

Mathematics Department

Year 9 - Higher

Scheme of Work

Key Objectives

- Add, subtract, multiply and divide fractions
- Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100% or as a whole
- Make and justify estimates and approximations of calculations
- Construct and solve linear equations with integer coefficients, using an appropriate method
- Generate terms of a sequence using term to term and position to term definitions of the sequence, on paper and using ICT; write an expression to describe the n th term of an arithmetic sequence
- Given values for m and c , find the gradient of lines given by equations of the form $y = mx + c$
- Construct functions arising from real life problems and plot their corresponding graphs; interpret graphs arising from real life situations
- Solve geometrical problems using properties of angles, of parallel and intersecting lines, and of triangles and polygons
- Know that translations, rotations and reflections preserve length and angle and map objects on to congruent images
- Know and use the formulae for the circumference and area of a circle

- Design a survey or experiment to capture the necessary data from one or more sources; determine the sample size and degree of accuracy needed; design, trial and if necessary refine data collection sheets
- Communicate interpretations and results of a statistical enquiry using selected tables, graphs and diagrams in support
- Know that the sum of probabilities of all mutually exclusive outcomes is 1 and use this when solving problems
- Solve substantial problems by breaking them into simpler tasks, using a range of efficient techniques, methods and resources, including ICT; give solutions to an appropriate degree of accuracy

Objectives for more able pupils

- Know and use the index laws for multiplication and division of positive integer powers
- Understand and use proportionality and calculate the result of any proportional change using multiplicative methods
- Square a linear expression and expand the product of two linear expressions of the form $x \pm n$; establish identities
- Solve a pair of simultaneous linear equations by eliminating one variable; link a graphical representation of an equation or a pair of equations to the algebraic solution
- Change the subject of a formula
- Know that if two 2D shapes are similar, corresponding angles are equal and corresponding sides are in the same ratio
- Understand and apply Pythagoras' Theorem
- Know from experience of constructing them that triangles given SSS, SAS, ASA or RHS are unique, but that triangles given SSA or AAA are not; apply these conditions to establish the congruence of triangles
- Use measures of speed and other compound measures to solve problems
- Identify possible sources of bias in a statistical enquiry and plan how to minimise it

- Examine critically the results of a statistical enquiry and justify choice of statistical representation in written presentations
- Generate fuller solutions to mathematical problems
- Recognise limitations on the accuracy of data and measurements

Number Overview

Unit	Objective
Solving problems and revision	Solve increasingly demanding problems and evaluate solutions; explore connections in mathematics across a range of contexts: number, algebra, shape, space, and measures, and handling data.
Solving problems and revision	Represent problems and synthesise information in algebraic, geometric or graphical form; move from one form to another to gain a different perspective on the problem.
N1	Use rounding to make estimates.
N2	Write numbers in standard form.
N2	Understand upper and lower bounds; round numbers to three decimal places and a given number of significant figures.
N1	Use efficient methods to add, subtract, multiply and divide fractions , interpreting division as a multiplicative inverse; cancel common factors before multiplying or dividing.
N1 Solving problems and revision	Recognise when fractions or percentages are needed to compare proportions; solve problems involving percentage changes.
N1 Solving problems and revision	Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole ; compare two ratios; interpret and use ratio in a range of contexts, including solving word problems.
N1	Understand the implications of enlargement for area and volume.
N1	Recognise and use reciprocals.
N2	Know that a recurring decimal is an exact fraction.

N2	Use algebraic methods to convert a recurring decimal to a fraction in simple cases.
N1	Understand the effects of multiplying and dividing by numbers between 0 and 1; use the laws of arithmetic and inverse operations.
N1	Estimate calculations by rounding numbers to one significant figure and multiplying or dividing mentally.
Oral work throughout	Use known facts to derive unknown facts; extend mental methods of calculation, working with decimals, fractions, percentages, factors, powers and roots; solve word problems mentally.
Throughout	Check results using appropriate methods.
N2	Use the reciprocal key of a calculator.
N2	Enter numbers in standard form into a calculator and interpret the display.
N2	Use a calculator efficiently and appropriately to perform complex calculations with numbers of any size, knowing not to round during intermediate steps of a calculation; use the constant, (and sign change keys, function keys for powers, roots and fractions, brackets and the memory.
Solving problems and revision	Enter numbers and interpret the display in context (negative numbers, fractions, decimals, percentages, money, metric measures, time).

Algebra Overview

A3	Solve a pair of simultaneous linear equations by eliminating one variable.
A3	Construct and solve linear equations with integer coefficients (with and without brackets, negative signs anywhere in the equation, positive or negative solution), using an appropriate method.
A3	Solve linear inequalities in one variable, and represent the solution set on a number line; begin to solve inequalities in two variables.
A3	Solve problems involving direct proportion using algebraic methods, relating algebraic solutions to graphical representations of the equations; use ICT as appropriate.
A3	Link a graphical representation of an equation or a pair of equations to the algebraic solution.
A5	Simplify or transform algebraic expressions by taking out single-term common factors; add simple algebraic fractions.
A5	Square a linear expression, expand the product of two linear expressions of the form $x \pm n$ and simplify the corresponding quadratic expression; establish identities such as $a^2 - b^2 = (a + b)(a - b)$.
A5	Derive and use more complex formulae, and change the subject of a formula.
A1&2	Generate terms of a sequence using term-to-term and position-to-term definitions of the sequence, on paper and using ICT.
A1&2	Generate sequences from practical contexts and write an expression to describe the nth term of an arithmetic sequence.
A1&2	Find the inverse of a linear function.
A1&2	Construct functions arising from real-life problems and plot their corresponding graphs.
A3	Find the next term and the n th term of quadratic sequences and functions and explore their properties.
A3 A5 Solving	Generate points and plot graphs of linear functions (y given implicitly in terms of x), e.g. $ay+bx=0$,

problems and revision	$y+bx+c=0$, on paper and using ICT; given values for m and c, find the gradient of lines given by equations of the form $y=mx+c$.
A4	Plot graphs of simple quadratic and cubic functions, e.g. $y = x^2$, $y = 3x^2 + 4$, $y = x^3$.
A4	Know and use the index laws (including in generalised form) for multiplication and division of positive integer powers; begin to extend understanding of index notation to negative and fractional powers, recognising that the index laws can be applied to these as well.
A4	Use ICT to estimate square roots and cube roots.

Shape, Space and Measures Overview

SSM4	Present a concise, reasoned argument, using symbols, diagrams, graphs and related explanatory text; give solutions to problems an appropriate degree of accuracy.
SSM4	Suggest extensions to problems, conjecture and generalise; identify exceptional cases or counter-examples, explaining why.
SSM1	Understand and apply Pythagoras' theorem.
SSM1	Understand congruence.
SSM1	Apply the conditions SSS, SAS, ASA or RHS to establish the congruence of triangles.
SSM1	Know that the tangent at any point on a circle is perpendicular to the radius at that point; explain why the perpendicular from the centre to the chord bisects the chord.
SSM1	Distinguish between practical demonstration and proof.
SSM1	Explain how to find, calculate and use the interior and exterior angles of regular polygons.
SSM3	Know that if two 2-D shapes are similar, corresponding angles are equal and corresponding sides are in the same ratio.
Solving problems and revision	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.
SSM4	Visualise and use 2-D representations of 3-D objects.
SSM3	Enlarge 2-D shapes given a fractional scale factor; recognise the similarity of the resulting shapes; understand the implications of enlargement for area and volume.
SSM4	Transform 2-D shapes by combinations of translations, rotations and reflections, on paper and using ICT; know that translations, rotations and reflections preserve length and angle and map objects on to congruent

	images ; identify reflection symmetry in 3-D shapes.
SSM1	Find the locus of a point that moves according to a more complex rule, involving loci and simple constructions.
SSM1	Know from experience of constructing them that triangles given SSS, SAS, ASA or RHS are unique, but that triangles given SSA or AAA are not.
SSM2	Find points that divide a line in a given ratio, using the properties of similar triangles.
SSM2 SSM4	Use units of measurement to calculate, estimate, measure and solve problems in a variety of contexts; convert between area measures (mm^2 to cm^2, cm^2 to m^2, and vice versa) and between volume measures (mm^3 to cm^3, cm^3 to m^3, and vice versa).
SSM2	Know and use the formulae for length of arcs and area of sectors of circles.
SSM2	Calculate lengths, areas and volumes in right prisms, including cylinders.
SSM2	Understand and use measures of speed (and other compound measures such as density or pressure) to solve problems; solve problems involving constant or average rates of change.
SSM3	Begin to use sine, cosine and tangent in right-angled triangles to solve problems in two dimensions.
SSM4	Know and use the formulae for the circumference and area of a circle.
SSM4	Calculate the surface area and volume of right prisms.

Handling Data Overview

HD3	Solve substantial problems by breaking them into simpler tasks, using a range of efficient techniques, methods and resources, including ICT.
HD1	Suggest a problem to explore using statistical methods, frame questions and raise conjectures.
HD1	Design a survey or experiment to capture the necessary data from one or more sources; determine the sample size and degree of accuracy needed; design, trial and if necessary refine data collection sheets.
HD1 HD3	Identify possible sources of bias and plan how to minimise it.
HD1 HD3	Discuss how data relate to a problem; identify possible sources, including primary and secondary sources.
HD1	Design and use two-way tables.
HD1 HD3	Select, construct and modify, on paper and using ICT, suitable graphical representation to progress an enquiry, Including: – line graphs for time series; – scatter graphs to develop further understanding of correlation; Identify key features present in the data.
HD1	Select, construct and modify, on paper and using ICT, suitable graphical representation to progress including lines of best fit by eye, understanding what they represent.
HD1	Find the median and quartiles for large data sets; estimate the mean, median and interquartile range of a large set of grouped data.
HD3	Find summary values that represent the raw data, and select the statistics most appropriate to the problem.
HD3 Solving problems and	Analyse data to find patterns and exceptions, look for cause and effect and try to explain anomalies.

revision	
HD3 Solving problems and revision	Interpret graphs and diagrams and draw inferences to support or cast doubt on initial conjectures; have a basic understanding of correlation.
HD3	Examine critically the results of a statistical enquiry, and justify choice of statistical representation in written presentations , recognising the limitations of any assumptions and their effect on conclusions drawn.
HD3	Communicate interpretations and results of a statistical enquiry using selected tables, graphs and diagrams in support , using ICT as appropriate.
HD3	Identify what extra information may be required to pursue a further line of enquiry.
HD2 HD4	Use the vocabulary of probability in interpreting results involving uncertainty and prediction.
HD2 HD4	Identify all the mutually exclusive outcomes of an experiment; know that the sum of probabilities of all mutually exclusive outcomes is 1 and use this when solving problems.
HD2 HD4	Understand relative frequency as an estimate of probability and use this to compare outcomes of experiments.
HD2 HD4	Estimate probabilities from experimental data.
HD4	Compare experimental and theoretical probabilities in a range of contexts; appreciate the difference between mathematical explanation and experimental evidence.

Mental and Oral Activities

Autumn Term

- Order, add, subtract, multiply and divide integers.
- Multiply and divide decimals by 10, 100, 1000, 0.1 and 0.01.
- Count on and back in steps of 0.4, 0.75, $\frac{3}{4}$...
- Round numbers, including to one or two decimal places.
- Know and use squares, cubes, roots and index notation.
- Know or derive quickly prime numbers less than 30 and factor pairs for a given number.
- Convert between fractions, decimals and percentages. Know that 0.005 is half of one per cent.
- Find fractions and percentages of quantities.
- Know or derive complements of 0.1, 1, 10, 50, 100, 1000.
- Add and subtract several small numbers or several multiples of 10, e.g. $250 + 120 - 190$.
- Use jottings to support addition and subtraction of whole numbers and decimals.
- Use knowledge of place value to multiply and divide, e.g. 432×0.01 , $37 \div 0.01$, 0.04×8 , $0.03 \div 5$, 13×1.4 .
- Recall multiplication and division facts to 10×10 . Derive products and quotients of multiples of 10, 100, 1000.
- Use factors to multiply and divide mentally, e.g. 22×0.02 , $420 \div 15$.

- Multiply and divide a two-digit number by a one-digit number.
- Use approximations to estimate the answers to calculations, e.g. 39×2.8 .
- Solve equations, e.g. $n(n - 1) = 56$
- Visualise, describe and sketch 2-D shapes.
- Recall and use formulae for the perimeter of a rectangle, and areas of rectangles and triangles.
- Calculate volumes of cuboids.
- Estimate and order acute, obtuse and reflex angles.
- Use metric units (length, mass, capacity) and units of time for calculations.
- Use metric units for estimation (length, mass, capacity).
- Convert between metric units, including area, volume and capacity measures.
- Discuss and interpret graphs.
- Calculate a mean using an assumed mean.
- Apply mental skills to solve simple problems.

Spring Term

- Order, add, subtract, multiply and divide integers.
- Find products of small integer powers.
- Know and use squares, cubes, roots and index notation.
- Know or derive quickly the prime factorisation of numbers to 30 and factor pairs for a given number.
- Find highest common factors (HCF) and lowest common multiples (LCM), e.g. the HCF of 36 and 48.
- Convert between improper fractions and mixed numbers. Simplify fractions by cancelling.
- Find the outcome of a given percentage increase or decrease.
- Know or derive complements of 0.1, 1, 10, 50, 100, 1000.
- Use jottings to support addition, subtraction, multiplication and division.
- Recall multiplication and division facts to 10×10 . Derive products and quotients of multiples of 10, 100, 1000.
- Use known facts to derive unknown facts, e.g. derive 36×24 from 36×25 .
- Use knowledge of place value to multiply and divide decimals by multiples of 0.1 and 0.01, e.g. 0.24×0.4 , $720 \div 0.03$.
- Use approximations to estimate the answers to calculations, e.g. 39×2.8 .
- Solve equations, e.g. $n(n - 1) = 56$, $\square + \square = -46$, $(3 + x)^2 = 25$.
- Visualise, describe and sketch 2-D shapes, 3-D shapes and simple loci.
- Estimate bearings.
- Use metric units (length, area and volume) and units of time for calculations.
- Use metric units for estimation (length, area and volume).

- Convert between metric units, including area, volume and capacity measures.
- Recall and use formulae for areas of rectangle, triangle, parallelogram, trapezium and circle.
- Calculate volumes of cuboids and prisms.
- Discuss and interpret graphs.
- Solve simple problems involving probabilities.
- Apply mental skills to solve simple problems.

Summer Term

- Order, add, subtract, multiply and divide integers.
- Round integers and decimals.
- Know and use squares, cubes, roots and index notation.
- Find highest common factors (HCF) and lowest common multiples (LCM).
- Convert between fractions, decimals and percentages, and between improper fractions and mixed numbers.
- Find fractions and percentages of quantities and the outcome of a given percentage increase or decrease.
- Know or derive complements of 0.1, 1, 10, 50, 100, 1000.
- Use jottings to support addition, subtraction, multiplication and division.
- Recall multiplication and division facts to 10×10 . Derive products and quotients of multiples of 10, 100, 1000.
- Use knowledge of place value to multiply and divide decimals by 0.1 and 0.01, e.g. 0.24×0.4 , $720 \div 0.03$.
- Use approximations to estimate the answers to calculations, e.g. 0.39×2.8 .
- Solve equations, e.g. $n(n - 1) = 56$, $(3 + x)^2 = 25$, $(12 - x)^2 = 49$,
- Visualise, describe and sketch 2-D shapes, 3-D shapes and simple loci.
- Estimate and order angles and bearings.
- Use metric units (length, mass, capacity, area and volume) and units of time for calculations.
- Use metric units for estimation (length, mass, capacity, area and volume).
- Convert between metric units including area, volume and capacity measures.
- Recall and use formulae for the perimeter of a rectangle and the circumference of a circle.

- Recall and use formulae for areas of rectangle, triangle, parallelogram, trapezium and circle.
- Calculate volumes of cuboids and prisms.
- Discuss and interpret graphs.
- Solve simple problems involving probabilities.
- Apply mental skills to solve simple problems.

Autumn Term

Teaching Objectives for the main activities

UNIT 1	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
<p>Algebra 1 & 2 (5 hours) Sequences and functions</p> <p>Functions</p> <p>Graphs</p>	<ul style="list-style-type: none"> • Generate terms of a sequence using position to term definitions of the sequence, on paper and using ICT • Generate sequences from practical contexts • Plot the graphs of linear functions, where y is given explicitly in terms of x, on paper and using ICT. • Interpret graphs arising from real situations (distance-time graphs) 	<ul style="list-style-type: none"> • Generate terms of a sequence using position to term definitions of the sequence, on paper and using ICT (MF: 2, 3) • Generate sequences from practical contexts and write an expression to describe the nth term of an arithmetic sequence (MF: 2, 3) • Generate terms of a sequence using term to term and position to term definitions of a sequence (MF: 2, 3) • Find the inverse of a linear function (MF: 2, 3) • Represent problems and synthesise information on algebraic form (MF: 2, 3) • Construct functions arising from real-life problems and plot their corresponding graphs. (MF: 2, 3) 	<ul style="list-style-type: none"> • Write an expression to describe the nth term of a quadratic sequence • Plot the graph of the inverse of a linear function

UNIT 2	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
<p>Number 1 (8 hours) Fractions, decimals, percentage</p> <p>Decimals</p> <p>Ratio</p>	<ul style="list-style-type: none"> • Simplify fractions by cancelling all common factors • Add and subtract simple fractions and fractions with a common denominator • Recognise simple fractions and their decimal and percentage equivalents • Calculate fractional and percentage parts of quantities • Multiply and divide decimals by 10, 100, 1000 • Use all four operations with decimals to two places • Compare ratios and reduce to its simplest form • Interpret and use ratio in a range of contexts, including solving word problems 	<ul style="list-style-type: none"> • Use efficient methods to add, subtract, multiply and divide fractions • Recognise when fractions or percentages are needed to compare proportions • Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100% or as a whole • Round decimals to the nearest whole number, one or two decimal places • Round values to one significant figure • Understand the effects of multiplying and dividing by numbers between 0 and 1; use the laws of arithmetic and inverse operations. • Use the unitary method to solve simple word problems involving ratio and direct proportion. 	<ul style="list-style-type: none"> • Understand and use proportionality and calculate the result of any proportional change using only multiplicative methods • Make and justify estimates and approximations of calculations • Recognise and use reciprocals <p>Understand the implications of enlargement for area and volume.</p>

UNIT 4	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
Shape, Space and Measures 1 (7 hours)	<ul style="list-style-type: none"> • Understand a proof that the sum of the angles within a triangle is 180° and a quadrilateral is 360° • Know the definition of a circle and the names of its parts 	<ul style="list-style-type: none"> • Find, calculate and use the interior and exterior angles of regular polygons • 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 • Understand and apply Pythagoras' theorem when solving problems in two dimensions • Construct the perpendicular bisector of a line, bisector of an angle and a right angled triangle from given data • Determine the locus of an object moving according to a rule, both by reasoning and by using ICT • Know that the tangent at any point on a circle is perpendicular to the radius at that point;; explain why the perpendicular from the centre to the chord bisects the chord 	<ul style="list-style-type: none"> • Understand and use congruence and mathematical similarity • Understand and apply Pythagoras' theorem when solving problems in three dimensions

UNIT 5	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
<p>Handling Data 1 (6 hours) Statistical diagrams</p> <p>Surveys and questionnaires</p>	<ul style="list-style-type: none"> • Construct 10 sector pie charts • Draw simple frequency diagrams 	<ul style="list-style-type: none"> • Construct, on paper and using ICT, pie charts for categorical data • Construct, on paper and using ICT, bar charts and frequency diagrams for continuous data, and line graphs for time series • Interpret statistical diagrams and graphs, drawing inferences to support or reject initial conjectures • Design and use 2 way tables • Compare two simple distributions • Design a survey or experiment to capture the necessary data from one or more sources; determine the sample size and degree of accuracy needed; design, trial and if necessary refine data collection sheets 	<ul style="list-style-type: none"> • Interpret scatter graphs and have a basic understanding or correlation • Compare two distributions or make inferences, identifying all outcomes, using diagrams, tables or other forms of communication

UNIT 7	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
Number 2 (7 hours) Powers of 10 Rounding Decimals and fractions	<ul style="list-style-type: none"> • Multiply integers and decimal values by 10 and 100 • Add and subtract decimals with up to two decimal places 	<ul style="list-style-type: none"> • Extend knowledge of integer powers of 10 • Multiply and divide by any integer power of 10 • Round numbers to the nearest whole number or to one decimal place • Use rounding to make estimates • Multiply and divide integers and decimal numbers • Know that a recurring decimal is an exact fraction • Convert recurring decimals to exact fractions • Use a calculator efficiently and appropriately to perform complex calculations • Use the bracket, fraction, square, square root, memory and sign change keys • Solve substantial problems by breaking them down into simpler tasks, using a range of efficient techniques, methods and resources including ICT. 	<ul style="list-style-type: none"> • Round numbers to any power of 10, and to two decimal places • Make and justify estimates and approximations of calculations • Use the power and/or cube and cube root keys

UNIT 8	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
Algebra 4 (4 hours) Factorising Squares, cubes and indices Straight line graphs	<ul style="list-style-type: none"> • Know multiplication facts up to 10 x 10 • Know and find factors and multiples • Know first 10 prime numbers • Plot coordinates in the four quadrants 	<ul style="list-style-type: none"> • Recognise and use multiples, factors, common factor, highest common factor and lowest common multiple • Use square and square roots, cubes and cube roots • Recognise that equations of the form $y = mx + c$ correspond to straight line graphs 	<ul style="list-style-type: none"> • Recognise factors of algebraic expressions • Solve equations which involve square roots • Use index notation for integer powers and simple instances of the index laws • Construct and interpret graphs arising from real situations

UNIT 10	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
<p>Shape, Space and Measure 3 (4 hours) Enlargements</p> <p>Reflection symmetry</p> <p>Scale drawings</p>	<ul style="list-style-type: none"> • Plot coordinates in all four quadrants • Recognise reflective symmetry in 2D shapes • Reflect 2D shapes in a mirror line • Make simple scale drawings • Reduce a ratio to its simplest form 	<ul style="list-style-type: none"> • Understand and use the language and notation associated with enlargement • Identify the scale factor of an enlargement as the ratio of the lengths of any two corresponding line segments • Recognise that enlargements preserve angle but not length, and understand the implications of enlargement for perimeter • Identify reflection symmetry in 3D shapes • Use and interpret maps and scale drawings • Interpret and use ratio in a range of contexts 	<ul style="list-style-type: none"> • Enlarge 2D shapes, given a centre of enlargement and a whole number scale factor, on paper and using ICT

Summer Term

Teaching objectives for the main activities

UNIT 11	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
Equations and Formulae (5 hours)	<ul style="list-style-type: none">• Use indices to represent squares • Substitute values into expressions • Plot coordinates in all 4 quadrants	<ul style="list-style-type: none">• Simplify linear expressions by collecting like terms• Multiply a single term over a bracket• Simplify by collecting like terms • Generate points and plot the graphs of linear functions (y given implicitly in terms of x) e.g. $y + ax + b = 0$, on paper and using ICT	<ul style="list-style-type: none">• Derive a formula and, change its subject • Substitute negative and decimal values into expressions involving powers

UNIT 12	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
<p>Solving Problems and Revision (6 hours) Number (Fractions, decimals and percentages, 4 rules, ratio and directed numbers)</p> <p>Algebra (Basic and manipulative algebra and linear equations)</p> <p>Graphs (Basic graphs and real life graphs)</p> <p>Shape, Space and Measure (Volume and area, symmetry, angles and enlargements)</p>	<ul style="list-style-type: none"> • Try different approaches and find ways of overcoming difficulties that arise when solving problems 	<ul style="list-style-type: none"> • Use own strategies to solve increasingly demanding problems • Make and justify estimates and approximations of calculations • Solve problems involving percentage changes • Interpret and use ratio in a range of contexts, including solving word problems • Represent problems and synthesise information in algebraic form • Represent problems and synthesise information in graphical form • Represent problems and synthesise information in geometric form • Solve problems using properties of angles, of parallel and intersecting 	<ul style="list-style-type: none"> • Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole

<p>Handling data (Probability, averages, surveys and scatter diagrams)</p>		<p>lines, and of triangles and other polygons, justifying inferences and explaining reasoning with diagrams and text</p> <ul style="list-style-type: none">• Interpret graphs and diagrams and draw inferences to support or cast doubt on initial conjectures; have a basic understanding of correlation• Analyse data to find patterns and exceptions, look for cause and effect and try to explain anomalies	
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UNIT 13	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
<p>Handling data (3 hours) Revision</p> <p>Handling data project</p>	<ul style="list-style-type: none"> • Extract and interpret information presented in simple tables and lists • Interpret information presented in bar charts and pictograms • Construct, on paper and using ICT, bar charts and frequency diagrams for continuous data • Interpret tables, graphs and diagrams for continuous data, and draw inferences that relate to the problem being discussed • 	<ul style="list-style-type: none"> • Decide which data to collect to answer a question, and the degree of accuracy needed • Identify possible sources of data, including primary and secondary data • Calculate statistics that represent the raw data • Select the statistics most appropriate to the problem • Select, construct and modify, on paper and using ICT, suitable graphical representations to progress an enquiry • Interpret graphs and diagrams and draw inferences to support or cast doubt on initial conjectures • Solve substantial problems by breaking them into simpler tasks, using a range of efficient techniques, methods and resources, using ICT • 	<ul style="list-style-type: none"> • Communicate interpretations and results of statistical enquiry using selected tables, graphs and diagrams in support, using ICT as appropriate

UNIT 16	SUPPORT: Level 5	CORE: Level 6 + 7 Teaching objectives	EXTENSION: Level 8 + Exceptional performance
GCSE Preparation (9 hours)	<ul style="list-style-type: none"> • Knowledge and use of the order of operations (BODMAS) • Recognise negative numbers in context • Use decimal notation in context • Use simple fractions and recognise when two simple fractions are equivalent 	<ul style="list-style-type: none"> • Order, add and subtract negative numbers in context • Recall multiplication facts up to 10 x 10 and quick derivation of corresponding division facts • Recognise number relationships, including factor, multiple and square • Use cubes and cube roots • Use all four operations with decimals to two places • Solve problems that involve multiplying or dividing any three digit number by any two digit number • Reduce a fraction to its simplest form by cancelling common factors • Calculate fractional or percentage parts of quantities, using a calculator where appropriate • Construct, express in symbolic form and use simple formulae involving one or two operations, using brackets 	<ul style="list-style-type: none"> • Add and subtract fractions by writing with a common denominator • Multiply and divide fractions • Use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole