how much matter is in an object commonly measured by weight. Origin: the coordinate (0, 0). Volume: the amount of 3D space a shape takes up. Substitute: putting numbers where letters are – replacing numbers into a formula.	
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Principled

Resilient

Open

Understanding

Disciplined



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

6.1 – Probability

- Find single event probability
- Find relative frequency
- Find expected outcomes
- Find independent events
- Use diagrams to work out probabilities

6.2 – Algebraic Representation

- Draw quadratic graphs
- Interpret quadratic graphs
- Interpret other graphs including reciprocals
- Represent inequalities

Keywords

Probability: the chance that something will happen.

Relative Frequency: how often something happens divided by the outcomes.

Independent: an event that is not affected by any other events.

Chance: the likelihood of a particular outcome.

Event: the outcome of a probability – a set of possible outcomes.

Biased: a built-in error that makes all values wrong by a certain amount.

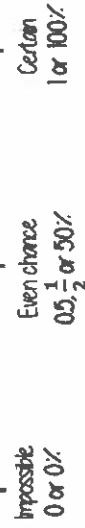
Quadratic: a curved graph with the highest power being 2 - square power.

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Core Knowledge

The probability scale



There are 2 pink and 2 yellow balls, so they have the same probability

There are 5 possible outcomes
So 5 intervals on this scale, each interval value is $\frac{1}{5}$

Single event probability

Probability is always a value between 0 and 1

The probability of getting a blue ball is $\frac{1}{5}$
∴ The probability of NOT getting a blue ball is $\frac{4}{5}$

The sum of the probabilities is 1

The table shows the probability of selecting a type of chocolate

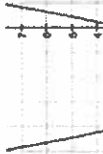
Dark	Milk	White
0.15	0.35	

$$P(\text{white chocolate}) = 1 - 0.15 - 0.35 = 0.05$$

Quadratic Graphs

$$y = x^2 + 4x + 3$$

Substitute the x values into the equation of your line to find the y coordinates



x	-4	-3	-2	-1	0	1
y	3	0	-1	0	3	8

Intersection with

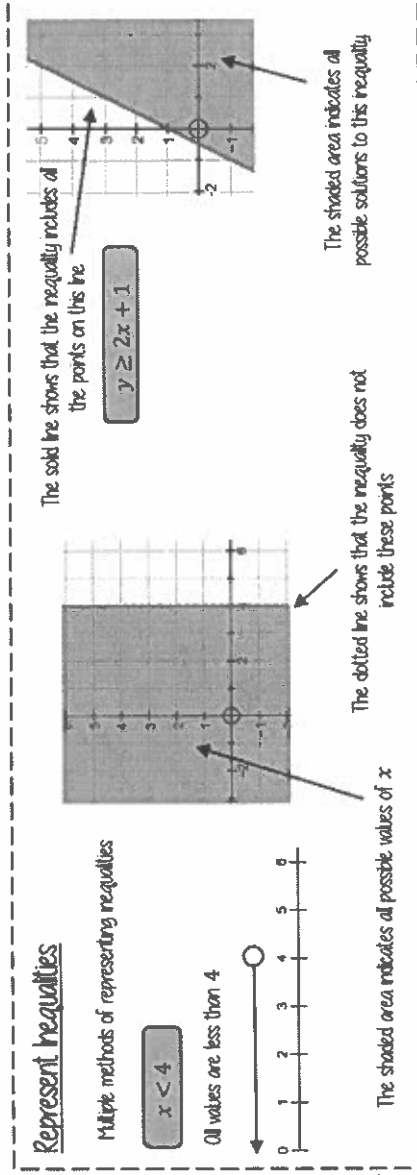
Inequality: makes a non-equal comparison between two numbers.

Reciprocal: a reciprocal is 1 divided by the number.

Cubic: a curved graph with the highest power being 3 - cubic power.

Origin: the coordinate (0, 0).

Parabola: a 'u' shaped curve that has mirror symmetry.

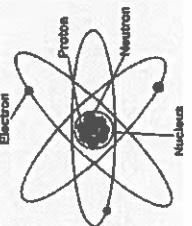
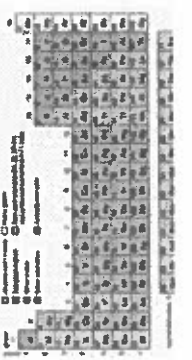


Science

Chemistry – Atomic structure and the Periodic table

Summary- Position in the Curriculum

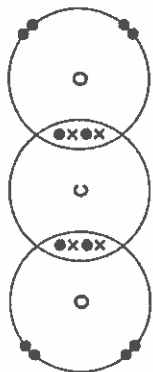
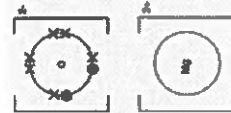
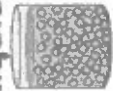
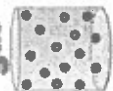
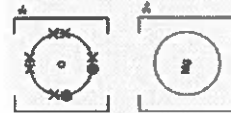
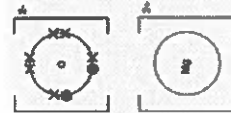
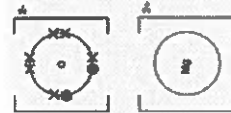
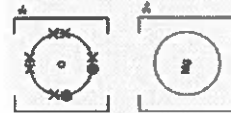
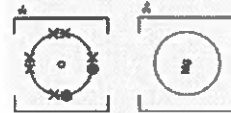
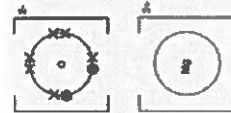
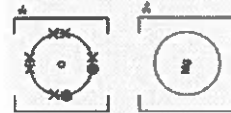
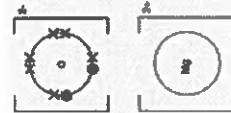
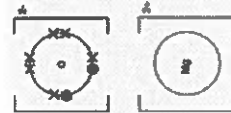
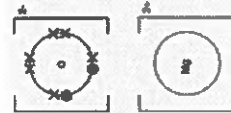
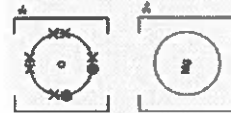
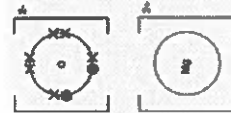
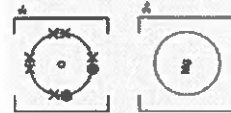
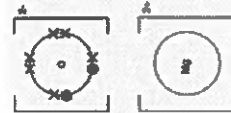
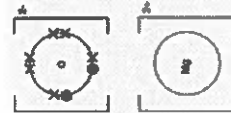
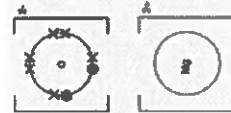
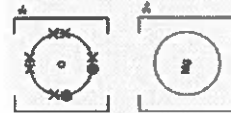
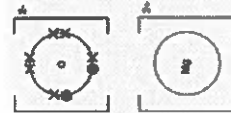
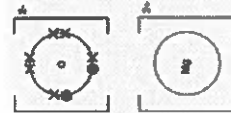
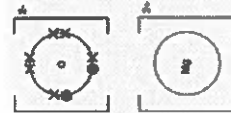
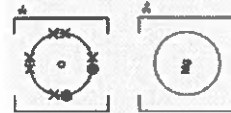
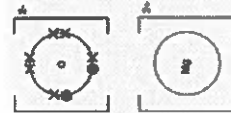
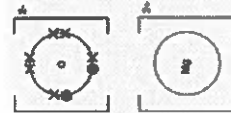
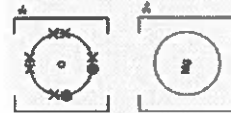
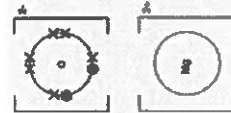
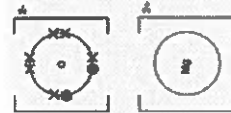
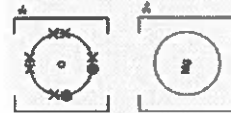
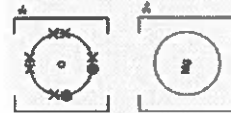
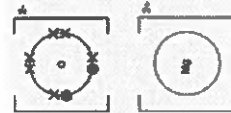
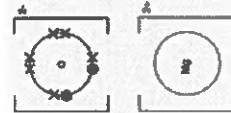
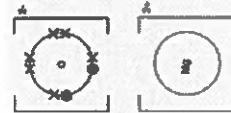
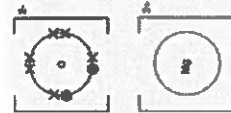
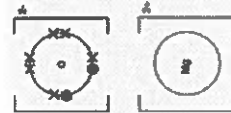
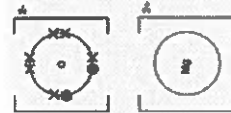
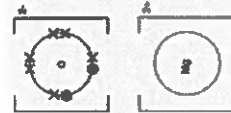
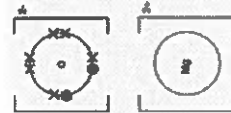
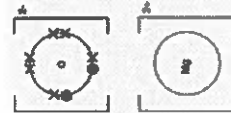
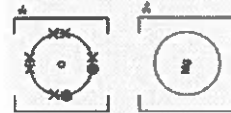
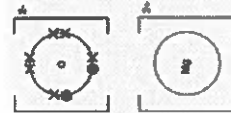
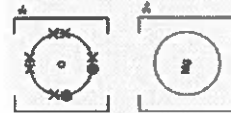
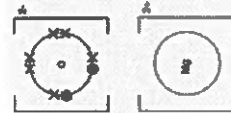
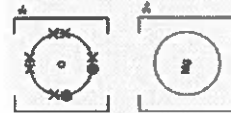
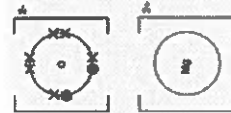
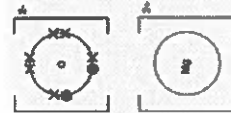
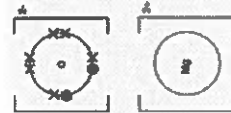
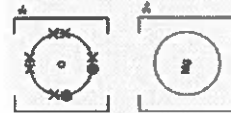
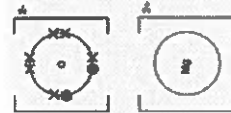
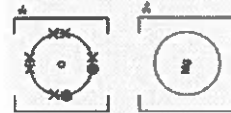
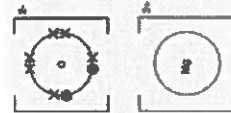
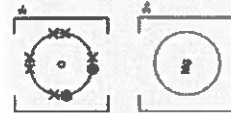
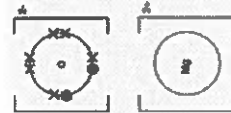
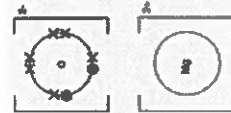
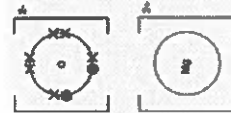
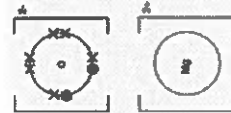
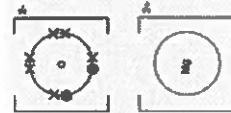
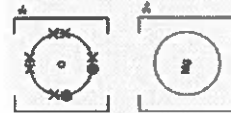
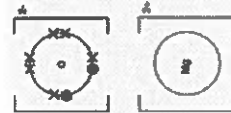
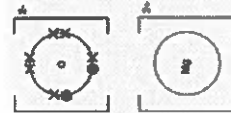
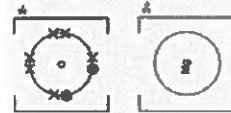
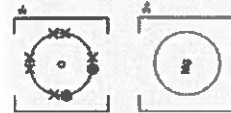
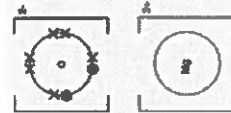
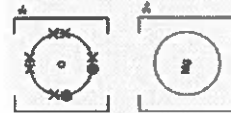
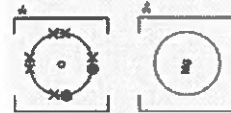
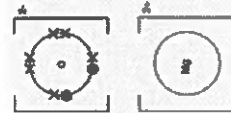
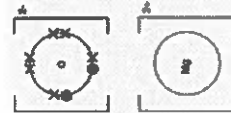
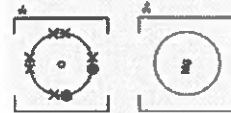
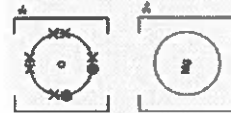
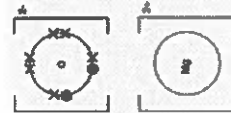
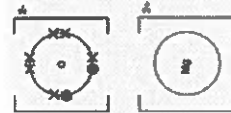
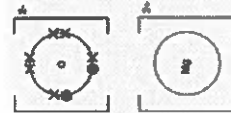
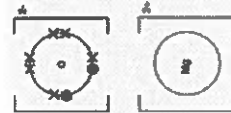
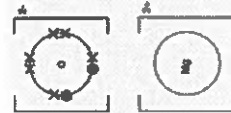
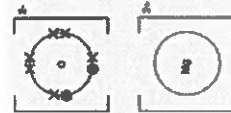
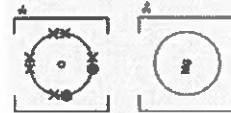
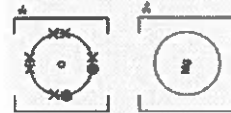
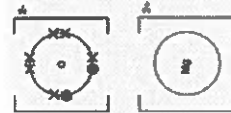
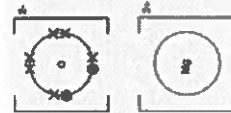
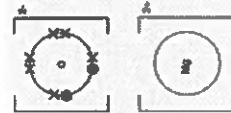
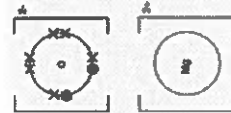
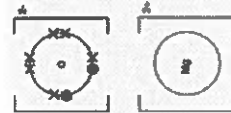
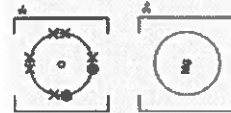
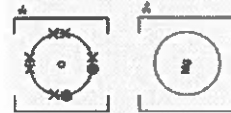
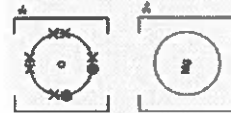
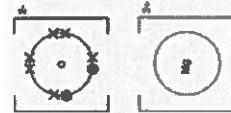
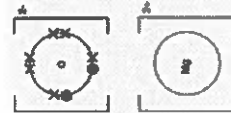
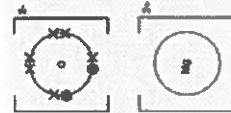
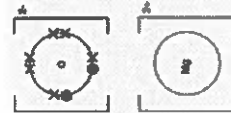
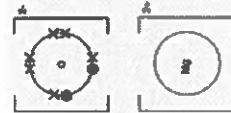
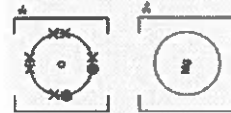
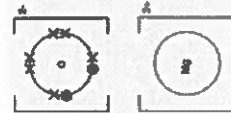
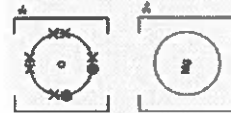
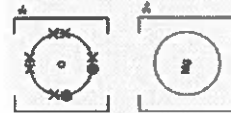
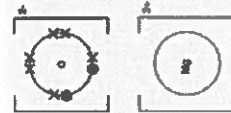
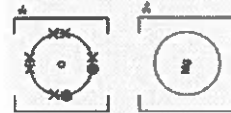
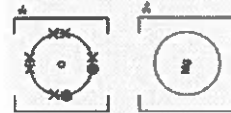
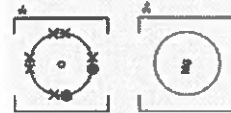
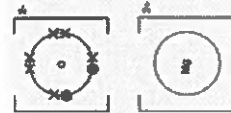
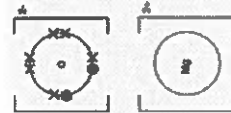
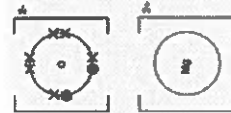
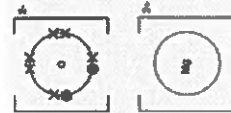
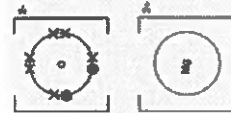
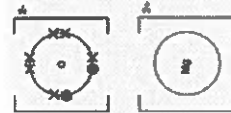
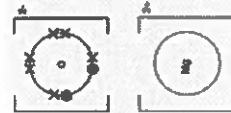
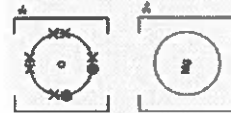
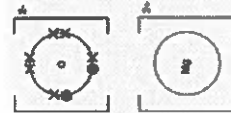
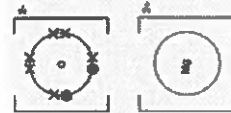
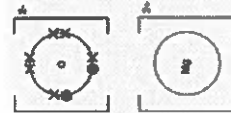
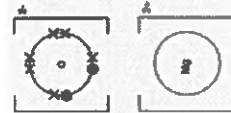
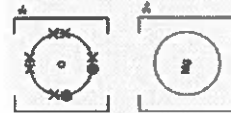
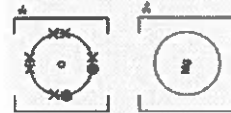
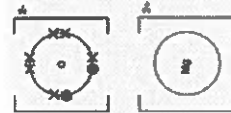
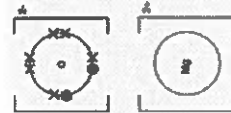
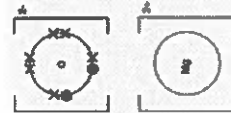
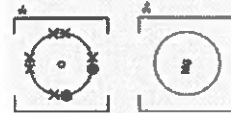
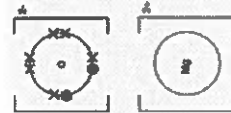
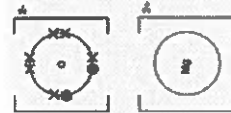
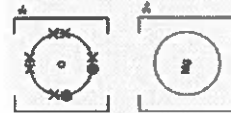
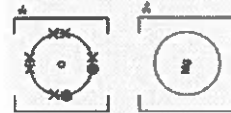
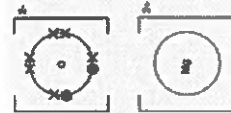
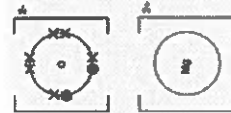
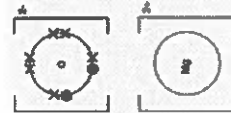
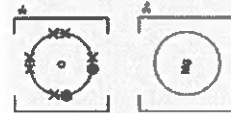
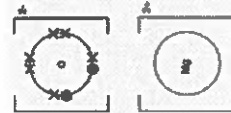
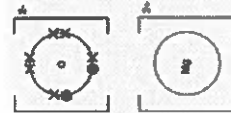
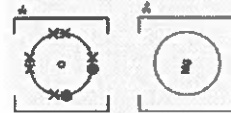
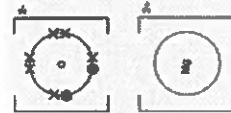
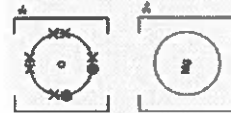
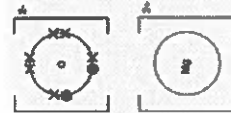
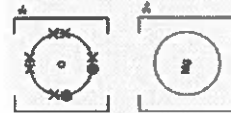
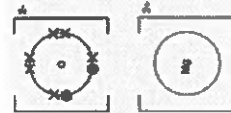
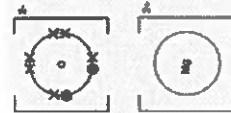
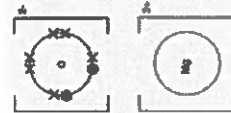
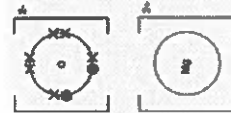
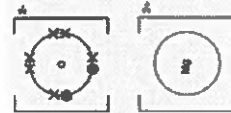
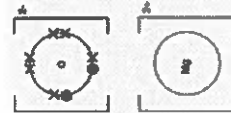
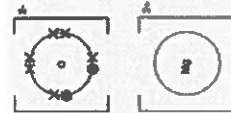
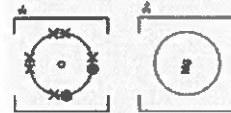
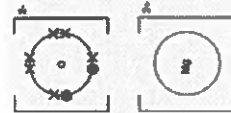
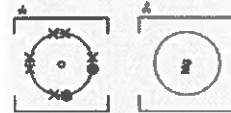
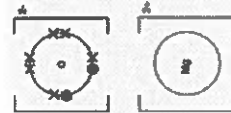
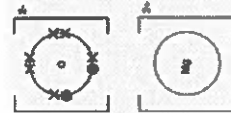
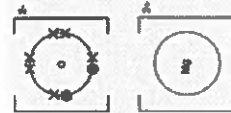
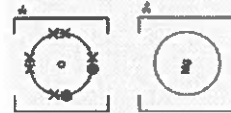
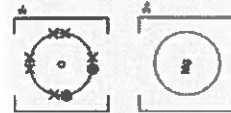
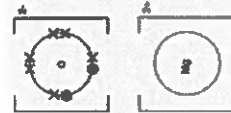
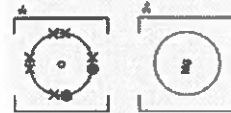
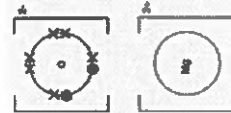
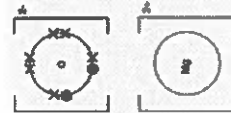
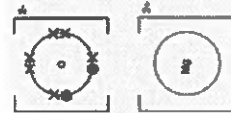
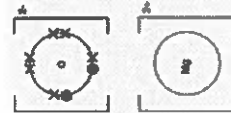
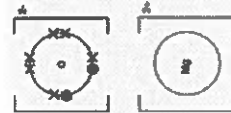
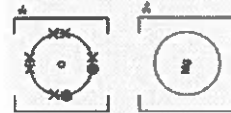
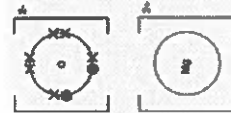
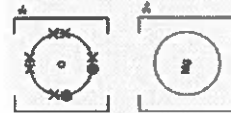
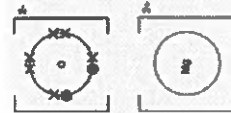
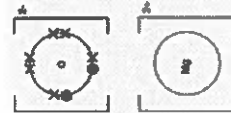
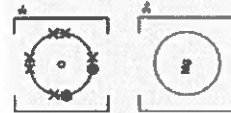
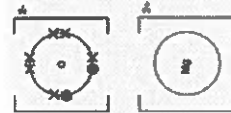
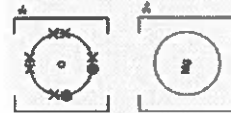
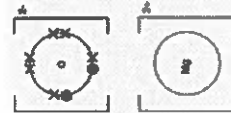
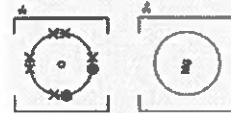
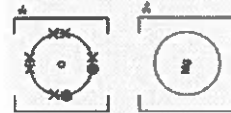
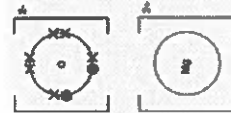
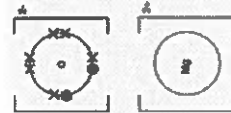
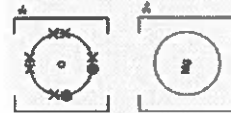
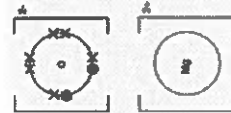
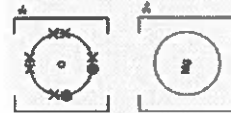
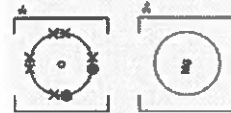
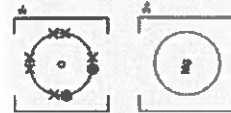
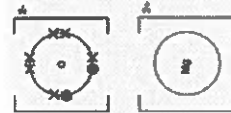
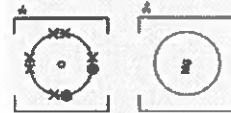
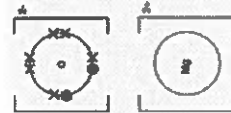
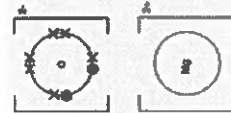
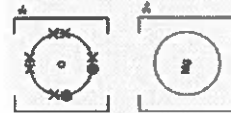
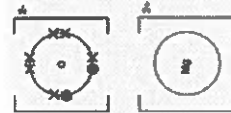
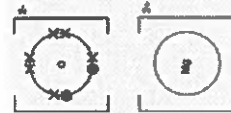
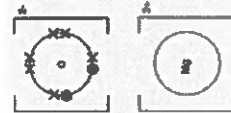
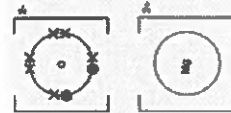
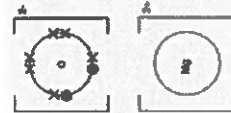
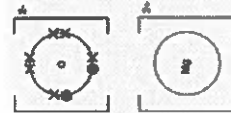
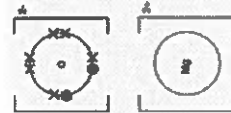
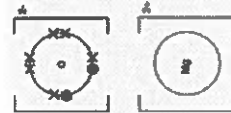
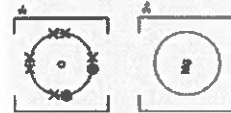
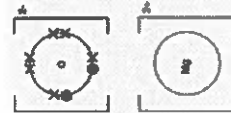
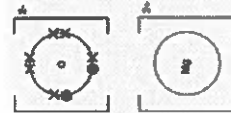
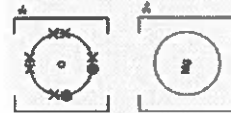
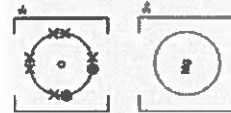
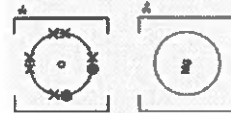
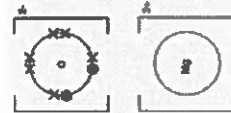
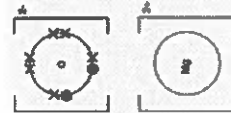
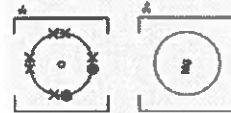
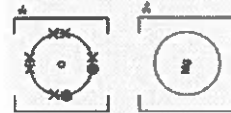
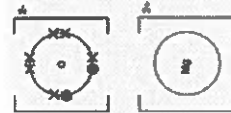
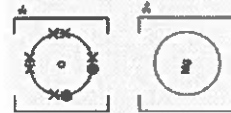
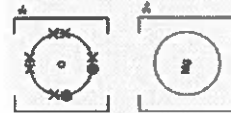
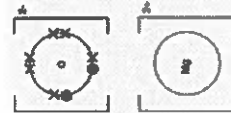
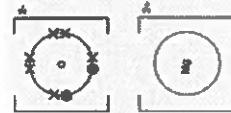
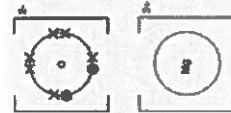
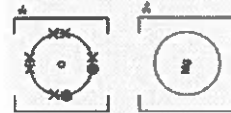
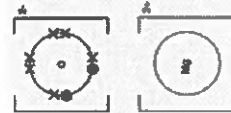
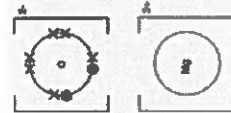
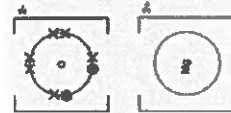
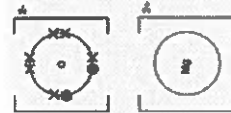
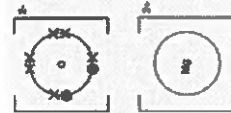
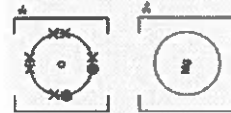
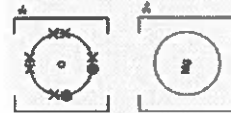
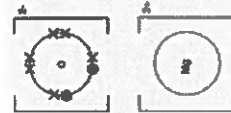
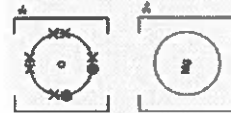
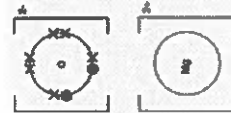
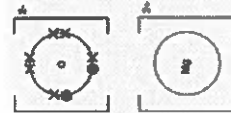
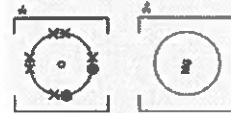
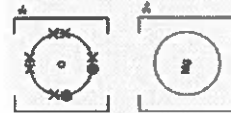
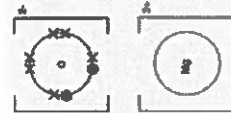
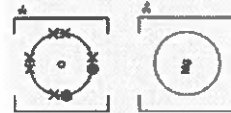
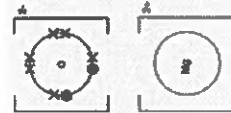
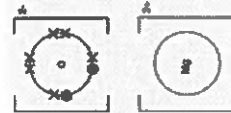
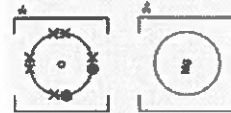
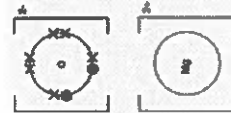
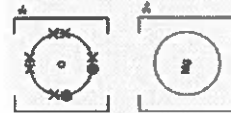
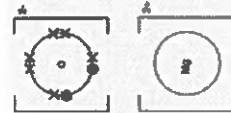
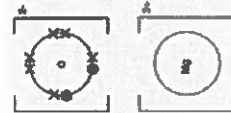
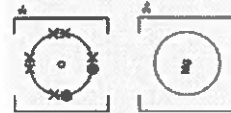
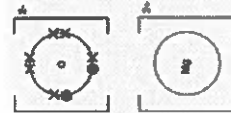
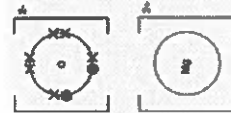
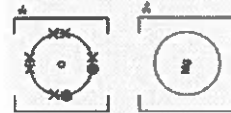
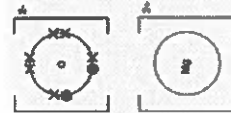
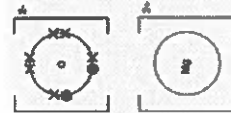
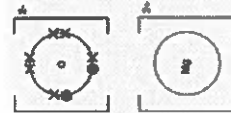
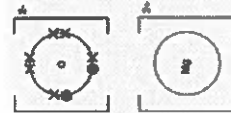
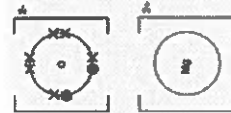
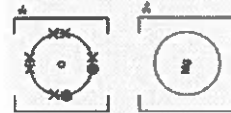
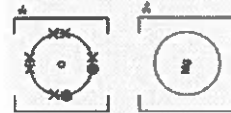
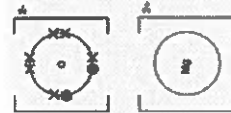
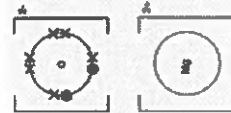
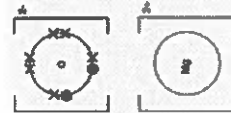
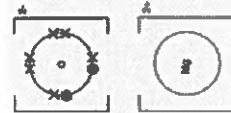
The periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties. The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Atom	The basic unit of a chemical element, consisting of a nucleus surrounded by electrons. The atom is the smallest entity that retains the properties of an element	Atoms, Elements, and Compounds: All substances are made of atoms, the smallest part of an element that can exist. Compounds are formed from elements through chemical reactions, combining two or more elements in fixed proportions, represented by formulae.	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.
Proton	A subatomic particle found in the nucleus of every atom, carrying a positive electric charge equal in magnitude to that of an electron but of opposite sign.	Development of the Atomic Model: Scientific models of the atom have evolved from the indivisible sphere to the nuclear model with protons in the nucleus and electrons in orbits, influenced by experimental evidence such as the alpha particle scattering experiment.	1. Describe and explain why Mendeleev periodic table was later accepted.
Group	A column of elements in the periodic table of the chemical elements. Elements in a group typically have similar properties and electron configurations in their outer shell.	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.	2. Discuss how the alpha particle scattering experiment contributed to the development of the nuclear model of the atom.
Alkali Metals	The group 1 elements, excluding hydrogen. They are very reactive metals	The Periodic Table: Organized by increasing atomic number, the periodic table arranges elements so those with similar properties are in the same group, explaining the table's structure through atomic structure and electron configuration.	3. Describe the structure of an atom in terms of its subatomic particles and explain how the atomic number and mass number are determined.
Halogen	The group 7 elements. They are non-metals and are very reactive.	The relative atomic mass of an element accounts for isotope abundance, averaging atom masses against carbon-12's 1/12th mass. Isotopes, differing only in neutron count, alter atomic mass but not chemical properties	4. Considering two isotopes of chlorine, Cl-35 and Cl-37, with natural abundances of approximately 75% and 25% respectively, how would you calculate the relative atomic mass of chlorine?
Electron	A negatively charged particle that orbits the nucleus of an atom in electron shells.	Electronic Structure: Electrons in an atom occupy the lowest available energy levels, with electron configurations indicating the distribution of electrons among the various shells. This arrangement can be represented by numbers (e.g., 2,8,1 for sodium) or diagrams, reflecting how electron configurations influence chemical properties and reactions.	5. Describe and explain the trend in reactivity for group 1 and group 7
Image	Image	Image	Image
			

Chemistry – Bonding, Structure, and the Properties of Matter

Summary- Position in the Curriculum

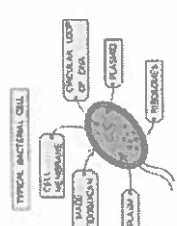
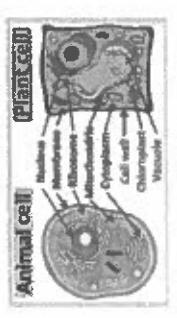
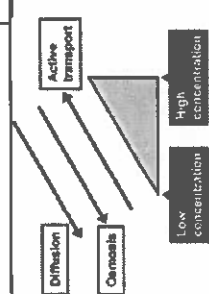
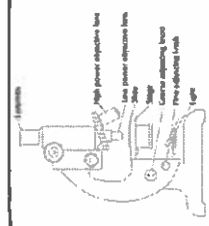
Chemists use theories of structure and bonding to explain the physical and chemical properties of materials. Analysis of structures shows that atoms can be arranged in a variety of ways, some of which are molecular while others are giant structures. Theories of bonding explain how atoms are held together in these structures. Scientists use this knowledge of structure and bonding to engineer new materials with desirable properties. The properties of these materials may offer new applications in a range of different technologies.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Ionic Bonding	The electrostatic attraction between oppositely charged ions.	States of Matter: Solids, liquids, and gases can be represented by particle models. Changing state involves energy transfer to overcome forces between particles.	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.
Covalent Bonding	The sharing of pairs of electrons between atoms	Properties of Ionic Compounds: High melting/boiling points due to strong electrostatic forces in the lattice. Conduct electricity when molten or dissolved as ions are free to move	1. Describe how ionic, covalent, and metallic bonds are formed and give examples.
Metallic Bonding	The attraction between delocalized electrons and positive metal ions.	Properties of Small Molecules: Usually gases or liquids with low melting/boiling points due to weak intermolecular forces. Do not conduct electricity.	2. Explain the properties of substances based on their type of bonding and structure.
Intermolecular Forces	Forces of attraction or repulsion which act between neighbouring particles (atoms, molecules, or ions).	Giant Covalent Structures: Very high melting/boiling points. Examples include diamond and graphite. Strong covalent bonds must be broken to change state.	3. Compare and contrast the structures and properties of diamond and graphite.
Alloys	A mixture of two or more elements, at least one of which is a metal, designed to have specific properties.	Properties of Metals and Alloys: Metals have high melting/boiling points due to strong metallic bonds. Alloys are harder than pure metals due to distorted atomic layers.	4. Recognize and explain the significance of polymers and giant covalent structures.
Electron	A negatively charged particle that orbits the nucleus of an atom in electron shells.	Metals as Conductors: Good conductors of electricity and heat because delocalized electrons carry charge/energy.	5. Discuss the uses and properties of graphene and fullerenes in technology.
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Biology B1- Cell biology

Summary- Position in the Curriculum

Cell Biology is the study of cells, their structure, function, and processes. This topic covers the cell theory, types of cells, cell structures and their functions, and the processes that occur within cells. Cells are the basic unit of all forms of life. In this section we explore how structural differences between types of cells enable them to perform specific functions. For a organism to grow and repair, cells must divide by mitosis. We also talk about stem cell technology- a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Cell	The basic unit of life.	Cells may be specialised to carry out a particular function: sperm cell, nerve cell and muscle cell in animals, and root hair cells and xylem, phloem in plants. Cells can be viewed under a microscope and magnification calculated using the following formula: Magnification = image size/ actual size.	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.
Organelle/subcellular structure	Specialized structures within a cell that perform specific functions.	Most animal cells contain a nucleus, cytoplasm, a cell membrane, mitochondria and ribosomes. Plant cells in addition have chloroplasts and a permanent vacuole filled with sap. Plant and algal cells also have a cell wall made of cellulose.	1. Describe the main differences between prokaryotic and eukaryotic cells.
Prokaryotic cell	A cell without a nucleus, such as bacteria.	Bacterial cells (prokaryotic cells) are much smaller than eukaryotic cells. They have cytoplasm and a cell membrane surrounded by a cell wall. The genetic material is not enclosed in a nucleus. It is a simple DNA loop.	2. Compare and contrast the processes of diffusion and active transport. Give examples. Define osmosis. Explain how osmosis is different from diffusion.
Eukaryotic cell	A cell with a nucleus, such as plant and animal cells.	Plant and animal cells are eukaryotic cells. They have a cell membrane, cytoplasm and genetic material enclosed in a nucleus.	
Mitosis and cell cycle	A process of division producing two genetically identical daughter cells.	During the cell cycle the genetic material is doubled and then divided into two identical cells. Before a cell divides, it grows and increases the number of subcellular structures. The DNA replicates to form two copies of each chromosome. Each set is then pulled to each end of the cell and the nucleus divides.	3. Describe the stages of the cell cycle, including mitosis.
Diffusion	Movement of particles from an area of high concentration to low concentration.	Substances may move in and out of cells via diffusion. These include oxygen and carbon dioxide in gas exchange. Factors that affect diffusion include concentration gradient, temperature and surface area of the membrane.	4. Explain how electron microscopy has increased understanding of subcellular structures.
Osmosis	Movement of water across a semi-permeable membrane from an area of high-water potential to low water potential.	Water may move across cell membranes via osmosis. Plants rely on osmosis to support their stems and leaves. Turgor pressure (when there is lots of water inside) makes cells rigid. If water is lost by osmosis, the vacuole and cytoplasm shrink and cell membrane pulls away from cell wall- cell becomes plasmolysed.	5. Describe different types of stem cells. Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatment.
Active transport	Movement of substances against a concentration gradient, requiring energy.	Active transport allows mineral ions to be absorbed into plant root hairs. It also allows sugar molecules to be transported from the gut into the blood stream.	
			
			

Biology B2- Organisation

Summary- Position in the Curriculum

This topic covers the hierarchical structure of multicellular organisms, focusing on cells, tissues, organs, and organ systems. It explores the functions of different systems in animals and plants, including the digestive system which provides the body with nutrients, and circulatory systems which provides it with oxygen. We also learn about transport systems in plants and how it is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Tissue, Organ and Organ system	A group of similar cells that work together to perform a specific function. A collection of tissues that work together to perform a specific function or group of functions. A group of organs that work together to perform complex functions.	Cells are basic structural and functional unit of life. Groups of similar cells are called a tissue (e.g., muscle tissue, epithelial tissue), whilst organs are made up of different tissues (e.g., heart, lungs). Groups of organs that work together are called organ system (e.g., digestive system, circulatory system). Damage to any of these systems can be fatal. Many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle. Digestive system breaks down food into smaller molecules that can be absorbed into the bloodstream. Its key organs are mouth, oesophagus, stomach, small intestine, large intestine, liver, pancreas. Enzymes aid digestion by breaking down polymer molecules into smaller soluble molecules. Amylase breaks down starch, protease breaks down proteins, lipase breaks down lipids.	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.
Digestive system	The system that breaks down food into absorbable units that enter the blood for distribution to body cells.		1. Explain the hierarchical organization of multicellular organisms.
Enzyme	A protein that acts as a biological catalyst, speeding up chemical reactions in cells.	Enzymes aid digestion by breaking down polymer molecules into smaller soluble molecules. Amylase breaks down starch, protease breaks down proteins, lipase breaks down lipids.	2. How does the structure of the villi in the small intestine aid in nutrient absorption?
Circulatory system	The system that transports blood and other materials throughout the body.	Circulatory system transports nutrients, oxygen, and hormones to cells and removes waste products. Key Components include: heart, blood vessels (arteries, veins, capillaries), blood. Heart has four chambers (two atria, two ventricles) and pumps blood throughout the body. Blood Vessel are: arteries carry blood away from the heart, veins carry blood to the heart, capillaries exchange materials with tissues.	3. Describe the role of enzymes in the digestive system. Discuss the importance of the liver and pancreas in digestion.
Non- communicable disease	Diseases that are not spread through infection or through other people, but are typically caused by unhealthy behaviours	Coronary heart disease and cancer are non- communicable diseases. In CVD layers of fatty material build up inside coronary arteries narrowing them. Stents and statins are used to manage the condition. Heart valves may become faulty. They can be replaced. Cancer is the result of changes in cells that lead to uncontrolled growth and division. Lifestyle factors may affect the risk of non- communicable diseases: diet, exercise, smoking, alcohol.	4. What are the functions of the different types of blood vessels in the circulatory system? How does the heart ensure unidirectional flow of blood?
Plant organ system	In plants typically these are root hair cells, xylem and phloem- to aid transport system.	Vascular bundle is made up by two tissue types: xylem which transports water and minerals from roots to leaves and phloem transporting sugars from leaves to the rest of the plant. Transpiration: loss of water vapor from the leaves through stomata	5. Compare and contrast the roles of xylem and phloem in plants. Describe the process of transpiration and its significance in plants

Types of blood vessels

Artery → **Capillary** → **Vein**

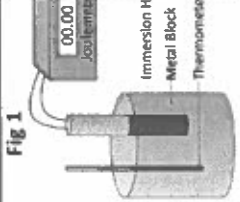
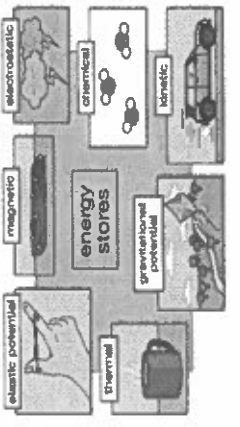
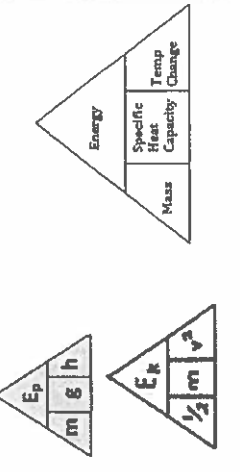
Xylem and Phloem

Xylem: Water and minerals, One-way flow of sap, Thick cell wall made of lignin, Cells having no end walls between them.

Phloem: Water and food, Two-way flow of sap, Thin cell wall made of cellulose, Cells with sieve plates and perforations.

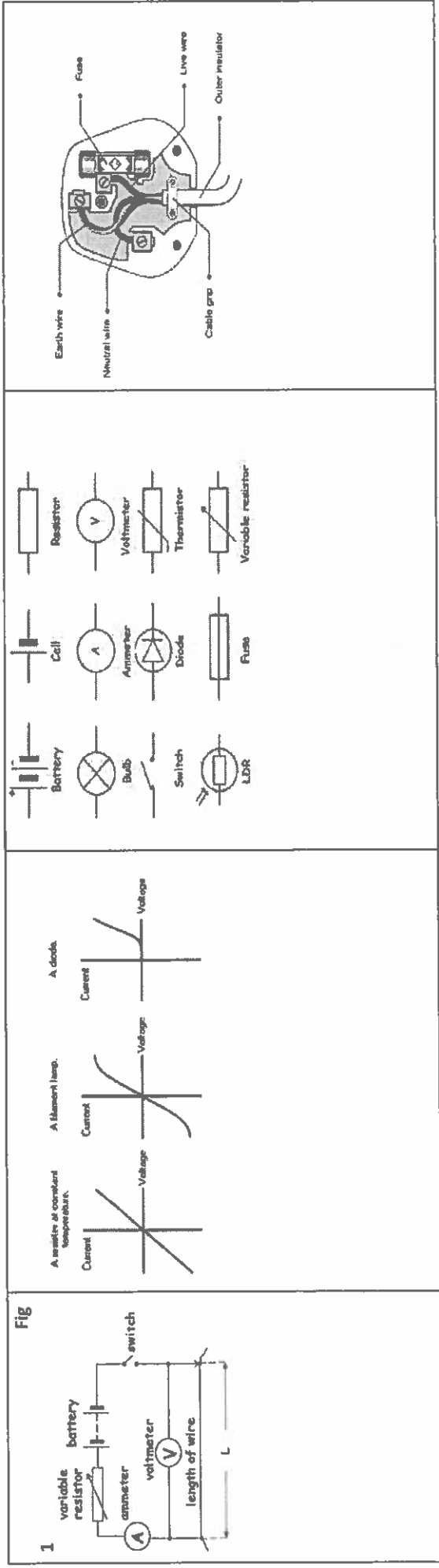
Summary- Position in the Curriculum

The concept of energy emerged in the 19th century. The idea was used to explain the work output of steam engines and then generalised to understand other heat engines. It also became a key tool for understanding chemical reactions and biological systems. Limits to the use of fossil fuels and global warming are critical problems for this century. Physicists and engineers are working hard to identify ways to reduce our energy usage.

Terminology	Definitions	Core Knowledge	Preparing for Assessment
Conservation of energy	Energy cannot be created or destroyed, only transferred from one form to another	Kinetic Energy (KE) stores describe the energy an object has because it is moving. Kinetic energy = $0.5 \times \text{mass} \times \text{speed}^2$ $E_k = \frac{1}{2} \times m \times v^2$ Ek in joules, J mass, m, in kilograms, kg, speed, v, in metres per second, m/s	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.
Closed system	An object or a group of objects for which the total energy is constant	Elastic potential energy stores describe the energy stored in a springy object when you stretch or squash it. Elastic potential energy = $0.5 \times \text{spring constant} \times \text{extension}^2$ $E_e = \frac{1}{2} k \times e^2$ Ee, in joules, J, spring constant, k, in newtons per metre, N/m extension, e, in metres, m	1. Calculate the specific heat capacity of iron, mass 2kg, when 78 kJ of energy are transferred to the iron block for 5 minutes from 20 to 80°C
Specific heat capacity, c	The specific heat capacity of a substance is the amount of energy required to raise the temperature of one kilogram of the substance by 1°C	Gravitational potential energy (GPE) stores are used to describe the energy stored in an object because of its position, such as an object above the ground. $GPE = \text{mass} \times \text{gravitational field strength} \times \text{height}$ $E_p = m \times g \times h$ Ep, in joules, J mass, m, in kilograms, kg gravitational field strength, g, in newtons per kilogram, N/kg, height, h, in metres, m	2. Discuss the advantages and disadvantages of using wind power, hydroelectric power, geothermal power, nuclear power and fossil fuels to generate electricity.
Renewable energy	Energy from natural sources that is always being replenished so it never runs out	Power(P) is defined as the rate at which energy is transferred or the rate at which work is done. power = energy transferred / time $P = E/t$ time $P = W/t$ Power is measured in Watts, W Work done = Energy transferred, measured in Joules $1 W = 1 J/s$	2. Calculate the velocity of the 2 kg mass just before it hits the rocks when it is dropped from a height of 16 m above the surface of the rocks.
Biofuel	Any fuel taken from living or recently living materials, such as animal waste	The energy efficiency for any energy transfer can be calculated using the equation: efficiency = useful output energy transfer/ total input energy transfer efficiency = useful power output/total power input	3. Describe an experiment to measure the specific heat capacity of an aluminium block using Fig 1
Dissipated energy	Any energy that is not transferred to useful energy stores is said to be wasted because it is lost to the surroundings	Specific heat capacity can be calculated using the equation $\Delta E = m \times c \times \Delta \theta$ rearranged to $c = \Delta E / (m \times \Delta \theta)$ E = change in thermal energy, J c is the specific heat capacity in J/kg°C in Kg $\Delta \theta$ = change in temp °C	4. Mr Ibrar wants to reduce the heating bills of his house. Explain how the teacher can reduce the rate of energy transfer from the walls, lofts and windows from his house.
Fig 1			

Physics 2 – Electricity

Summary- Position in the Curriculum Electric charge is a fundamental property of matter everywhere. Understanding the difference in the microstructure of conductors, semiconductors and insulators makes it possible to design components and build electric circuits. Electrical power fills the modern world with artificial light and sound, information and entertainment, remote sensing and control. If we all continue to demand more electricity this means building new power stations in every generation – but what mix of power stations can promise a sustainable future?			
Terminology	Definitions	Core Knowledge	Preparing for Assessment
Electric current	Electric current is a flow of electrical charge	Electric current - The size of the electric current is the rate of flow of electrical charge. A current has the same value at any point in a single closed loop. Charge flow = current $\times$ time $Q = I \times t$ t = time, measured in seconds, s Q = charge flow, measured in Coulombs, C I = Current, measured in Amps, A	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.
Ohm's law	The current through a resistor at constant temperature is directly proportional to the potential difference across the resistor	Resistance in the circuit slows down the flow of charge (the current). Resistance is measured in Ohms, Ω . Current, potential difference or resistance can be calculated using the equation, $V = I \times R$ V = potential difference in volts, V I = Current in Amps, A R is resistance in ohms, Ω	1. A current of 40 mA flows through a lamp for 300 seconds. Calculate the charge flow that passes through the lamp.
Potential difference (voltage)	A measure of the work done, or energy transferred to the lamp by each coulomb of charge that passes through it. The unit is volt (V)	Series circuit – current is the same through each component, potential difference is shared by each component and the total resistance is some of the resistance of each component. Parallel circuit – potential difference across each component is the same, the total current through the whole circuit is the sum of the currents through the separate components and the total resistance of two resistors is less than the resistance of the smallest individual resistor.	2 A length of wire is connected to a 9.0 V power pack and an ammeter. The reading on the ammeter is 0.25 A. Calculate the resistance of the wire. Give the unit.
Diode	A non-ohmic conductor that has a much higher resistance in one direction than in the other direction, so the current flows in one direction only.	Power of the appliance, in watts, is the energy it transfers in joules/second. Power = potential difference $\times$ current $P = V \times I$ Power = Current ² $\times$ resistance $P = I^2 \times R$ Energy transferred = power $\times$ time Energy transferred = charge $\times$ potential difference $E = P \times t$ $E = Q \times V$	3 Describe an experimental method which will allow 10Q students to investigate how the resistance of a wire depends on its length. Include circuit diagrams, variables and safety aspects.
Alternating current (AC)	Electric current in a circuit that repeatedly reverses its direction	The potential difference between the live wire (brown) and earth (0 V) is about 230 V. The neutral wire (blue) is at, or close to, earth potential (0 V). The earth wire (green & yellow) is at 0 V, it only carries a current if there is a fault.	4 Describe how a metal case of an electrical appliance is connected to earth
National grid	The National Grid is a system of cables and transformers linking power stations to consumers.	Step-up transformers are used to increase the potential difference from the power station to the transmission cables then step-down transformers are used to decrease, to a much lower value, the potential difference for domestic use.	5 Write and explain how the resistance of a filament lamp changes when the current through is increased.
Image		Circuit components	Wiring a plug



Notes

	Monday	Tuesday	Wednesday	Thursday	Friday
Form					
P1					
P2					
P3					
P4					
P5					