

Unit	SOW III				
A Calculations	Add and subtract proper fractions and mixed numbers with different denominators and be able to predict if the answer will be greater or less than a whole. Multiply and fractions and hence decimals by changing them to their fraction equivalence first. Calculate a percentage of a quantity and solve simple interest problems. Addition and subtraction with directed numbers.				
B Number System	Order positive and negatives fractions and decimals. Convert between factions, decimals and percentages. Round numbers to 2 decimal places and 1 significant figure.				
C Indices	Use index laws with numerical and algebraic expressions involving multiplication and division of integer powers. Express a number as a product of its prime factors. Derive a formula from words or function machine and in simple cases, change its subject.				
D Equations and Formulae	Manipulate algebraic expressions by expanding, simplifying and basic linear factorising. Solve two step linear equations and inequalities with integer coefficients with the unknown on one side and check by substitution. Understand the difference between expressions, equations, formulae and identities.				
E Proportion	Understand and use the unitary method and common multiples when solving problems involving direct proportion. Simplify a ratio and write in the form 1:n or n:1. Interpret scales and maps using ratio. Express a ratio as a fraction of a whole and use this to share in a given ratio.				
F Mensuration	Know and use formulae for area and perimeter of common triangles and quadrilaterals. Find volumes of shapes made from cuboids.				
G Graphs and Sequences	Use the nth term to generate a linear, quadratic sequence, including triangular numbers, geometric and cubic functions. Plot simple linear, quadratic and cubic functions. Use the x, or y, coordinates of a given graph to calculate the corresponding y or x coordinate, graphically or through substitution.				
H Transformations	Understand congruence in the context of reflections and rotations. Reflect a shape in a named line. Rotate a shape given the coordinate, angle and direction of rotation.				
I Angles	Calculate and use the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons. Identify and calculate missing angles using alternate, corresponding co-interior angles of parallel lines.				
J Probability	Understand and use frequency trees.				
K Handling Data	Calculate, use and interpret the statistical measures mode, median, mean and range for discrete data, including comparing distributions. Interpret graphs representing real data, including pie charts and recognise misleading diagrams.				
L Constructions	Construct triangles using a ruler and protractor only given information about their sides and angles; Construct nets of 3D shapes.				
	Know	Use	Apply	Problem Solve	Reason

SOW IV

Unit					
A Calculations	Increase and decrease a number by a % using a decimal or fraction multiplier. Solve problems involving calculating with negative numbers. Identify the reciprocal of an integer, fraction or decimal. Divide fractions using the reciprocals. Divide decimals by converting to equivalent fractions and simplifying.				
B Number System	Use the equivalence of $\times 0.1$ and $\div 10$, $\times 0.01$ and $\div 100$ etc. to multiply and divide by powers of 10. Use rounding and approximation to estimate the answer to decimal calculations. Use the answer to a given calculation to determine the answer to another.				
C Indices	Use prime factorisation to derive square and cube roots of larger numbers. Use and understand prime decomposition for LCM and HCF. Write functions from words and diagrams using algebraic notation and substitute in positive and negative integers, fractions and decimals. Rearrange formulae expressed in algebraic form where the subject appears only once.				
D Equations and Formulae	Expand the product of two linear expressions and simplify. Factorise quadratic expressions by identifying a single term common factor. Form and solve fractional equations and equations with unknowns on both sides using balancing correctly.				
E Proportion	Use equality of ratios to solve problems. Represent ratios as linear equations and draw their graphs. Understand and use fractions, decimals and percentages as multipliers when calculating the original amount after a % change. Link improper fractions to percentage change.				
F Mensuration	Derive, recall and use formulae for area and circumference of circles and parts of circles, using pi in exact calculations. Use compound measures such as speed and density. Use and apply knowledge to interpret distance time graphs.				
G Graphs and Sequences	Find the nth term for linear sequences and find terms in oscillating sequences. Understand $y = mx + c$ represents a straight line and the effects of changing m and c, including interpreting the gradient as a rate of change and the y intercept as the starting value in a real life graph. Use the intersection of graphs to solve linear simultaneous equations.				
H Transformations	Understand congruence in the context of translations. Translate shapes by a given column vector and describe translations using vector notation. Recognise, visualise and construct enlargements using positive and fractional scale factors ; identify the centre and scale factor of enlargement.				
I Angles	Solve problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons, justifying inferences and explaining reasoning with diagrams and text; derive the sum of angles in a triangles. Use bearings to describe position and draw given bearings.				
J Probability	Solve probability problems involving theoretical models and relative frequency and calculate expected outcomes.				
K Handling Data	Draw and interpret graphs including scatter graphs. Know that correlation does not mean causation. Identify modal class and median class and estimate the mean of grouped data. Draw conclusions from data and consider outliers when drawing these conclusions.				
L Constructions	Draw the plan view and different elevations of 3D shapes. Draw a 3D shape on isometric dotted paper given different elevations				
	Know	Use	Apply	Problem Solve	Reason

SOW V

Unit					
A Calculations	Use multipliers to solve problems involving repeated percentage change, compound interest and reverse percentages. Convert between fractions, decimals and percentages to find the most appropriate method to use in a calculation.				
B Number System	Solve problems involving numbers expressed in standard index form with and without a calculator. Error Intervals using inequality notation. Recognise that measurements given to the nearest whole unit may be inaccurate by up to half a unit in either direction.				
C Indices	Understand that even powers and roots are always positive but odd can be positive or negative. Substitute values into complex expressions and formulae involving powers and roots (including all formulae expected to be recalled for maths exam). Simplify algebraic expressions using multiplication and division of integer powers. Index laws with integer powers. Use algebraic manipulation skills to prove simple identities (using $2n$ and $2n+1$ to represent odd and even numbers) and multiples.				
D Equations and Formulae	Factorise quadratic expressions and solve quadratic equations where the coefficient of x^2 is 1 (including the difference of two squares). Solve pairs of linear simultaneous equations through elimination.				
E Proportion	Direct and inverse proportion write relationships and recognise graphs.				
F Mensuration	Know and use formulae for volume and surface area of all prisms, pyramids, spheres and cones, including frustums. Use Pythagoras' theorem to solve problems involving right angled triangles. Change freely between standard and compound units. Use compound measures such as speed and density.				
G Graphs and Sequences	Find equations of lines from two coordinates or a coordinate and a gradient and by rearranging. Find the midpoint and length of a line segment. Solve a quadratic by identifying its roots on a graph and link to its factorised form.				
H Transformations	Transform 2D shapes by a combination of reflection, rotation and translation including the use of vector notation. Describe the resultant image as a single transformation.				
I Angles	Explore the angle and side ratios of equilateral and isosceles right angles triangles. Use an understanding of similar shapes to find missing sides and angles within right angled triangles. Know exact values of sin cos tan 30 45 60 and 90.				
J Probability	Use Venn diagrams to solve problems with probability. Use tree diagrams to calculate probabilities of successive or combined events. Apply the AND/OR rule for combined or successive events.				
K Handling Data	Select, construct and modify, on paper and using ICT suitable graphical representation to progress an enquiry including trends in time series and lines of best fit on scatter graphs.				
L Constructions	Construct triangles and other 2-D shapes using a ruler and a protractor, given information about their sides and angles. Understand and use SSS, SAS, ASA and RHS condition to prove the congruence of triangles. Use congruence to show that translations, reflections and rotations preserve length and angle. Use standard constructions to create a scale drawing. Use straight edge and compasses to produce standard constructions including the midpoint and perpendicular bisector of a line segment, the perpendicular from a point to a line, and the bisector of an angle.				
	Know	Use	Apply	Problem Solve	Reason

SOW VI

Unit	SOW VI				
A Calculations	Solve problems involving repeated proportional or percentage changes, including compound interest; represent repeated proportional change using a multiplier raised to a power.				
B Number System	Understand and use the difference between rational and irrational numbers. Simplify surds, rationalise the denominator and expand brackets involving surds.				
C Indices	Solve problems involving standard form, checking for correct order of magnitude, and using a calculator as appropriate. Use fractional, negative and zero powers in simplifying numerical expressions, including using inverse operations.				
D Equations and Formulae	Solve linear inequalities in two variables and identify correct regions on a graph. Manipulate algebraic expressions including algebraic fractions, using expansion, factorising, rearranging and simplifying. Rearrange harder formulae including cases where the subject appears twice or a power of the subject appears.				
E Proportion	Direct and inverse proportion including rec graphs. Form and use equations to solve word and other problems involving direct or inverse proportion including relating algebraic solutions to graphical representations of the equations.				
F Mensuration	Understand the difference between formulae for perimeter, area and volume by considering dimensions of formulae. Solve problems involving Pythagoras' theorem.				
G Graphs and Sequences	Understand and use the gradient properties of parallel and perpendicular lines. Construct graphs of circular and exponential functions. Solve problems involving intersection of a line with a curve (including circles).				
H Transformations	Calculate and represent graphically the sum of two vectors, the difference of two vectors and a scalar multiple of a vector, calculate the resultant of two vectors, understand and use the commutative and associative properties of vector addition. Enlarge by any scale factor and understand the effect of enlargement on area and volume				
I Angles	Use the Circle Theorems. [INCLUDING alternate segment theorem, and problems involving tangents meeting]. Trigonometry to multistep problems.				
J Probability	Solve complex problems involving probability, including those requiring algebraic manipulation and complex conditional probability. Interpret, connect and use multiple representations of outcomes.				
K Handling Data	Use and interpret the median, inter-quartile range and range for discrete data presented in a frequency table, to include the drawing of box plots. Draw and interpret cumulative frequency tables and diagrams and box plots for grouped data; find the median, quartiles, percentiles and interquartile range.				
L Constructions	Apply loci to spatial problems involving shapes and paths; use straight edge and compasses to produce standard constructions including the midpoint and perpendicular bisector of a line segment, the perpendicular from a point to a line, and the bisector of an angle.				
	Know	Use	Apply	Problem Solve	Reason

Unit

SOW VII/VIII

A Calculations	SOW VII - Use iterative processes. Understand and generate recursive sequences. SOW VIII - Set up solve and interpret Growth and Decay Problems.
B Number System	SOW VII - Identify the upper and lower bounds of measures provided to a given degree of accuracy. Use upper and lower bounds to identify the range in values of a compound measure. Use the product rule for counting. SOW VIII - Use a formal algebraic method to convert a recurring decimal into a fraction.
C Indices	SOW VII - Solve equations involving indices and different bases and rearrange formulae where the subject is non-linear. Use algebraic manipulation skills to prove identities and form arguments (using $2n$ and $2n+1$ to represent odd and even numbers). SOW VIII - Use fractional, negative and zero powers in simplifying numerical expressions, including using inverse operations. Solve equations involving Indices and different bases and rearrange formulae where the subject is non-linear.
D Equations and Formulae	SOW VII - Rearrange quadratic equations (including algebraic fractions) and solve by factorising, completing the square and using the quadratic formula. Use generalisations and algebraic proofs to solve problems. Expand the product of more than two binomials. SOW VIII - Solve a pair of simultaneous equations where one is quadratic or in the form $x^2 + y^2 = r^2$. Solve quadratic inequalities. Deduce, use and interpret inverse and composite functions.
E Proportion	SOW VII/VIII - Solve multi-stage geometric and algebraic problems using an understanding of proportionality.
F Mensuration	SOW VII/VIII - Solve complex problems involving volume and surface area of pyramids, cylinders, cones, frustums and spheres, and problems involving sectors, arc lengths and segments, including those requiring complex algebraic manipulation and Trigonometry.
G Graphs and Sequences	SOW VII - Find the n th term of a quadratic sequence. Recognise and use geometric sequences (including common ratio of a surd). Locate turning points of a quadratic function by completing the square. SOW VIII - Apply the concept of instantaneous and average rates of change by looking at gradients of tangents and chords to a curve, including circles. Interpret areas under graphs and gradients of graphs in real life contexts e.g. area under velocity-time graph is displacement. Understand and use speed and acceleration calculations.
H Transformations	SOW VII - Apply vector methods for simple geometric proofs, recognise when lines are parallel using vectors, recognise when three or more points are co-linear using vectors, vectors to show three or more points are collinear. SOW VIII - Transform the graph of any function $f(x)$: $f(x) + a$, $f(x + b)$, $af(x)$ and $f(ax)$ where a and b are integers, recognise transformations of functions and be able to express a transformed function in algebraic form. Apply transformations to the graphs of sine and cosine functions.
I Angles	SOW VII - Use the sine and cosine rules to solve 2-D problems. Know and apply $\frac{1}{2}ab\sin C$ to any triangle. Know and use circle theorem proofs. SOW VIII - Solve multi-stage Trigonometric Problems. Use trigonometric relationships in 3-D contexts, including finding the angles between a line and a plane. Use the sine and cosine rules to solve 2-D and 3-D problems.
J Probability	Solve increasingly complex, multistage problems involving probability.
K Handling Data	SOW VII - Draw and interpret histograms for grouped data; understand frequency density. Select a representative sample from a population using random and stratified sampling; criticise a range of sampling methods. SOW VIII - Calculate an appropriate moving average. Identify seasonality and trends in time series, from tables or diagrams; interpret graphs modelling real situations.
L Constructions	Solve more complex problems with loci and constructions.

Know

Use

Apply

Problem Solve

Reason