Co-op Academy Grange

Mathematics - Long term plans

Year 7

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	Properties of Arithmetic (3 weeks) Factors and Multiples (2 weeks) Prime Factorisation (1 week) Order of Operations (1 week)	Positive and Negative Numbers (2 weeks) Comparing and Conceptualising Fractions (2 weeks) Manipulating and Calculating Fractions (2 weeks)	Manipulating and Calculating Fractions (1 week) Ratio and Proportion (3 weeks) Sequences, Expressions and Equations (1 week)	Sequences, Expressions and Equations (2 weeks) Coordinates (2 weeks)	Angles (3 weeks) Classifying 2D Shapes (1 week) Area of 2D shapes (1 week)	Area of 2D shapes (1 week) Transformations (2 weeks)
Learning objectives Substantive and procedural knowledge covered in the unit	Define the commutativity, associativity and distributivity. Identify factors, multiples and primes Define primes and composites Define the Highest Common Factor and Lowest Common Multiple (LCM)	Identify positive and negative integers. Identify the numerator and denominator of a fraction. Identify mixed and improper numbers. Recognise inequality symbols. Recognise fractions as parts of a whole. Recognise equivalent fractions.	Identify fractions and mixed numbers. Identify algebraic expressions and equations. Identify variables in an expression.. Recognise a ratio. Identify direct proportion. Recognise a sequence.	Identify a linear sequence. Recognise algebraic expressions. Identify like terms. Recognise linear equations. Identify word problems that can lead to equations. Recognise coordinates. Identify the x-axis and y-axis. Recognise points on a grid. Identify quadrants. Recognise a midpoint. Identify vertices of shapes.	Identify angles on a straight line and around a point. Identify the concept of area. Identify angles within polygons Identify angles in parallel lines Identify types of angles Recognise common 2D shapes. Identify different polygons. Recognise regular polygons. Recognise the area of a quadrilaterals	Recognise compound shapes. Identify the perimeter of a shape. Recognise a mirror line. Identify a fixed point of rotation. Recognise a column vector. Identify a scale factor. Recognise a reflection. Recognise a rotation. Recognise a translation. Recognise an enlargement.
Key ideas/ Themes:	Strengthen understanding of number properties. Develop structured problem-solving approaches. Emphasizes primes as integer building blocks. Introduces fundamental statistical interpretation.	Strengthen understanding of number properties and relationships. Develop structured approaches to mathematical problems. Understanding prime numbers as fundamental building blocks. Introducing basic statistical measures for data interpretation..	Focuses on calculations involving fractions. Emphasizes understanding ratios and proportions. Introduces fundamental concepts of algebra. Develops the ability to identify and understand patterns.	Focuses on extending algebraic concepts. Emphasizes articulating observed patterns. Develops understanding of spatial relationships. Concentrates on depicting geometric ideas.	Understanding characteristics of shapes. Developing the ability to visualize and manipulate objects in space. Focusing on calculating area and perimeter. Grouping and distinguishing shapes based on attributes.	Understanding transformations that maintain the original dimensions. Focuses on how shapes are translated, rotated, or reflected. Encompasses changes in position, orientation, or size of geometric figures.
Prerequisite knowledge:	Students should have a strong command of basic arithmetic operations using positive integers. They should possess some familiarity with simple number patterns. Students should also be familiar with representing data from Key Stage 2.	Students possess a strong understanding of basic arithmetic operations (addition, subtraction, multiplication, division) using positive whole numbers. They are comfortable with the use and interpretation of number lines. Students have an introductory understanding of simple fraction concepts.	Students have a strong grasp of operations involving both positive and negative integers. They possess a solid understanding of fractions, including equivalence, simplification, and conversions between mixed numbers and improper fractions. These fractional concepts are reinforced from HT2.	Students have a basic understanding of sequences, algebraic expressions, and solving one-step equations, building on HT3 content. They possess a strong grasp of positive and negative numbers (integers) from HT2.	Students possess a basic understanding of shape identification from Key Stage 2. Prior familiarity with protractors for measuring angles is beneficial, but not strictly required as concepts will be taught from scratch. Basic arithmetic skills are a prerequisite.	Students possess a solid understanding of 2D shapes and their properties, building on knowledge from HT5. Familiarity with coordinates from HT4 is essential for successful work with transformations. Basic arithmetic skills are required, with particular emphasis on multiplication for understanding enlargements.
Outcomes (Stickable-output that the student produces to demonstrate	Understanding and applying fundamental properties of numbers, including factors, multiples, and prime factorization. Proficiency in calculating mathematical expressions involving various operations, brackets, and powers.	Order positive and negative numbers and solve real-life problems involving them (e.g., temperature, depth). Accurately add, subtract, multiply, and divide positive and negative integers. Represent fractions both visually and numerically.	Add, subtract, multiply, and divide fractions and mixed numbers with confidence. Simplify ratios, share quantities proportionally, and solve direct proportion problems. Generate terms of a sequence when given a specific rule.	Find next terms and the nth term for linear sequences, and simplify algebraic expressions by collecting like terms. Solve two-step linear equations and formulate and solve simple equations from word problems. Plot points in all four quadrants, reading coordinates, and	Calculate missing angles on straight lines, around a point, at intersections, and within triangles and quadrilaterals. Identify and apply angle properties associated with parallel lines. Classifying various triangles and quadrilaterals by their properties	Calculate the area and perimeter of compound 2D shapes. Reflect, rotate, and translate shapes accurately. Enlarging shapes from a center with a given scale factor.

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their knowledge)	Compute and interpret key statistical measures such as mean, median, mode, and range.			determining missing coordinates of simple geometric shapes.	and drawing common 2D shapes based on given attributes. Calculate the area of squares, rectangles, triangles, and parallelograms.	

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Year 8

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	Sequences (2 weeks) Forming and Solving Equations (2 weeks) Forming and Solving Inequalities (2 weeks)	Linear Graphs (3 weeks) Accuracy and Measure (2 weeks) Standard Form (1 week)	Ratio (1 week) Real Life Graphs/Rate of Change (2 weeks) Direct and Inverse Proportion (2 weeks)	Univariate Data (2 weeks) Bivariate Data (2 weeks)	Angles in Polygons (2 weeks) Bearings (2 weeks)	Circles and Composite Shapes (2 weeks) Volume and Surface Area of Prisms (3 weeks)
Learning objectives Substantive and procedural knowledge covered in the unit	Identify different sequences. Recognise a common difference and ratio in a sequence. Recognise an nth term of a sequence. Distinguish between an expression, a linear equation, and an identity. Recognise multi-step linear equations. Recognise inequality notation (> and <, etc.). Identify inequalities represented on a number line.	Identify regions represented by inequalities. Recognise variables. Recognise constant rates. Identify a line equation. Recognise perpendicular lines. Identify a gradient. Recognise a Cartesian plane. Identify intercepts on a graph. Understand rounding. Identify place value. Recognise significant figures. Recognise estimation. Recognise powers of 10. Identify standard form. .	Recognise ratios. Identify parts and wholes in a ratio relationship. Recognise bar models as a representation for ratio problems. Identify ratios used in geometry. Recognise a rate of change.	Identify types of data. Recognise data collection methods. Identify measures of central tendency. Identify the range as a measure of spread. Recognise an outlier. Recognise a frequency table. Identify a types of charts and graphs Recognise the distribution of a single variable. Recognise relationships between two variables. Identify a scatter graph. Recognise correlation.	Recognise angles as properties of shapes. Identify types of angles Recognise a regular polygon. Distinguish between regular and irregular polygons. Understand a bearing. Identify North as the reference for bearings. Recognise that bearings are measured clockwise. Recognise that bearings are expressed in three figures.	Identify parts of a circle. Recognise part of a circle. Understand total surface area. Identify faces of a 3D shape. Identify a net of a 3D shape. Identify a prism. Recognise cross-sectional areas. Recognise a cylinder. Identify a cuboid. Recognise composite solids. Identify 3D shape terminology (e.g., face, edge, vertex).
Key ideas/ Themes:	Identifying patterns, rules, and various sequence types. Translating problems into and solving algebraic equations. Representing and solving relationships of inequality, including number line visualization.	Visualizing relationships, understanding gradients and intercepts. Applying rounding techniques and understanding estimation. Efficiently representing and comparing very large/small numbers.	Understanding and applying multiplicative relationships between quantities. Interpreting practical graphs and comprehending how quantities change over time or in relation to each other. Recognising and solving problems where quantities increase or decrease at a constant rate with one another.	Collecting, organising, and interpreting data for a single variable. Understanding measures like mean, median, mode, and range for single datasets. Explore relationships and patterns between two different variables. Identify correlation in bivariate data.	Understanding and calculating interior and exterior angles within various polygons. Using polygon angle properties to determine unknown angle measures. Introduces three-figure bearings as a method for describing direction. Emphasises the application of bearings for navigation and specifying location.	Understanding concepts like circumference, area, and sectors. Applying circle properties to calculate attributes of complex shapes. Determining the space occupied by 3D shapes with uniform cross-sections. Calculating the total area of the faces of various prisms.
Prerequisite knowledge:	Students need solid KS2 knowledge of number patterns, ordering numbers, and fluency in addition, subtraction, multiplication, and division, including positive and negative numbers. They should be comfortable with algebraic notation (using letters for unknowns), substituting values into expressions..	Building on Upper Key Stage 2, you'll be using simple formulas, generating linear number sequences, and describing positions across all four quadrants of the coordinate grid. From Upper Key Stage 2, you'll apply skills in rounding whole numbers to various degrees of accuracy. Counting forwards or backwards in steps of powers of 10. .	Strong foundation from KS2, particularly in fractions, including understanding equivalent forms and simplifying them. Proficiency in multiplication and division is vital for scaling and simplifying ratios. They should also be familiar with multiplicative relationships and have some informal experience with comparing quantities	Strong foundational arithmetic skills. This includes addition, subtraction, multiplication, and division of whole numbers and decimals. Understanding of coordinates and plotting points in the first quadrant of a Cartesian plane. Students also need to be able to read scales accurately on both axes	Solid understanding of basic angle types Recognise and be able to name common polygons Identify parallel lines	Area calculations Multiplication Units of measurement
Outcomes (Stickable-output that the	Generate terms, identify rules (including the nth term), and classify different types of sequences.	Plot points, draw linear graphs from equations, and interpret them. Rounding to decimal places and significant figures, and use estimation to verify your answers.	Simplify ratios, share quantities proportionally, and apply ratio concepts in both geometric and rate of change scenarios.	Analyse and represent data for a single variable using appropriate graphs and statistical measures.	Calculate angles within both regular and irregular polygons. Find unknown angle measures using polygon properties.	Calculate the circumference and area of circles and their sectors. Find the area and perimeter of complex shapes that include circular

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student produces to demonstrate their knowledge)	Setting up and solving linear equations derived from various contexts, including geometric problems. Derive, form, and solve inequalities from different contexts. Represent inequality solutions on a number line.	Write numbers in standard form and convert them to ordinary numbers. Compare and order numbers in standard form and use a calculator for related conversions.	Interpreting and drawing graphs that represent real-world situations. Calculate and understand rates of change from various contexts. Solve problems involving both direct and inverse proportion, understanding how quantities relate multiplicatively.	Analyse and represent data for two variables to identify and describe relationships.	Use bearings to describe specific locations. Apply three-figure bearings for navigation and positioning.	components. Calculate the volume and surface area of cuboids, cylinders, and other prisms, including composite solids.

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Year 9

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	FDP Review (1 week) Probability (2 weeks) Sets, Venn and Sample Space Diagrams (3 weeks)	Solving Algebraically (3 weeks) Solving Graphically (3 Weeks)	Angle Review (1 Week) Constructions, Congruence and Loci (2 Weeks) Pythagoras' Theorem (2 weeks)	Ratio Review (1 week) Similarity and Enlargement (2 Weeks) Trigonometry (1 week)	Trigonometry (1 week) Algebra Review (1 week) Quadratic Expressions and Equations (2 weeks)	Quadratic Expressions and Equations (2 weeks) Surds (1 week) Indices (1 week) Growth and Decay (2 weeks)
Learning objectives Substantive and procedural knowledge covered in the unit	**Identify** an event and an . **Identify** an outcome. **Distinguish** between relative frequency and theoretical probability. **Recognise** fairness in the context of outcomes. **Recognise** expected outcomes. **Understand** complementary probabilities. **Recognise** diagrams for combined event probabilities (e.g., tree diagrams). **Recognise** Venn diagrams. **Distinguish** between Venn diagrams and Euler diagrams. **Identify** complements in Venn diagrams. **Recognise** relationships between events in Venn diagrams.	**Identify** a system of equations. **Recognise** equivalent equations. **Identify** variables in equations. **Identify** a coordinate pair. **Recognise** linear equations. **Recognise** a solution that satisfies all equations in a system. **Recognise** situations that lead to unlimited solutions. **Identify** intersection points on graphs. **Identify** parallel lines. **Recognise** that parallel lines have no intersection. **Recognise** shaded areas representing inequalities. **Identify** solution sets for inequalities. **Recognise** different types of solutions (e.g., no solution, one solution, multiple solutions).	Define "adjacent" in geometric contexts. Define "opposite" in geometric contexts. **Recognise** isosceles triangles. **Identify** an interior angle and its corresponding exterior angle. **Recognise** a polygon. **Understand** that a circle represents all points equidistant from a central point. **Understand** that a perpendicular bisector is the locus of points equidistant from two given points. **Recognise** angle bisectors. **Recognise** specific conditions that define a triangle (e.g., SAS, ASA). **Identify** the hypotenuse of a right-angled triangle. **Recognise** Pythagoras' Theorem. **Recognise** a right-angled triangle.	Identify part-to-part relationships. Identify part-to-whole relationships. Recognise equivalent ratios. Identify a constant of proportionality. Recognise unit ratios. Distinguish between congruent and similar shapes. Recognise a scale factor. Recognise that congruent shapes are identical in shape and size. Understand the effect of a negative scale factor. Identify the hypotenuse in a right-angled triangle. Identify the opposite side in a right-angled triangle relative to an angle. Identify the adjacent side in a right-angled triangle relative to an angle. Identify primary trigonometric ratios (sine, cosine, tangent). Recognise inverse trigonometric functions.	**Identify** double brackets in an expression. **Recognise** common factors in an expression. **Identify** unknowns in an equation. **Recognise** inverse operations. **Recognise** quadratic expressions. **Identify** the highest variable power of 2 in an expression. **Recognise** quadratic equations. **Recognise** a parabola as a quadratic graph.	**Recognise** that surds are irrational roots of integers. **Identify** like surds. **Understand** the concept of rationalising the denominator. **Identify** multiplication rules for powers with the same base. **Identify** division rules for powers with the same base. **Understand** zero indices. **Understand** negative indices. **Recognise** an index (power) as indicating repeated multiplication. **Recognise** decimal multipliers for percentage change. **Identify** compound growth and decay. **Recognise** index expressions for repeated percentage changes.
Key ideas/ Themes:	Understand how **fractions, decimals, and percentages** relate and convert between them for calculations. Exploring **chance, likelihood, and uncertainty** through various tools and calculations. Applying **Venn diagrams and sample space diagrams** to represent relationships and calculate probabilities.	Finding solutions for both linear and simultaneous equation systems. Interpreting and solving equations and inequalities visually. .	Exploring geometric constructions and understanding conditions for triangle congruence to prove geometric results. Applying the theorem to find unknown lengths in 2D and 3D, including connections to coordinate geometry and surds. **Loci:** Understanding and constructing loci based on given conditions.	Understanding **shape-preserving transformations** that alter size, and recognizing proportional relationships in similar figures. Learning the relationships between **angles and side lengths** in right-angled triangles using trigonometric ratios.	Understanding and application of **sine, cosine, and tangent** to find unknown sides and angles in right-angled triangles. Exploring algebraic expressions with a **squared term**, focusing on their expansion and factorization. Understanding and applying various methods to **solve quadratic equations**.	Understanding and manipulating algebraic expressions that involve a squared variable, and solving equations with such terms. Working with numbers expressed as roots (radicals) to maintain precision in calculations. Understanding and applying rules for powers and exponents in various mathematical contexts. Analysing percentage increases and decreases over time.
Prerequisite knowledge:	Basic understanding of chance and likelihood, often introduced informally in KS2 using terms like 'certain', 'likely', 'unlikely', and 'impossible'. Comfortable with fractions, as probability is usually expressed	Solid foundation in basic algebraic manipulation. This includes collecting like terms, expanding single brackets, solving linear equations with one unknown, and substituting numerical values into expressions	Accurately using a ruler to draw straight lines and a compass to draw circles and arcs. Basic geometric concepts such as points, lines, and the idea of distance	Strong grasp of **ratio and proportional reasoning** **Solid understanding of Pythagoras' Theorem for finding missing sides in right-angled triangles**	Strong foundation in algebraic manipulation. This includes confidently expanding single and double brackets, collecting like terms, and factorising linear expressions	Basic multiplication Square and cube roots Strong foundation in percentages

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	as a fraction, and be able to simplify them. A grasp of basic counting and listing possible outcomes is also necessary.					
Outcomes (Stickable-output that the student produces to demonstrate their knowledge)	Convert between fractions, decimals, and percentages and confidently perform calculations. Use probability language, calculate theoretical probability and relative frequency, determine fairness, and find expected outcomes of events. Interpret and use set notation, and effectively represent and calculate probabilities using Venn diagrams and sample space diagrams. Identify unions, intersections, and complements within set diagrams to solve probability problems.	Solve linear equations with one or two unknowns using methods like scaling, addition, subtraction, and substitution. Plotting linear equations and identifying parallel lines on a coordinate plane. Find graphical solutions for simultaneous equations (both linear and nonlinear) and represent and solve inequalities graphically.	Draw loci for points and lines, perform precise constructions of perpendicular and angle bisectors, and identify and prove congruent triangles using established geometric properties. Identify the hypotenuse in right-angled triangles and apply Pythagoras' Theorem to calculate unknown side lengths in both 2D and 3D contexts.	Effectively use and simplify ratio notation, divide quantities proportionally, and understand the direct relationship between ratios, fractions, and percentages. Develop a foundational understanding of angle properties within triangles, specifically focusing on right-angled triangles, and grasp the basic concept of trigonometric ratios in this context.	Apply sine, cosine, and tangent to calculate unknown side lengths and angles specifically in right-angled triangles. Interpret algebraic notation, form and solve equations and inequalities, simplify various algebraic expressions, and confidently work with coordinates. Working with powers and roots, expanding and factorising quadratic expressions, and accurately plotting quadratic graphs.	Work with powers and roots, expand and factorise quadratic expressions, and plot graphs of quadratic functions. Calculating with roots and integer indices, understanding the notation for square and cube numbers, and applying rules for zero, negative, and fractional indices. Calculate repeated percentage changes and understand the use of decimal multipliers for growth and decay scenarios.

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Year 10 Foundation

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	HCF/LCM (1 Week) Expanding and Factorising (1 Week) Factorising Quadratics (1 Week) Indices and Standard Form (2 weeks) Solving Equations and Inequalities (2 weeks)	Expressions, Equations and Formulae (2 Weeks) Pythagoras (1 week) Trigonometry (2 weeks) Fractions Review (1 week)	Percentages (1 week) Percentage Change (2 weeks) Circles, Area and Volume (2 weeks)	Straight Line Graphs and Parallel Lines (2 weeks) Quadratics (1 week) Further Graphs (1 week)	Angles in Polygons (1 week) Probability (1 week) Transformation (2 weeks)	Vectors (2 weeks) Graphs and Tables (4 weeks)
Learning objectives Substantive and procedural knowledge covered in the unit	Expand and simplify algebraic expressions, including double and triple brackets. Factorise expressions by common factors and basic quadratics Factorise quadratic expressions of the form Apply all rules of indices to simplify expressions. Convert numbers to/from standard form and perform calculations with them. Solve linear equations, including those with brackets and fractions. Solve linear inequalities and simple quadratic equations by factorisation.	Manipulate and simplify algebraic expressions, including substituting values into formulae. Rearrange formulae to make a different variable the subject. Apply the Pythagorean theorem to calculate unknown sides in right-angled triangles. Solve practical problems involving 2D and 3D shapes using Pythagoras' theorem. Use SOHCAHTOA to find unknown sides or angles in right-angled triangles. Apply the Sine Rule and Cosine Rule to solve problems involving non-right-angled triangles (Higher Tier). Perform all four operations (add, subtract, multiply, divide) with fractions and mixed numbers. Solve problems involving fractions of amounts and express quantities as fractions.	Convert fluently between percentages, fractions, and decimals. Calculate percentages of amounts, including non-calculator methods. Calculate percentage increase or decrease in given contexts. Solve problems involving reverse percentages and compound percentage change. Calculate the circumference and area of circles, and the area of sectors. Calculate the surface area and volume of 3D shapes, including cylinders and prisms.	Find the gradient and equation of a straight line, including y=mx+c. Determine if lines are parallel or perpendicular, and find equations of parallel lines. Solve quadratic equations by factorising, using the formula Plot and interpret quadratic graphs, identifying roots and turning points. Plot and interpret reciprocal and exponential graphs. Solve equations graphically, including simultaneous equations and finding approximate solutions.	Calculate interior and exterior angles of regular polygons. Solve problems involving angles in irregular polygons. Calculate probabilities of single and combined events. Use tree diagrams and Venn diagrams to represent and solve probability problems. Perform and describe single transformations: reflection, rotation, translation, and enlargement. Combine multiple transformations and understand invariant points/lines.	Understand and use vector notation, including magnitude and direction. Add and subtract vectors, and multiply vectors by a scalar, to solve geometry problems. Construct and interpret various types of graphs and tables, including frequency tables, bar charts, and pie charts. Draw and interpret line graphs, stem and leaf diagrams, and scatter graphs to identify trends and relationships.
Key ideas/ Themes:	Apply the distributive property to combine terms. Break expressions into their multiplicative components. Simplify expressions involving powers. Represent and calculate with very large/small numbers compactly. Isolate the variable by balancing the equation. Find a range of values, reversing the sign when multiplying/dividing by negative. Use the zero product property to find solutions.	Transform expressions into a simpler form and evaluate them by replacing variables with numbers. Isolate a specific variable on one side of an equation. Apply the Pythagorean theorem to calculate unknown sides in right-angled triangles: Solve practical problems involving 2D and 3D shapes using Pythagoras' theorem Relate angles and side ratios in right triangles using sine, cosine, and tangent. Combine and separate fractional quantities using standard arithmetic rules. Calculate parts of a whole and represent relationships as fractions.	Understand and apply the interchangeable nature of these three representations of parts of a whole. Determine a specified percentage of a given quantity, using both mental and written strategies. Quantify relative change (growth or reduction) from an initial value. Find the original amount before a percentage change, or calculate the effect of multiple consecutive percentage changes. Apply formulas to find the distance around, space inside, and fractional areas of circular shapes. Determine the total area of all surfaces and the space occupied by three-dimensional objects.	Determine the steepness and define the relationship between x and y for a straight line. Use gradients to identify geometric relationships between lines and write equations for lines with matching gradients. Find the values of the variable that satisfy a quadratic equation either by breaking it into factors or by applying a standard algebraic formula. Draw the parabolic shape of a quadratic function and identify its x-intercepts and maximum/minimum point. Sketch and understand the characteristic shapes and behaviours of functions like y=1/x Find solutions to equations by identifying intersection points on a graph, including for systems of equations.	Determine angle measures within and outside polygons with equal sides and angles. Apply geometric principles to find unknown angles in polygons with varying side lengths and angles. Quantify the likelihood of one or more outcomes occurring. Visually organize outcomes and their probabilities to solve complex chance scenarios. Apply and describe the effects of flipping, turning, sliding, and resizing geometric shapes. Execute a sequence of transformations and identify points or lines that remain unchanged.	**Understand and use vector notation, including magnitude and direction:** Represent quantities with both size and specific orientation using appropriate symbols. **Add and subtract vectors, and multiply vectors by a scalar, to solve geometry problems:** Combine or scale vectors to solve problems involving position, displacement, or forces. Organise and display data visually using appropriate tables and charts, and extract information from them. Create and analyse specific types of graphs to reveal patterns, distribution, and correlations within data.

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Prerequisite knowledge:	Arithmetic, order of operations, combining like terms, distributive property. Factors, HCF, reverse distributive property. Finding specific factor pairs (sum/product). Understanding exponents (positive, negative, zero) and their operational rules. Place value, powers of 10, decimal manipulation. Inverse operations, distributive property, fraction arithmetic. Inequality rules, Zero Product Property.	Arithmetic, order of operations, combining terms, distributive property, variable replacement. Inverse operations, equation balancing. Basic algebra (squares/roots), understanding right triangles, geometric visualisation. Ratios, basic algebra, calculator use for trigonometric functions. Understanding fractions, common denominators, mixed number conversion, simplification. "Fraction of" concept (multiplication), expressing ratios as fractions.	Place value, division/multiplication by 100, fraction simplification. Multiplication/division, "of" means multiply, mental arithmetic strategies. Percentage of amount skills, addition/subtraction, understanding "change." Percentage increase/decrease foundation, algebraic thinking, repeated multiplication. Radius/diameter, formula application (π), angles in a circle. 2D area calculation, 3D dimensions, volume formulas, net visualization for surface area.	Coordinates, plotting, gradient calculation, linear equation basics Gradient concept, negative reciprocals, equation rearrangement. Quadratic factorisation, formula arithmetic (roots, order of operations). Table of values, accurate plotting, identifying roots/turning points/symmetry. Understanding reciprocal/exponential functions, table of values, plotting, asymptotes. Plotting various function types, identifying intersection points as solutions, reading graphs.	Basic angle facts, polygon properties, sum of triangle angles, simple algebra. All regular polygon prerequisites, application of angle facts in complex diagrams, problem-solving. Fractions/decimals/percentages, likelihood, sample space, independent/dependent events. Probability calculation, basic set theory (Venn), multiplying probabilities along branches (Tree). Coordinate plane, shape understanding, specifics for each (mirror lines, center/angle, vectors, center/scale factor). Performing sequential transformations, understanding unchanging points/lines.	Coordinate geometry, basic number sense, Pythagorean theorem. Vector notation, basic arithmetic, geometric concepts. Counting, data organization, proportions/percentages, clear labelling. Plotting coordinates, data ordering, understanding scales, trend identification.
Outcomes (Stickable-output that the student produces to demonstrate their knowledge)	Expands and simplifies double and triple brackets. Factorising by common factors and basic quadratics. Factorising quadratic expressions Applies all index rules to simplify expressions. Converts to/from standard form and performs calculations. Solves linear equations (including brackets/fractions). Solves linear inequalities. Solves simple quadratic equations by factorisation.	Simplifies algebraic expressions. Substitutes values into formulae. Rearranges formulae to change the subject. Applies Pythagoras' theorem to find unknown sides in right-angled triangles. Uses SOH CAH TOA to find unknown sides or angles. Performs all four operations with fractions and mixed numbers. Solves problems involving fractions of amounts. Expresses quantities as fractions.	Converts fluently between percentages, fractions, and decimals. Calculates percentages of amounts (including non-calculator). Calculates percentage increase/decrease. Solves reverse percentage and compound percentage change problems. Calculates circumference and area of circles. Calculates area of sectors. Calculates surface area and volume of cylinders and prisms.	Finds gradient and equation of a straight line (including y=mx+c). Determines if lines are parallel/perpendicular. Finds equations of parallel lines. Solves quadratic equations by factorising. Solves quadratic equations using the formula. Plots and interprets quadratic graphs (identifying roots, turning points). Plots and interprets reciprocal and exponential graphs. Solves equations graphically. Solves simultaneous equations graphically. Finds approximate solutions graphically.	Calculates interior and exterior angles of regular polygons. Solves problems involving angles in irregular polygons. Calculates probabilities of single and combined events. Uses tree diagrams and Venn diagrams for probability problems. Performs and describes reflection, rotation, translation, and enlargement. Combines multiple transformations. Understands invariant points/lines.	Uses vector notation (magnitude, direction). Adds, subtracts, and scalar-multiplies vectors to solve geometry problems. Constructs and interprets frequency tables, bar charts, and pie charts. Draws and interprets line graphs, stem and leaf diagrams, and scatter graphs. Identifies trends and relationships from graphs.

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Year 10 Higher

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	Expanding and Factorising (2 weeks) Indices and Surds (2 weeks) Equations and their Graphs (2 weeks)	Functions and Formulae (2 weeks) Pythagoras (1 week) Trigonometry (2 weeks) Fractions and Recurring Decimals (1 week)	Percentages (2 weeks) Circles, Area and Volume (1 week) Spheres, Cones and Frustums (2 weeks)	Straight Line Graphs and Parallel Lines (2 weeks) Real Life Graphs (1 week) Quadratic Graphs and Equations (1 week)	Angle Review (1 week) Vectors (1 week) Probability (2 weeks)	Transformation (2 weeks) Vectors (1 week) Graphs, Tables and Charts (2 weeks)
Learning objectives Substantive and procedural knowledge covered in the unit	Fluently expand and simplify algebraic expressions, including triple brackets and products of multiple terms. Factorise complex quadratic expressions, the difference of two squares, and expressions by grouping. Apply all rules of indices, including negative and fractional powers, to simplify complex algebraic expressions. Simplify and rationalise surds, and perform operations (addition, subtraction, multiplication, division) with surds. Solve quadratic equations by completing the square and using the quadratic formula, interpreting the nature of the roots. Interpret and solve simultaneous equations graphically, including linear/quadratic pairs, and understand transformations of graphs.	Understand and use function notation (f(x)), including composite and inverse functions. Manipulate and rearrange complex formulae, including those involving powers and roots. Apply Pythagoras' theorem to solve problems in 3D shapes. Use the converse of Pythagoras' theorem to determine if a triangle is right-angled. Apply Sine Rule and Cosine Rule to find unknown sides and angles in non-right-angled triangles. Calculate the area of a non-right-angled triangle using and understand graphs of trigonometric functions. Perform advanced calculations with fractions, including algebraic fractions. Convert recurring decimals to fractions and solve problems involving these conversions.	Solve complex percentage problems, including reverse percentages, compound growth/decay, and deprecation. Apply percentage concepts to financial mathematics, such as interest and tax. Calculate areas of sectors and segments of circles and solve problems involving arc length. Solve problems involving the volume and surface area of prisms, cylinders, and composite solids. Calculate the volume and surface area of spheres and cones. Calculate the volume and surface area of frustums and solve related practical problems.	Find the equation of a line parallel or perpendicular to a given line, and calculate the distance between two points. Understand and use the concept of gradients for perpendicular lines Interpret and draw complex real-life graphs, including distance-time and velocity-time graphs. Calculate gradients and areas under real-life graphs to determine rates of change and total values. Sketch and interpret quadratic graphs, identifying roots, turning points, and lines of symmetry. Solve quadratic equations graphically and understand the discriminant to determine the number of real roots.	Apply all angle properties (parallel lines, polygons, circle theorems) to solve complex geometrical problems. Prove angle relationships in geometric figures using deductive reasoning. Use vectors to prove geometric properties, such as collinearity or parallelism. Solve complex vector problems, including position vectors and midpoints. Solve complex probability problems using tree diagrams, Venn diagrams, and conditional probability. Understand and apply concepts of independent and mutually exclusive events in various contexts.	Perform and describe all four transformations (reflection, rotation, translation, enlargement) on complex shapes. Understand and apply combined transformations and describe the effects of negative scale factors for enlargement. Use vectors to solve geometric problems, including finding unknown points and determining ratios. Understand and apply vector proofs for properties of geometric figures (e.g., midpoints, parallel lines). Construct and interpret advanced statistical diagrams, including histograms with unequal class widths and cumulative frequency graphs. Use graphs and tables to estimate statistical measures (e.g., median, quartiles from cumulative frequency) and identify data distributions.
Key ideas/ Themes:	Systematically multiply out and combine terms in complex algebraic products. Break down various types of expressions into their multiplicative components using advanced techniques. Master the full set of rules for exponents to simplify expressions involving various power types. Manipulate and perform calculations with square roots to express them in their simplest form without roots in the denominator. Determine solutions to quadratic equations using structured algebraic methods and understand whether solutions are real, distinct, or repeated.	Represent mathematical relationships as functions, combine them, and find their reverse operations. Isolate specific variables in intricate equations, including those with exponents and radicals. Use specific trigonometric laws to solve triangles that do not contain a 90-degree angle. Determine the area of any triangle using trigonometry and comprehend the periodic nature of sine, cosine, and tangent graphs. Execute all arithmetic operations with numerical and variable-based fractions. Express repeating decimals as exact fractions and apply this conversion to problem-solving.	Master various advanced percentage calculations, including finding original amounts, repeated changes over time, and value decrease. Use percentages to calculate financial outcomes like earnings from savings or money owed for services. Determine the area of parts of a circle defined by angles and find the length of curved portions of a circle's circumference. Calculate the space occupied by and the total surface area of various three-dimensional shapes, including those made up of multiple simpler shapes. Apply specific formulas to find the space occupied by and the total surface area of perfectly round 3D objects and pointed shapes with circular bases.	Determine the equation of a line based on its relationship (parallel or perpendicular) to another line, and find the length of the segment connecting two points. Recognize that the gradients of perpendicular lines are negative reciprocals of each other. Create and understand visual representations of real-world phenomena over time, such as movement and speed. Extract specific numerical information from graphs, like speed from a distance-time graph or displacement from a velocity-time graph. Draw the parabolic shape of a quadratic function and pinpoint its x-intercepts, maximum/minimum point, and reflective symmetry.	Utilize the full range of angle rules related to parallel lines, multi-sided shapes, and circles to solve intricate geometry challenges. Demonstrate why certain angle properties hold true in shapes through logical step-by-step arguments. Employ vector algebra to formally show relationships between points (like being on the same line) or lines (like being parallel). Navigate advanced vector calculations, including defining locations from an origin and finding the central point between two given points. Tackle challenging probability scenarios by visually mapping outcomes and understanding how	Apply and articulate the effects of flipping, turning, sliding, and resizing complex geometric figures. Execute multiple transformations in sequence and interpret how negative scale factors invert and resize shapes. Apply vector operations to locate specific points in space and to express proportional relationships between lengths or distances. Formally demonstrate geometric characteristics of shapes using vector algebra. Create and analyze sophisticated visual representations of data, particularly for continuous data with varying bin sizes and for tracking running totals. Extract key summary statistics from visual data displays and understand the overall shape and spread of the data.

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	Find solutions to systems of equations by identifying intersection points on graphs, and recognise how basic functions are shifted, stretched, or reflected.		Determine the space occupied by and the total surface area of truncated cones or pyramids, and apply these calculations to real-world scenarios.	Find solutions to quadratic equations by observing graph intersections and use a specific value to predict how many real solutions exist.	the probability of an event changes based on prior events. Distinguish between events that don't affect each other and events that cannot happen at the same time, applying these concepts to real-world situations.	
Prerequisite knowledge:	Distributive property mastery, accurate like-term combining, strong arithmetic. Basic quadratic factorization, square root understanding, identifying common factors by grouping. Fluency with all index laws (positive, negative, fractional). Square roots, prime factorization, surd arithmetic, rational/irrational numbers. Algebraic manipulation, square roots, understanding the discriminant. Accurate plotting, intersection solutions, knowledge of basic graph transformations.	Substitution, algebraic manipulation, input/output concept. Advanced inverse operations, reverse order of operations, handling fractions/brackets. Understanding and applying the theorem for verification. Basic trigonometry, algebraic rearrangement, calculator trig functions. Area formulas, trig function proficiency (sin), coordinate plotting, periodic functions. All four basic fraction operations, algebraic factorization/common denominators. Place value, basic algebraic equation solving, simultaneous equations (for complex cases).	Percentage fluency, calculating amounts, algebraic setup for reverse, exponential growth/decay. Complex percentage skills, financial term understanding, formula substitution. Circle formulas (circumference, area), angular proportions, fractions. 2D area calculation, basic 3D volume formulas, net visualization, deconstruction of composite shapes. Radius/height understanding, formula application (π, powers, roots). Cone/cylinder/prism calculations, similar shapes/ratios, algebraic manipulation.	Coordinate geometry, gradient, y=mx+c, Pythagorean theorem. Perpendicular Gradients: Gradient concept, negative reciprocals. Accurate plotting, axis interpretation, understanding basic physics concepts (speed, accel.). Gradient calculation, basic area formulas, contextual interpretation (rates, totals). Plotting from tables, identifying roots, turning points, symmetry. Accurate plotting, solutions at x-intercepts, discriminant (b2−4ac) meaning for real roots.	Mastery of all basic angle facts, parallel line rules, and comprehensive circle theorems; deductive reasoning. Vector operations, position vectors, translating geometry into vector relationships. Basic vector algebra, position vectors, midpoint formula. Basic probability, tree/Venn diagram use	Mastery of all four single transformations, sequential application, understanding negative scale factor effects. Vector arithmetic, position vectors, applying vectors to find points/ratios and prove geometric properties (midpoints, parallel). Basic diagrams, frequency density for histograms, cumulative frequency calculation/plotting. Understanding median/quartiles, reading from graphs (especially cumulative frequency), identifying data skewness.
Outcomes (Stickable-output that the student produces to demonstrate their knowledge)	Expands and simplifies expressions (including triple brackets, multiple terms). Factorising complex quadratics. Factorises the difference of two squares. Factorising by grouping. Applies all index rules (negative, fractional powers) to simplify complex algebraic expressions. Simplifies and rationalises surds. Performs all arithmetic operations with surds. Solves quadratic equations by completing the square. Solves quadratic equations using the quadratic formula. Interprets the nature of the roots. Interprets and solves simultaneous equations graphically (including linear/quadratic pairs). Understands transformations of graphs.	Understands/uses function notation (f(x)). Finds composite and inverse functions. Manipulates and rearranges complex formulae (including powers/roots). Applies Pythagoras' theorem to solve 3D problems. Uses the converse of Pythagoras' theorem. Applies Sine Rule and Cosine Rule to non-right-angled triangles. Calculates the area of non-right-angled triangles. Understands graphs of trigonometric functions. Performs advanced calculations with fractions (including algebraic fractions). Converts recurring decimals to fractions and solves related problems.	Solves reverse percentages. Solves compound growth/decay problems. Solves deprecation problems. Applies percentage concepts to financial scenarios (interest, tax). Calculates areas of sectors and segments. Solves problems involving arc length. Calculates volume and surface area of prisms and cylinders. Solves problems involving composite solids. Calculates volume and surface area of spheres and cones. Calculates volume and surface area of frustums. Solves practical problems involving frustums.	Finds equations of parallel/perpendicular lines. Calculates the distance between two points. Understands gradients of perpendicular lines (negative reciprocals). Interprets and draws complex real-life graphs (distance-time, velocity-time). Calculates gradients (rates of change) and areas (total values) under real-life graphs. Sketches and interprets quadratic graphs (identifying roots, turning points, lines of symmetry). Solves quadratic equations graphically. Understands the discriminant for number of real roots.	Applies all angle properties (parallel lines, polygons, circle theorems) to solve complex problems. Proves angle relationships using deductive reasoning. Uses vectors to prove geometric properties (collinearity, parallelism). Solves complex vector problems (position vectors, midpoints). Solves complex probability problems using tree/Venn diagrams and conditional probability. Understands/applies independent and mutually exclusive events.	Complex Transformations: Performs and describes all four transformations on complex shapes. Applies combined transformations. Understands negative scale factors for enlargement. Uses vectors to solve geometric problems (unknown points, ratios). Applies vector proofs for geometric properties (midpoints, parallel lines). Constructs and interprets histograms (unequal class widths) and cumulative frequency graphs. Uses graphs/tables to estimate statistical measures (median, quartiles from cumulative frequency). Identifies data distributions from graphs.

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Mathematics - Long term plans

Year 11 Foundation

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	Indices and Standard Form (3 Weeks) Area and Volume (3 weeks) Rounding, Bounds and Error Intervals (1 week)	Percentages (1 week) Transforming and Constructions (2 weeks)	Revision and Recap	Revision and Recap	Revision and Recap	
Learning objectives Substantive and procedural knowledge covered in the unit	Apply all rules of indices (positive, negative, zero, fractional) to simplify expressions. Convert numbers to/from standard form and perform calculations (multiplication, division, addition, subtraction) with them. Calculate the area of 2D shapes (including compound shapes and sectors). Calculate the surface area and volume of 3D shapes (prisms, cylinders, cones, spheres, pyramids). Round numbers to a given number of decimal places or significant figures. Determine upper and lower bounds for calculations, and calculate error intervals.	Calculate percentages of amounts and understand percentage increase/decrease. Solve problems involving reverse percentages and compound interest. Perform and describe reflections, rotations, translations, and enlargements. Use a compass and ruler to perform standard geometric constructions (e.g., perpendicular bisector, angle bisector).				
Key ideas/ Themes:	Master and utilize all exponent rules to simplify algebraic and numerical expressions. Fluently switch between ordinary and scientific notation, and accurately compute numbers in standard form. Determine the amount of space within various flat figures, including those made of simpler shapes and parts of circles. Find the total area of the external surfaces and the amount of space enclosed by common three-dimensional objects. Approximate numbers to a specified level of precision. Find the maximum and minimum possible values for results due to rounding, and define the range of potential error.	Determine parts of a whole as percentages and quantify relative changes (growth or reduction). Find original amounts before a percentage change, or calculate the effect of repeated percentage changes over time. Apply and articulate the effects of flipping, turning, sliding, and resizing geometric shapes. Accurately create fundamental geometric figures and lines using only basic drawing tools.				

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Prerequisite knowledge:	Understanding all exponent rules (positive, negative, zero, fractional). Place value, powers of 10, basic arithmetic. Basic shape formulas, breaking down compound shapes, sector calculations. 2D area, 3D dimensions, specific shape formulas. Place value, decimal places, significant figures. Rounding rules, inequalities, basic arithmetic.	Basic arithmetic, fraction/decimal understanding, "of" means multiply. All percentage skills, algebraic thinking, repeated multiplication. Coordinate plane, geometric terms, applying transformation rules. Familiarity with compass/ruler, basic geometric concepts (lines, angles).				
Outcomes (Stickable-output that the student produces to demonstrate their knowledge)	Simplifies expressions using all index rules (positive, negative, zero, fractional). Converts numbers to/from standard form. Performs all calculations (multiplication, division, addition, subtraction) with standard form. Calculates area of 2D shapes, including compound shapes and sectors. Surface Area and Volume of 3D Shapes: Calculates surface area and volume of prisms, cylinders, cones, spheres, and pyramids. Rounds numbers to given decimal places or significant figures. Determines upper/lower bounds and calculates error intervals.	Calculates percentages of amounts. Solves percentage increase/decrease problems. Solves reverse percentage and compound interest problems. Performs and describes reflections, rotations, translations, and enlargements. Uses compass/ruler for standard constructions (e.g., bisectors).				

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Mathematics - Long term plans

Year 11 Higher

Term	Autumn Term		Spring Term		Summer Term	
Half term	HT1	HT2	HT3	HT4	HT5	HT6
Unit Titles lengths:	Indices and Standard Form (1.5 Weeks) Surds (1.5 weeks) Area and Volume (3 weeks) Rounding, Bounds and Error Intervals (1 week)	Percentages (1 week) Transforming and Constructions (2 weeks) Proof (1 week)	Charts and Graphs (2 weeks) Transformation of Graphs (1 week) Algebraic Methods and Functions (2 weeks)	Revision and Recap	Revision and Recap	
Learning objectives Substantive and procedural knowledge covered in the unit	Apply all index laws fluently to simplify complex algebraic and numerical expressions, including those with fractional and negative powers. Perform calculations and solve problems involving numbers in standard form, interpreting results in context. Simplify surds and perform arithmetic operations (add, subtract, multiply, divide) with surds. Rationalise the denominator of a fraction when it contains a surd. Calculate the area of complex 2D shapes, including segments of circles and composite shapes. Calculate the surface area and volume of various 3D shapes, including cones, spheres, pyramids, and frustums. Round numbers to appropriate degrees of accuracy, including decimal places and significant figures, in problem-solving contexts. Determine the upper and lower bounds for calculations and express solutions using error intervals.	Solve advanced percentage problems, including compound interest, depreciation, and reverse percentages. Apply percentage concepts to financial scenarios and interpret percentage change in real-world data. Perform and describe all four geometric transformations (reflection, rotation, translation, enlargement) including combined transformations. Use a compass and ruler to perform complex geometric constructions and understand loci in 2D and 3D. Understand and apply methods of proof, including algebraic proof and proof by deduction. Construct rigorous mathematical proofs for given statements, particularly in algebra and number theory.	Construct and interpret advanced statistical charts, including histograms for grouped frequency data with unequal class intervals. Draw and interpret cumulative frequency graphs and box plots, using them to estimate statistical measures like quartiles and the median. Understand and apply transformations of functions: y=f(x)+a, y=f(x+a), y=af(x), and y=f(ax). Sketch transformed graphs given the original graph and the type of transformation. Perform advanced algebraic manipulation, including simplifying algebraic fractions and solving complex algebraic equations. Understand and apply function notation, including composite functions and inverse functions, and solve problems involving domain and range.			
Key ideas/ Themes:	Master and apply all rules of exponents (positive, negative, zero, and fractional) to simplify both numerical and algebraic expressions effectively. Accurately carry out arithmetic operations with numbers expressed in scientific notation and understand the real-world meaning of the results. Express square roots in their simplest form and competently perform all four basic arithmetic operations with them.	Solve advanced percentage problems, including compound interest, depreciation, and reverse percentages: Master complex calculations involving repeated percentage changes over time (growth or decay) and finding original amounts before a percentage adjustment. Use percentages to understand and analyze financial situations (e.g., investments, loans) and to make sense of real-world statistical trends. Accurately apply and articulate the effects of flipping, turning, sliding, and resizing shapes, and understand the	Create and analyze histograms where the width of the data groups can vary, accurately representing frequency distribution. Construct graphs showing running totals of frequencies and visual summaries of data distribution, then use them to estimate key statistical values. Comprehend how adding/subtracting constants or multiplying by constants outside or inside a function shifts, stretches, or compresses its graph. Draw the altered appearance of a graph based on specific transformations applied to its original form.			

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	Rationalise the denominator of a fraction when it contains a surd: Transform fractions so that their denominators do not contain irrational square roots. Determine the total area of intricate flat figures, including parts of circles defined by a chord and shapes made up of multiple simpler figures. Compute the total external area and the space occupied by a wide range of three-dimensional geometric solids. Approximate numerical values to a suitable level of precision based on the context of the problem. : Identify the maximum and minimum possible values of a result due to rounding in the input values, and represent the range of uncertainty.	outcome of performing multiple transformations sequentially. Create intricate geometric figures using basic tools and understand the set of all points that satisfy a given geometric condition in both two and three dimensions. Grasp and utilize formal logical methods, such as demonstrating general statements using algebra or drawing conclusions from established facts. Develop clear, step-by-step logical arguments to establish the truth of mathematical assertions, especially within algebraic properties and number relationships.	Master intricate operations with expressions involving variables, including reducing fractions with variables and finding solutions to challenging equations. Grasp the concept of functions, how to combine them (composite), how to reverse them (inverse), and identify the permissible input (domain) and output (range) values.			
Prerequisite knowledge:	Mastery of all exponent rules (positive, negative, zero, fractional). Place value, powers of 10, performing all four operations. Square roots, prime factorization, all four arithmetic operations. Surd understanding, fraction multiplication to remove radicals. Basic 2D formulas, composite shapes, sectors/segments. 2D area, 3D formulas (cones, spheres, pyramids, frustums). Decimal places, significant figures, practical application. Rounding rules, inequalities, arithmetic with bounds.	Basic percentage mastery, algebraic setup for reverse, exponential change. Advanced percentage skills, financial context application, real-world data analysis. Mastery of individual transformations, sequential application, understanding vectors/centers/scale factors. Basic constructions, interpreting positional conditions in 2D/3D. Strong algebraic manipulation, logical reasoning, mathematical terminology. All proof skills, deep understanding of number properties and algebraic identities.	Basic charts, frequency density, cumulative frequency, understanding quartiles/median. Coordinate plane, interpreting how constants affect graph position/stretch/reflection, sketching transformed graphs. Mastery of basic algebra (expansion, factorisation), algebraic fraction operations, complex equation solving. Function concept, substitution, finding composite/inverse functions, identifying valid inputs/outputs.			
Outcomes (Stickable-output that the student produces to demonstrate their knowledge)	Simplifies expressions using all index laws (including fractional/negative powers). Performs calculations with standard form. Interprets standard form results in context. Simplifies surds and performs all arithmetic operations. Rationalising surd denominators. Calculates area of segments of circles and composite shapes. Surface Area and Volume of 3D Shapes: Calculates surface area and volume of cones, spheres, pyramids, and frustums. Rounds numbers to appropriate decimal places/significant figures. Determines upper/lower bounds and expresses solutions using error intervals.	Calculates compound interest and depreciation. Solves reverse percentage problems. Interprets percentage change in financial/real-world contexts. Performs all four transformations (reflection, rotation, translation, enlargement). Describes combined transformations. Uses compass/ruler for complex constructions. Defines/applies 2D and 3D loci. Understands/applies algebraic and deductive proof. Constructs rigorous mathematical proofs (algebra, number theory).	Creates/interprets basic charts (Histograms, Cumulative Freq., Box Plots). Calculates/uses frequency density. Determines quartiles/median from data/graphs. Identifies the effect of constants on graphs (position, stretch, reflection). Sketches transformed functions accurately. Simplifies algebraic fractions. Solves complex algebraic equations. Evaluates functions (substitution). Finds composite/inverse functions. Determines function domain/range.			

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