

Key Stage 3

The purpose of our KS3 Maths curriculum is to inspire pupils, secure strong academic outcomes and to drive learners to think and work independently and with a powerful sense of curiosity. Pupils develop mathematical fluency and confidence because they are supported by a challenging curriculum that gives abundant opportunities to master their knowledge and understanding so that they can analyse, evaluate, make judgements and justify their reasoning.

Throughout Key Stage 3 pupils explore and extend their understanding of:

- our number system, and parts of wholes;
- number operations and calculation methods;
- relationships between sets of numbers, using algebra and graphs;
- the properties and measurements of 2-D and 3-D shapes;
- using and analysing data to inform us about our world.

Key Stage 4

During Key Stage 4 pupils extend the knowledge, skills and understanding developed in earlier Key Stages. A fundamental aim is to enable pupils to apply their knowledge logically and creatively. They see more challenging questions related to a wide variety of contexts and mature in their ability to reason mathematically, make deductions and inferences and draw conclusions. They are also taught to check and evaluate their methods and answers, assessing whether they are reasonable and make sense.

Key Stage 5

Studying Mathematics at KS5 invites pupils to enhance the breadth and depth of their mathematical knowledge covering pure maths, mechanics and statistics with a deeper emphasis on developing and assessing reasoning, problem-solving skills and modelling. A Level Mathematics challenges pupils to gain mastery in their subject in order to fully develop the skills required to study Mathematics, in any sense, at higher education.

KS5 is split into Mathematics and Further Mathematics, both of which are further split into Core and Applied topics.

The complexity of study increases and students engage with new mathematical concepts and methods, such as the binomial theorem.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
7 Term 1	Number sense and calculations	Integer place value Decimal place value Times tables Using number lines Ordering negative numbers Adding Subtracting Multiplying Dividing Calculating with negative numbers	Number sense, adding and subtracting, multiplying, dividing, calculating with negative numbers, order of operations.	Pupils will be able to call upon various strategies to tackle various calculations. They will know how to work with large or small numbers and both positive and negative numbers	integer, place value, decimal, negative number, operation, sum, difference, product, quotient, estimate, rounding, order of operations
7 Term 1	Expressions and equations	Times tables Using the correct order of operations Using the commutative laws Using the associative laws	Expressions, substitution, solving equations.	Pupils will be able to simplify simple expressions, understand how functions and formulae turn an input into an output and use some basic real-life formulae	expression, equation, variable, term, coefficient, substitute, simplify, solve, unknown, formula, inverse operation

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Calculating with negative numbers Calculating with negative numbers Algebraic notation Function machines Substituting into expressions			
7 Term 1	Measures	Multiplying and dividing by 10, 100 and 1000 Using number lines	Time, measures.	Pupils will be able to interpret and solve time-based questions. They will also have a firm understanding of different measures used in real world situations.	unit, measure, metric, length, mass, capacity, time, convert, millimetre, centimetre, metre, kilometre, gram, kilogram, litre
7 Term 2	2D Shapes		Line and shape properties.	Pupils will be able to recognise and describe properties of lines and shapes.	2D shape, polygon, quadrilateral, triangle, rectangle, square, side, vertex, angle, parallel, perpendicular, perimeter, area

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
7 Term 2	Perimeter and area	Adding Line properties Shape properties Multiplying	Perimeter, area.	Pupils will find the perimeter of simple shapes, begin to use formulae to calculate areas and volumes of simple shapes and solids, use correct units to describe Perimeter, area, volume.	perimeter, area, length, width, height, rectangle, square, compound shape, unit, square unit, centimetre squared, metre squared
7 Term 2	Coordinates	Shape properties	Coordinates and shapes using coordinate axis.	Pupils will be able to plot and interpret a set of axis along with coordinates and 2 plotted shapes.	coordinate, grid, axis, x-axis, y-axis, origin, point, plot, horizontal, vertical, quadrant
7 Term 2	Factors, multiples, and primes	Odd and even numbers Dividing numbers into equal groups Using a written method to divide integers Times tables Finding factors and using divisibility tests	Factors and multiples, prime numbers.	Pupils will be able to identify factors and multiples of an integer, find the highest common factor and lowest common multiple of two or three integers. They will recognise prime numbers between 0 and 100 and be able to describe an integer in terms of its prime factors	factor, multiple, prime number, composite number, square number, common factor, common multiple, HCF, LCM, divisible, divisibility

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
7 Term 2	Fractions; Fractions, decimals and percentages	Finding the lowest common multiple Finding the highest common factor Finding equivalent fractions Simplifying fractions Converting between mixed numbers and improper fractions	Writing and comparing fractions, adding and subtracting fractions, multiplying and dividing fractions, fractions of amounts, fractions, decimals, and percentages.	Pupils will be able to order and simplify fractions, add/subtract fractions with common or differing denominators, multiply fractions by initially simplifying, dividing fractions, converting between mixed numbers and improper fractions. Pupils will know common equivalences between fractions, decimals & percentages and be able to calculate the equivalences if not known. They will be able to round to the nearest integer/10/100 etc or to round to a given number of decimal places or significant figures. Pupils will be able to perform calculations involving fractions, decimals & percentages.	fraction, numerator, denominator, equivalent fraction, simplify, mixed number, improper fraction, unit fraction, compare, order, decimal, percentage, percent, fraction, equivalent, convert, tenth, hundredth, place value, proportion, increase, decrease
7 Term 2	Brackets	Algebraic notation	Expanding and factorising with single brackets.	Pupils will be able to expand single brackets and understand the process of	bracket, single bracket, expand, term, expression,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Simplifying expressions containing a single variable Finding the highest common factor		finding a common factor to factorise.	coefficient, variable, multiply, simplify, factor
7 Term 3	Angles	Types of angles Solving equations with one step Solving equations of the form $ax + b = c$	Identifying and measuring angles, finding unknown angles.	Pupils will be able to measure, draw and estimate angles, as well as being able to calculate angles in a range of simple situations.	angle, degree, right angle, acute angle, obtuse angle, reflex angle, straight line, full turn, vertically opposite, unknown angle
7 Term 3	Handling data and statistical diagrams	Place value Adding Subtracting Multiplying Dividing Averages and the range Interpreting frequency tables and two-way tables Drawing and interpreting tally charts	Averages and range, tables and charts, collecting and presenting data.	Pupils will be able to work out the mean, median, mode, and range for a set of data. They will be able to draw and interpret this on various tables and charts.	data, frequency, table, chart, bar chart, pictogram, mean, median, mode, range, average, axis, scale

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Drawing and interpreting pictograms Drawing and interpreting bar charts			
7 Term 3	Proportion		Ratio, proportion word problems.	Pupils will use the unitary method for calculating different quantities from known comparisons. This will be applied to proportion, equivalent ratios, fractions of quantities.	proportion, ratio, unitary method, multiplier, scale factor, equivalent, direct proportion, share, compare, amount
7 Term 3	Fractions, decimals and percentages	Multiplying fractions Solving proportion problems Constructing fractions Finding equivalent fractions Simplifying fractions Ordering fractions	Reciprocals, multiplying fractions, dividing fractions, multiplying with mixed numbers, dividing with mixed numbers, Fractions of amounts without a calculator, Fractions of amounts with a calculator, converting between fractions and decimals, Converting between fractions, decimals and percentages, Ordering fractions, decimals and percentages	Pupils will understand how the same value can be represented in different forms and how to convert confidently between them. They will be able to compare, order, simplify, and calculate with fractions, decimals, and percentages in a range of contexts. Pupils will also develop their understanding of percentage increase, percentage decrease, percentage change, and reverse percentages, helping	fraction, decimal, percentage, numerator, denominator, equivalent fraction, simplify, mixed number, improper fraction, terminating decimal, recurring decimal, convert, percentage multiplier, percentage increase, percentage decrease, reverse percentage,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Converting between mixed numbers and improper fractions	Writing numbers as percentages of other numbers	them solve real-life problems involving money, measures, and proportion.	percentage change, original amount, decimal place, significant figure
7 Term 3	Probability	Constructing fractions Adding and subtracting fractions Converting between fractions, decimals and percentages Ordering fractions, decimals and percentages Writing numbers as percentages of other numbers	Theoretical probability.	Pupils will use the language associated with probability, understand the probability scale, calculate the probability of single events and understand how theoretical and experimental probabilities may differ.	probability, outcome, event, likelihood, impossible, unlikely, even chance, likely, certain, theoretical probability, probability scale
8 Term 1	Percentages	Converting between fractions, decimals and percentages Fractions of amounts without a calculator	Percentages of amounts, percentage change.	Pupils will use non-calculator and calculator methods to find percentages of amounts and percentage change.	percentage, percent, multiplier, percentage increase, percentage decrease, original amount,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Fractions of amounts with a calculator Finding percentages of amounts without a calculator Finding percentages of amounts with a calculator			percentage change, decimal multiplier, reverse percentage
8 Term 1	Money	Solving proportion problems Adding decimals Subtracting decimals Using a written method to multiply decimals Using a written method to divide by integers to get a decimal answer	Calculating with money.	Pupils will develop their understanding of proportion by working with finding the best value for money.	currency, value for money, cost, price, profit, loss, discount, sale price, interest, simple interest, budget
8 Term 1	Indices	Calculating with roots and powers Simplifying fractions Algebraic notation	Index laws; multiplication, division, brackets.	Pupils will learn and apply the index laws and use them algebraically.	index, indices, power, base, exponent, square, cube, reciprocal, index law, negative index, zero index

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
8 Term 1	Equations	Solving equations with one step Expanding single brackets Solving equations of the form $ax+b=c$ Solving equations of the form $x/a+b=c$ Simplifying expressions containing a single variable Substituting into expressions with multiple operations	Solving equations.	Pupils will be able to solve one, two, and multi-step equations.	equation, solve, unknown, variable, inverse operation, balance method, linear equation, solution, coefficient, constant
8 Term 1	Sequences	Using number lines Adding and subtracting with negative numbers Multiplying and dividing with negative numbers Term-to-term rules for numerical sequences Term-to-term rules for sequences of patterns	Term to term rules, position to term rules.	Pupils will be able to recognise key types of sequences as well as be able to find and use the nth term.	sequence, term, term-to-term rule, position-to-term rule, nth term, arithmetic sequence, common difference, generate, pattern

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Solving equations of the form $ax+b=c$ Substituting into expressions with multiple operations			
8 Term 1	Ratio	Finding the highest common factor Constructing fractions Writing numbers as percentages of other numbers Writing and simplifying ratios Using equivalent ratios to find unknown amounts Writing ratios in the form 1:n	Ratio, scale diagrams.	Pupils will be able to write and simplify ratios as well as use equivalent ratios to find amounts. They will share amounts in a given ratio and use scaling of ratios on diagrams.	ratio, simplify, equivalent ratio, part, whole, share, scale factor, proportion, unit ratio, multiplicative relationship
8 Term 2	Rounding		Significant figures.	Pupils will be able to round to different degrees of significance and use this to estimate calculations.	rounding, decimal place, significant figure, estimate, approximation, upper

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
					bound, lower bound, degree of accuracy
8 Term 2	Coordinates	Reading and plotting coordinates	Coordinates and midpoints.	Pupils will expand their understanding of coordinates by finding midpoints of lines and pairs of coordinates.	coordinate, coordinate grid, x-axis, y-axis, origin, quadrant, point, plot, midpoint, horizontal, vertical
8 Term 2	Area	Finding the area of rectangles Finding the area of triangles Finding the area of compound shapes containing triangles Converting units of length	Area and units.	Pupils will be able to find the area of parallelograms, trapezia, and convert units of area.	area, compound shape, rectangle, triangle, parallelogram, trapezium, base, height, perpendicular height, square unit
8 Term 2	Circles	Calculating with roots and powers	Area and circumference of a circle.	Pupils will recognise and understand the significance of Pi and be able to use it to	circle, radius, diameter, circumference, centre, chord, arc,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Substituting into algebraic formulae Rounding decimals		find the area and circumference of circles.	sector, tangent, pi, area of a circle
8 Term 2	Standard form	Multiplying and dividing by 10, 100 and 1000	Standard form and ordinary numbers.	Pupils will be able to convert between standard form and ordinary numbers and apply this to contextual questions.	standard form, ordinary number, power of ten, index, coefficient, positive power, negative power, significant figure
8 Term 2	Venn diagrams	Writing probabilities as fractions Writing probabilities as fractions, decimals and percentages Probabilities of mutually exclusive events Venn diagrams Finding the lowest common multiple Finding factors and using divisibility tests	Venn diagrams, factors, multiples and primes.	Pupils will be able to use venn diagrams to solve highest common factor and lowest common multiple questions.	Venn diagram, set, subset, universal set, intersection, union, complement, region, overlap, frequency

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Finding the highest common factor Finding prime numbers Prime factor decomposition			
8 Term 2	3D Shapes	Shape properties	Nets.	Pupils will be able to identify and draw the nets of key 3D shapes.	3D shape, prism, cuboid, cube, cylinder, cone, sphere, face, edge, vertex, net, cross-section
8 Term 2	Surface area and volume	Nets of 3D shapes Finding the area of compound shapes Finding the area of compound shapes containing triangles Converting units of length Finding the area of compound shapes Finding the area of compound shapes containing triangles	Surface area, volume.	Pupils will be able to find the surface area of 3D shapes including using their nets. They will be able to find the volume of different prisms.	surface area, volume, face, net, cubic unit, square unit, capacity, prism, compound solid, depth

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Converting units of length			
8 Term 3	Linear graphs	Reading and plotting coordinates Substituting into algebraic formulae	Plotting graphs and finding equations.	Pupils will be able to plot horizontal, vertical, and diagonal lines. They will find and interpret the equations of straight lines.	linear graph, straight line, gradient, intercept, y-intercept, equation, coordinate, plot, axis, $y = mx + c$
8 Term 3	Transformations	Reading and plotting coordinates	Transforming shapes.	Pupils will recognise, describe and draw all four transformations in isolation and in combination.	transformation, reflection, rotation, translation, enlargement, mirror line, centre of rotation, vector, scale factor, invariant
8 Term 3	Angles	Angles on a line and about a point Vertically opposite angles Angles in triangles	Finding unknown angles, angles on parallel lines, angles in polygons.	Pupils will work with and solve problems involving angles in quadrilaterals, parallel lines, and angles in polygons.	angle, degree, acute, obtuse, reflex, corresponding angles, alternate angles, co-interior angles, parallel lines, transversal

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
8 Term 3	Statistical diagrams	Drawing angles Angles on a line and about a point Fractions of amounts without a calculator Averages and range	Drawing and interpreting statistical diagrams.	Pupils will be able to draw and interpret pie charts, line graphs, and stem and leaf diagrams.	data, frequency, bar chart, line graph, pie chart, stem-and-leaf diagram, sector, scale, axis, key
8 Term 3	Inequalities	Using number lines Solving equations with one step Mixed problems: solving equations with two or more steps	Linear inequalities.	Pupils will be able to read and draw linear inequalities on number lines as well as solve equations involving single inequalities.	inequality, inequality symbol, greater than, less than, greater than or equal to, less than or equal to, solution set, number line
8 Term 3	Brackets	Expanding single brackets and simplifying expressions	Double brackets.	Pupils will be able to expand and simplify double brackets.	bracket, expand, factorise, double bracket, term, expression, coefficient, constant, simplify, collect like terms

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
8 Term 3	Algebraic fractions	Adding and subtracting fractions Adding and subtracting mixed numbers Multiplying fractions Multiplying with mixed numbers Dividing fractions Dividing with mixed numbers Calculating with fractions Simplifying algebraic fractions by cancelling common factors Factorising into one bracket	Fractions review, algebraic fractions.	Pupils will be able to extend their knowledge of fractions and apply it in an algebraic setting.	algebraic fraction, numerator, denominator, simplify, common denominator, factorise, cancel, expression, variable
8 Term 3	Recurring decimals	Using a written method to divide by integers to get a decimal answer Converting between fractions, decimals and percentages	Fractions and recurring decimals.	Pupils will use and understand recurring decimal notation. They will also be able to convert fractions to recurring decimals.	recurring decimal, terminating decimal, dot notation, recurring digit, recurring cycle, fraction, numerator, denominator, convert

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
9 Term 1	Fractions and percentages	Finding equivalent fractions Ordering fractions Multiplying fractions Finding percentages of amounts without a calculator Finding percentages of amounts with a calculator	Fractions, decimals and percentages review, percentage change.	Pupils will be able to order and simplify fractions, add/subtract fractions with common or differing denominators, multiply fractions by initially simplifying, dividing fractions, converting between mixed numbers and improper fractions. Pupils will know common equivalences between fractions, decimals & percentages and be able to calculate the equivalences if not known. They will be able to round to the nearest integer/10/100 etc or to round to a given number of decimal places or significant figures. Pupils will be able to perform calculations involving fractions, decimals & percentages. Pupils will use non-calculator and calculator methods to	fraction, numerator, denominator, mixed number, improper fraction, equivalent fraction, percentage, percentage change, multiplier, reverse percentage, recurring decimal, terminating decimal

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
				find percentages of amounts and percentage change.	
9 Term 1	Probability	Writing probabilities as fractions, decimals and percentages Probabilities of mutually exclusive events Finding fractions of amounts Finding percentages of amounts	Theoretical and experimental probability.	Pupils will understand the difference between theoretical and experimental probability and solve questions involving probability trees.	probability, outcome, event, sample space, relative frequency, theoretical probability, experimental probability, mutually exclusive, exhaustive, probability scale, Venn diagram
9 Term 1	Standard form	Using standard form with positive indices Using standard form with negative indices Index rules with positive indices Index rules with negative indices	Calculations with standard form.	Pupils will be able to convert between standard form and ordinary numbers and apply this to contextual questions.	standard form, ordinary number, power of ten, coefficient, index, positive index, negative index, significant figure, order of magnitude, scientific notation

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
9 Term 1	Inequalities	Reading and drawing inequalities on number lines Solving single inequalities	Linear inequalities.	Pupils will be able to solve single and double inequalities as well as representing them visually.	inequality, inequality symbol, solution set, number line, boundary value, greater than, less than, greater than or equal to, less than or equal to, integer solution
9 Term 1	Quadratic Equations	Expanding double brackets Factorising into one bracket	Factorising and solving quadratic equations.	Pupils will be able to recognise a quadratic equation and factorise it.	quadratic, quadratic equation, expression, coefficient, constant, factorise, bracket, root, solution, solve, zero product property
9 Term 1	Formulae	Solving equations with two or more steps Solving equations with the variable on both sides Solving equations with the variable in the denominator	Rearranging formulae.	Pupils will be able to rearrange formulae and substitute values in.	formula, subject, substitute, rearrange, variable, constant, coefficient, equation, inverse operation, evaluate

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
9 Term 1	Constructions	Using a ruler Using a pair of compasses	Constructing bisectors and perpendicular lines.	Pupils will be able to bisect angles and construct perpendicular bisectors and lines.	construction, compass, ruler, perpendicular bisector, angle bisector, locus, equidistant, arc, perpendicular, scale drawing
9 Term 1	Circles	Identifying parts of circles Finding the circumference of circles Finding the area of circles Finding the surface area of prisms Finding the volume of prisms	Circles and cylinders.	Pupils will be able to find the arc length of a sector, the area of a sector, and the surface area and volume of cylinders.	circle, radius, diameter, circumference, centre, chord, arc, sector, segment, tangent, pi, area of a circle
9 Term 2	Rounding	Rounding integers Rounding decimals Rounding integers using significant figures	Error intervals.	Pupils will be able to round using significant figures, truncate values, and give error intervals.	rounding, decimal place, significant figure, estimate, approximation, degree of accuracy,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Rounding decimals using significant figures			upper bound, lower bound, error interval
9 Term 2	3D Shapes	Properties of 3D shapes	Representations of 3D shapes.	Pupils will be able to sketch plans and elevations of different shapes.	3D shape, prism, cuboid, cube, cylinder, cone, sphere, pyramid, face, edge, vertex, net, cross-section
9 Term 2	Pythagoras' theorem	Calculating with roots and powers Solving equations with two or more steps	Pythagoras' theorem in 2D.	Pupils will be able to recognise and apply Pythagoras' theorem.	right-angled triangle, hypotenuse, shorter side, square, square root, theorem, Pythagoras' theorem, length, diagonal, 3D Pythagoras
9 Term 2	Ratio and proportion	Finding the highest common factor Operations with money	Ratio, proportion word problems.	Pupils will be able to write and share ratios. Pupils will solve direct and inverse proportion questions and convert currency.	ratio, proportion, direct proportion, inverse proportion, scale factor, unitary method, multiplier, equivalent ratio,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
					share, constant of proportionality
9 Term 2	Linear graphs	Reading and plotting coordinates Plotting horizontal, vertical and diagonal lines Plotting straight line graphs	Plotting graphs and finding equations.	Pupils will be able to recognise the equation of a line and plot graphs using xy tables.	linear graph, straight line, gradient, y-intercept, intercept, coordinate, axis, equation of a line, parallel lines, perpendicular lines, $y = mx + c$
9 Term 2	Compound measures	Substituting into formulae Solving equations with two or more steps Changing the subjects of formulae with two or more steps Reading, converting and calculating with time Converting units of length, mass and capacity	Speed and rates of change.	Pupils will be able to recognise rates and speed, distance, time questions and solve in context.	compound measure, speed, distance, time, density, mass, volume, pressure, force, area, rate, unit conversion

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
9 Term 2	Motion-time graphs	Calculating with speed Finding equations of straight line graphs	Distance-time graphs.	Pupils will be able to plot distance-time graphs, interpret them, and calculate speed and distance.	distance-time graph, speed-time graph, gradient, speed, acceleration, deceleration, constant speed, stationary, distance, time interval, area under a graph
9 Term 3	Quadratic graphs	Substituting into algebraic formulae Plotting straight line graphs Factorising to solve quadratic equations of the form $x^2+bx+c=0$	Plotting and interpreting quadratic graphs.	Pupils will be able to sketch or plot graphs of quadratics and recognise various features of the graph. Pupils will solve quadratics graphically.	quadratic graph, parabola, curve, turning point, vertex, line of symmetry, roots, solutions, intercept, y-intercept, maximum, minimum
9 Term 3	Angles and bearings	Angles on a line and about a point Vertically opposite angles Angles in triangles Angles in quadrilaterals Line and shape properties	Angles on parallel lines and in polygons, bearings.	Pupils will be able to solve questions involving angles on parallel lines, angles in quadrilaterals and angles in polygons.	angle, bearing, three- figure bearing, clockwise, north line, acute angle, obtuse angle, reflex angle, corresponding angles, alternate angles, co- interior angles

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary (Tier 3)
		Understanding, measuring and drawing angles Combining angle facts Angles on parallel lines			
9 Term 3	Transformations	Translation Reflection	Transforming shapes.	Pupils will be able to translate, reflect, rotate, and enlarge given shapes.	transformation, reflection, rotation, translation, enlargement, object, image, mirror line, centre of rotation, vector, scale factor, centre of enlargement
9 Term 3	Similarity and congruence	Solving direct proportion word problems	Similar shapes, congruent shapes.	Pupils will be able to recognise similar and congruent shapes and use this to find unknown sides.	similar, congruent, corresponding sides, corresponding angles, scale factor, enlargement, proportional, ratio, identical, orientation
9 Term 3	Handling data and statistical diagrams	Reading and plotting coordinates Finding equations of straight line graphs	Scatter graphs, collecting and presenting data, grouped data.	Pupils will be able to draw and interpret scatter graphs, collect and present both discrete and continuous data.	data, frequency, grouped data, class interval, bar chart, pie chart, scatter

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary (Tier 3)
		Averages and range Interpreting graphs and charts Interpreting frequency tables and two-way tables Finding averages from frequency tables			graph, correlation, mean, median, mode, range, outlier
9 Term 3	Vectors		Column vectors.	Pupils will be able to understand and manipulate column vectors.	vector, column vector, magnitude, direction, resultant, scalar, multiple, translation vector, equal vectors, parallel vectors

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
7 Term 1	Number sense and calculations	Each KPI is assessed through an end of topic assessment. KPI 7.1 Number Sense and Calculations KPI 7.2 Expressions and Equations KPI 7.3 Time and Measures KPI 7.4 2D Shapes & Perimeter and Area KPI 7.5 Coordinates & Brackets KPI 7.6 Factors, Multiples, and Primes. KPI 7.7 Fractions	Revisits KS2 place value, ordering numbers, rounding, negative numbers in context, written and mental methods, times tables, division with remainders, and estimation. The unit builds internally from place value into operations, negative numbers and order of operations.	All pupils access learning through explicit modelling, worked examples and concrete-pictorial-abstract approaches, including counters for negative number calculations, number lines and place value grids. Key vocabulary is pre-taught and revisited regularly. Tasks are chunked from fluency to reasoning, with scaffolds such as times table grids and step-by-step prompts where needed. Mini whiteboards and questioning are used for immediate feedback. Secure pupils are challenged to explain why methods work, choose efficient strategies and solve multi-step problems involving decimals,	Links directly to GCSE integers, place value, decimals, written methods, negative numbers, order of operations, estimation and rounding. At Higher, this also feeds into indices, roots, reciprocals, standard form and surds.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
		KPI 7.8 Angles		negatives and order of operations.	
7 Term 1	Expressions and equations	KPI 7.9 Handling Data and Statistical diagrams KPI 7.10 Proportion KPI 7.11 Fractions, Decimals, and Percentages KPI 7.12 Probability Pupils also sit 3 cumulative end-of-term examinations which cover topics covered in the Autumn, Spring, and Summer terms.	Revisits KS2 missing-number problems, inverse operations, order of operations and early algebraic thinking. It also revisits earlier Year 7 Number sense and calculations, especially times tables, negative numbers, arithmetic fluency and order of operations.	Pupils move from concrete and visual representations to abstract algebraic notation. Tasks are sequenced effectively with scaffolds such as partially completed examples, highlighted like terms and step-by-step equation layouts. Secure pupils are challenged to form expressions, apply formulae in context, solve multi-step equations and explain their reasoning using correct algebraic vocabulary.	Leads into GCSE algebra basics, including algebraic notation, simplifying expressions, substitution, formulae, solving linear equations, inequalities, rearranging formulae, simultaneous equations and later quadratic equations.
7 Term 1	Measures		Revisits KS2 metric units, length, mass, capacity, volume, time, money, reading scales and converting units. It also revisits	Practical measuring equipment, visual scales and conversion tables	Prepares pupils for GCSE unit conversion, metric measures, time, mass, length, capacity, area,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			Year 7 Number sense and calculations, especially multiplying and dividing by 10, 100 and 1000, decimal place value and number lines.	are used to make units and relationships explicit. Worked examples model how to read scales and convert between metric units, with place-value grids and step-by-step prompts available where needed. Pupils then move from practical examples to contextual problems. Secure pupils are challenged with multi-step conversions and less familiar compound-measure contexts.	volume and compound measures such as speed, density, pressure and rates of pay. It also links to real-life graphs and ratio/proportion contexts.
7 Term 2	2D Shapes		Revisits KS2 shape properties, polygons, symmetry, parallel and perpendicular lines, right angles and accurate geometric vocabulary. This is the first main Year 7 geometry topic, so it mostly consolidates KS2	Pupils use physical and visual representations of shapes before moving to formal diagrams and notation. Properties are highlighted and classified using sorting	Links to GCSE properties of shapes, parallel lines, angle facts, polygons, transformations, constructions, similarity, congruence, Pythagoras and trigonometry. Shape

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			knowledge and then becomes a foundation for later Year 7 topics.	activities, labelled examples and key vocabulary prompts. Diagrams can be enlarged or partially annotated where needed. Secure pupils are challenged to justify classifications, compare properties and reason from minimal information rather than simply identify shapes.	language in Year 7 becomes essential for geometric reasoning later.
7 Term 2	Perimeter and area		Revisits KS2 perimeter of rectangles and rectilinear shapes, area of rectangles and squares, square units and measuring length. It also revisits earlier Year 7 Number sense and calculations through addition and multiplication, and 2D Shapes through line and shape properties.	Squared paper, tiles and clearly labelled diagrams are used to connect perimeter and area to length and square units. Formulae are introduced through worked examples before pupils use scaffolded layouts to substitute values accurately. Compound shapes are broken into	Builds towards GCSE perimeter, area and volume, including compound shapes, triangles, parallelograms, trapezia, circles, composite shapes, surface area and volume. The GCSE schemes specifically develop area/perimeter into volume, circles and 3D solids.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				manageable parts where needed. Secure pupils are challenged to select efficient methods, work backwards and explain why perimeter and area require different approaches.	
7 Term 2	Coordinates		Revisits KS2 reading and plotting coordinates, including coordinates in the first quadrant and then all four quadrants. It also revisits Year 7 2D Shapes, because pupils use shape properties when solving coordinate problems.	Coordinate grids are modelled explicitly, with the origin and axes highlighted and movement from x to y reinforced through consistent routines. Pupils can use enlarged grids, axis prompts and partially completed examples before plotting independently. Shapes on grids provide a visual link to geometry. Secure pupils are challenged with missing coordinates, all	Links to GCSE real-life graphs, straight-line graphs, coordinate geometry, plotting in all four quadrants, midpoint, gradient, intercepts, graphing equations and graphical solutions. Coordinates also support transformations and vectors later.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				four quadrants and reasoning about shapes without plotting every point.	
7 Term 2	Factors, multiples, and primes		Revisits KS2 multiplication tables, factors, multiples, common factors, common multiples, prime numbers and divisibility. It also revisits Year 7 Number sense and calculations, especially times tables, written division, odd/even numbers and dividing into equal groups.	Arrays, counters, multiplication grids and factor lists are used to make factors and multiples visible before pupils move to abstract notation. Divisibility rules and prime factor methods are introduced in small steps, with worked examples and structured factor trees where needed. Secure pupils are challenged to compare methods, justify divisibility and solve HCF and LCM problems in unfamiliar contexts.	Develops into GCSE HCF, LCM, prime factor decomposition, divisibility, Venn diagrams, product notation and standard form. These skills also support fraction simplification, ratio, algebraic factorisation and problem solving.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
7 Term 2	Fractions; Fractions, decimals and percentages		Revisits KS2 equivalent fractions, simplifying, comparing and ordering fractions, mixed numbers, improper fractions and adding/subtracting fractions. It also revisits Year 7 Factors, multiples and primes, particularly HCF and LCM, which support simplifying fractions and finding common denominators.	Fraction walls, bar models and number lines are used to connect equivalent fractions, simplifying and ordering. Worked examples make common denominators and the four operations explicit, with multiplication grids and step-by-step calculation frames available where needed. Pupils move gradually towards abstract methods. Secure pupils are challenged to choose efficient strategies, work with mixed numbers and explain equivalence using precise vocabulary.	Links to GCSE fractions, decimals and percentages, including simplifying, equivalent fractions, mixed and improper fractions, operations with fractions, fractions of amounts, reciprocals and exact calculation. At Higher, it later supports algebraic fractions.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
7 Term 2	Brackets		Revisits KS2 order of operations using brackets, missing-number work and early algebraic reasoning. It also revisits Year 7 Expressions and equations, especially algebraic notation and simplifying expressions, and Factors, multiples and primes when factorising using common factors.	Algebra tiles, area models and colour-coded examples are used to show what brackets represent before pupils move to symbolic manipulation. Expansion and factorisation are modelled as inverse processes, with partially completed examples and common-factor prompts where needed. Secure pupils are challenged to spot structure, work backwards from expanded expressions and explain why different expressions are equivalent.	Leads into GCSE expanding brackets, factorising, collecting like terms, solving equations with brackets, expanding double brackets, quadratic factorisation and algebraic proof. It is a key stepping stone from early algebra to GCSE quadratics.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
7 Term 3	Angles		Revisits KS2 measuring and drawing angles, acute/obtuse/reflex angles, angles on a straight line, angles around a point and missing-angle reasoning. It also revisits Year 7 2D Shapes through triangle and shape properties, and Expressions and equations when forming or solving missing-angle equations.	Angle types and facts are supported through clear diagrams, practical measuring and explicit modelling of protractor use. Unknown-angle problems are annotated in stages, with key facts and equation structures provided as prompts where needed. Mini whiteboards allow misconceptions to be identified quickly. Secure pupils are challenged to combine several angle facts, form equations and justify each step of their reasoning.	Builds towards GCSE properties of shapes, parallel lines and angle facts, interior and exterior angles of polygons, bearings, constructions, Pythagoras, trigonometry and circle theorems. At Higher, angle reasoning becomes important for proof-style geometry.
7 Term 3	Handling data and statistical diagrams		Revisits KS2 tables, bar charts, pictograms, line graphs, timetables and interpreting data. It also revisits Year 7 Number sense and calculations,	Tables, charts and data sets are introduced through familiar contexts, with worked examples modelling how	Links to GCSE tables, charts, graphs, pie charts, scatter graphs, averages, range, frequency tables, sampling, grouped data,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			especially addition, subtraction, multiplication, division and place value. Within the topic itself, averages and range are then reused when interpreting frequency tables and diagrams.	to read scales and organise information. Pre-drawn axes, frequency-table templates and calculation frames support pupils where needed. Calculators can reduce arithmetic load when the statistical idea is the focus. Secure pupils are challenged to compare representations, identify misleading features and justify conclusions from data.	stem-and-leaf diagrams, cumulative frequency, box plots and histograms. The Higher scheme develops this into more advanced representation and interpretation of data.
7 Term 3	Proportion		Revisits KS2 ratio and proportion, scaling, missing-value problems, unequal sharing, percentages of amounts and multiplicative reasoning. It also revisits Year 7 Number sense and calculations through multiplication/division	Bar models, ratio tables and double number lines are used to make multiplicative relationships visible before pupils use the unitary method independently.	Leads into GCSE ratio, proportion, multiplicative reasoning, scale factors, best value, rates of pay, currency conversion, compound measures, direct proportion and inverse proportion. This

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			fluency, and links to Fractions through fractions of amounts and equivalent relationships.	Problems are chunked so pupils identify what one unit represents before scaling up or down. Key vocabulary is reinforced through sentence stems. Secure pupils are challenged to solve multi-step proportion problems and compare alternative methods for efficiency.	becomes especially important for multi-step GCSE problem solving.
7 Term 3	Fractions, decimals and percentages		Revisits KS2 fraction-decimal-percentage equivalence, decimal place value, common FDP conversions, multiplying/dividing decimals by powers of 10 and percentages as parts per hundred. It also revisits Year 7 Fractions heavily, including equivalent fractions, simplifying, ordering, mixed/improper fractions and fraction calculations, as well as Proportion when finding	Fraction walls, hundred grids, bar models and place-value representations are used to connect fractions, decimals and percentages as equivalent forms. Conversion methods are modelled explicitly and percentage multipliers are introduced after conceptual	Links directly to GCSE FDP conversion, ordering, percentage of amounts, percentage increase/decrease, percentage change, reverse percentages, simple interest, compound interest and financial mathematics. The GCSE Foundation scheme explicitly includes converting between fractions, decimals and

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			percentages and fractions of amounts.	understanding is secure. Reference grids and worked examples support pupils where needed. Secure pupils are challenged with reverse percentages, percentage change and multi-step problems requiring flexible movement between representations.	percentages and interpreting percentages multiplicatively.
7 Term 3	Probability		Probability is not a separate statutory KS2 strand, so much of the formal probability language is new in Year 7. However, it revisits KS2 fractions, FDP equivalence, systematic listing and interpreting information from tables or diagrams. It also revisits Year 7 Fractions, Fractions, decimals and percentages, and Proportion, because pupils write, compare	Probability language is introduced using visual probability scales, simple experiments and organised sample spaces. Fractions, decimals and percentages are linked explicitly so pupils can represent the same probability in different forms. Structured tables and sentence stems	Builds towards GCSE theoretical probability, experimental probability, probability scales, sample spaces, mutually exclusive events, combined events, tree diagrams, Venn diagrams and relative frequency. It also relies on pupils being confident with fractions, decimals and percentages.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			and convert probabilities using FDP forms.	support systematic reasoning where needed. Secure pupils are challenged to compare theoretical and experimental results, explain differences and solve less familiar probability problems.	
8 Term 1	Percentages	Each KPI is assessed through an end of topic assessment. KPI 8.1 Percentages & Money KPI 8.2 Indices, Equations, and Sequences KPI 8.3 Ratio	Revisits Fractions, Fractions, decimals and percentages, and Proportion. Pupils build on converting between fractions, decimals and percentages, finding fractions of amounts, and using proportion methods to find percentages of amounts and percentage change.	Percentage grids, bar models and fraction-decimal-percentage equivalences are used before pupils move to multiplier methods. Worked examples separate finding a percentage of an amount from percentage increase, decrease and change, with calculator key sequences modelled where appropriate. Secure pupils are	Links directly to GCSE fractions, decimals and percentages, percentage increase/decrease, percentage change, reverse percentages, simple interest, compound interest, profit/loss, and real-life percentage contexts. It also supports multiplicative reasoning and financial problem solving.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
		KPI 8.4 Rounding, Coordinate Midpoints, and Standard Form KPI 8.5 Area and Units & Circles		challenged to choose between mental, written and multiplier methods and solve reverse or multi-step percentage problems.	
8 Term 1	Money	KPI 8.6 Venn Diagrams & Factors, Multiples, and Primes KPI 8.7 3D Shapes & Surface Area and Volume KPI 8.8 Linear Graphs KPI 8.9 Transformations & Angles KPI 8.10 Statistical Diagrams	Revisits Number sense and calculations and Proportion. Pupils use decimal addition, subtraction, multiplication and division, alongside proportion problem-solving, to work with money, value for money and real-life financial contexts.	Realistic price lists, receipts and comparison tables make money calculations meaningful and reduce unnecessary language barriers. Decimal calculations and proportion methods are modelled in clear stages, with calculators used when arithmetic is not the main focus. Key information can be highlighted in longer questions. Secure pupils are challenged to justify best-value decisions and solve multi-step problems involving	Builds towards GCSE questions involving value for money, best buys, currency conversion, unit pricing, profit and loss, interest, compound interest, and percentage change. It also links strongly with ratio, proportion and multiplicative reasoning.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
		KPI 8.11 Inequalities, Brackets, and Algebraic Fractions		discounts, profit, loss and interest.	
8 Term 1	Indices	KPI 8.12 Fractions & Recurring Decimals.	Revisits Number sense and calculations, Fractions, and Expressions and equations. Pupils build on roots and powers, simplifying fractions, and algebraic notation before applying index laws to numerical and algebraic expressions.	Repeated multiplication is used to establish the meaning of indices before index laws are generalised. Powers are colour-coded and matched to expanded forms, with an index-law reference grid and worked examples available where needed. Pupils practise one law at a time before combining them. Secure pupils are challenged to simplify multi-step expressions and explain why zero and negative indices behave as they do.	Leads into GCSE powers, roots, index laws, zero and negative indices, standard form, and, at Higher, fractional indices and surds. This also supports algebraic simplification and standard form calculations.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
8 Term 1	Equations		Revisits Expressions and equations and Brackets. Pupils build on one-step equations, equations of the form $ax + b = c$, substitution, simplifying expressions and expanding single brackets, then extend to brackets, unknowns on both sides and more complex equation types.	Balance models and inverse-operation diagrams are used to connect equation solving to maintaining equality. Worked examples are laid out consistently, with one change per line and algebraic steps highlighted where needed. Pupils move from concrete and visual models to abstract equations. Secure pupils are challenged with variables on both sides, brackets and equations formed from contextual problems, explaining why each transformation preserves the solution.	Develops into GCSE linear equations, equations with brackets, unknowns on both sides, constructing equations from word problems, rearranging formulae, simultaneous equations, and later quadratic equations.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
8 Term 1	Sequences		Revisits Number sense and calculations and Expressions and equations. Pupils use number lines, negative numbers, substitution and solving equations to move from term-to-term rules towards position-to-term rules and arithmetic sequences.	Sequences are introduced through visual patterns, number lines and term tables before pupils move to algebraic rules. Differences are highlighted and position-to-term relationships are modelled step by step, with partially completed tables available where needed. Secure pupils are challenged to generate sequences from rules, work backwards from given terms and justify nth-term expressions using the structure of the sequence.	Links to GCSE term-to-term rules, position-to-term rules, nth term of linear sequences, arithmetic sequences, geometric sequences, and recognising pattern sequences from diagrams.
8 Term 1	Ratio		Revisits Factors, multiples and primes, Fractions, Fractions, decimals and percentages, and Proportion. Pupils use HCF,	Counters, bar models and ratio tables are used to represent parts and wholes before pupils	Leads directly to GCSE simplifying ratios, sharing in a ratio, three-part ratios, ratio as a fraction,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			constructing fractions, equivalent fractions, and writing numbers as percentages before simplifying ratios, sharing in a ratio and converting between ratios, fractions and percentages.	work with ratio notation. Simplifying and sharing are modelled through common factors and unit ratios, with double number lines available where helpful. Secure pupils are challenged with multi-step sharing, ratios involving different units and problems where the whole or one part must be inferred.	scale factors, recipes, currency conversion, similarity, and links between ratio and linear functions.
8 Term 2	Rounding		Revisits Number sense and calculations. Pupils extend Year 7 rounding of integers and decimals into rounding to significant figures and estimating calculations.	Place-value charts and number lines are used to make the size of numbers and rounding boundaries visible. Worked examples model decimal places and significant figures separately, with digits to retain and inspect highlighted where	Builds towards GCSE rounding to decimal places and significant figures, estimation, checking answers, limits of accuracy, upper and lower bounds, and error intervals. This is especially important for Higher work on accuracy and bounds.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				needed. Estimation is linked to checking reasonableness. Secure pupils are challenged to select an appropriate degree of accuracy and justify estimates in contextual problems.	
8 Term 2	Coordinates		Revisits Coordinates from Year 7. Pupils build on reading and plotting coordinates by calculating midpoints and solving mixed coordinate problems.	Enlarged coordinate grids, axis labels and colour-coded x and y movements support accurate reading and plotting. Midpoints are introduced visually before pupils use numerical methods, with partially completed coordinates and grid prompts where needed. Secure pupils are challenged to find missing endpoints, reason without drawing and connect coordinate	Links to GCSE coordinates in all four quadrants, midpoints, length of a line segment, straight-line graphs, coordinate geometry, transformations, and later vectors.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				changes to geometric properties and later graph work.	
8 Term 2	Area		Revisits Perimeter and area and Measures. Pupils use area of rectangles, triangles and compound shapes, as well as converting units of length, before moving on to parallelograms, trapezia and area unit conversions.	Shapes are decomposed, rearranged and represented on squared paper so pupils can see how area formulae are constructed. Base and perpendicular height are highlighted consistently, with formula prompts and labelled diagrams available where needed. Unit conversion is modelled separately before being combined with area. Secure pupils are challenged with compound shapes, missing dimensions and problems requiring selection of an appropriate formula.	Prepares pupils for GCSE area of triangles, rectangles, parallelograms and trapezia, compound shapes, area unit conversion, circle area, sector area, and eventually surface area and volume.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
8 Term 2	Circles		Revisits Number sense and calculations, Expressions and equations, and Rounding skills from Year 7. Pupils use powers, substitution into formulae and rounding decimals when finding circumference and area. This is also a new extension of shape work from 2D Shapes.	Physical circles, string and labelled diagrams are used to establish radius, diameter and circumference before formulae are applied. The relationship between diameter and circumference is explored visually so pi has meaning rather than being treated only as a button. Formula and substitution frames support pupils where needed. Secure pupils are challenged with reverse problems, compound shapes and reasoning involving exact answers.	Leads into GCSE radius, diameter, circumference, area of a circle, semicircles, quarter-circles, composite shapes involving circles, and at Higher, arc length, sector area, circle theorems and circle geometry.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
8 Term 2	Standard form		Revisits Number sense and calculations. Pupils build on multiplying and dividing by 10, 100 and 1000 before writing numbers in standard form with positive and negative powers of ten.	Place-value charts and powers-of-ten grids are used to connect ordinary numbers with standard form. Movement of the decimal point is linked explicitly to multiplication by powers of ten, with positive and negative indices modelled separately. Calculator notation is demonstrated where appropriate. Secure pupils are challenged to compare magnitudes, interpret contextual values and explain why a number is or is not written correctly in standard form.	Links directly to GCSE writing large and small numbers in standard form, positive and negative powers of ten, calculator displays, and multiplying/dividing numbers in standard form. At Higher, this also connects to indices and surds.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
8 Term 2	Venn diagrams		Revisits Probability, Fractions, Fractions, decimals and percentages, and Factors, multiples and primes. Pupils use probability as fractions/FDP, mutually exclusive events, HCF, LCM, prime factor decomposition and divisibility before using Venn diagrams for probability and factor problems.	Physical sorting using hoops and cards is used before pupils move to abstract Venn diagrams and set notation. Regions are labelled and examples are built one condition at a time, with partially completed diagrams and factor lists available where needed. Secure pupils are challenged to reason from incomplete information, connect Venn diagrams to HCF and LCM and explain intersections and unions precisely.	Builds towards GCSE sorting information, HCF/LCM using Venn diagrams, probability from Venn diagrams, set notation, union, intersection, and links with probability and mutually exclusive events. The Edexcel probability unit includes Venn diagrams and union/intersection notation.
8 Term 2	3D Shapes		Revisits 2D Shapes. Pupils build on shape properties and line/shape language before identifying properties of 3D shapes and working with nets.	Physical 3D models and nets are handled and matched so pupils can connect two-dimensional representations to solid	Links to GCSE faces, edges, vertices, nets, cubes, cuboids, prisms, cylinders, pyramids, cones and spheres, as well as plans and elevations. It

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				shapes. Faces, edges and vertices are highlighted and key vocabulary is reinforced through labelled diagrams. Net templates can be provided before pupils draw their own. Secure pupils are challenged to visualise unseen faces, compare possible nets and justify whether a net will form a given solid.	prepares pupils for surface area, volume and 3D geometry.
8 Term 2	Surface area and volume		Revisits Perimeter and area, Measures, and 3D shape knowledge. Pupils use area of compound shapes, area of shapes containing triangles, converting units of length, and nets before calculating surface area and volume of cubes, cuboids and prisms. It also builds on the earlier Year 8 3D shapes topic.	Unit cubes, nets and labelled 3D diagrams are used to connect volume and surface area to prior area work. Calculations are separated into clear stages, with formula prompts and face-by-face checklists available where needed. Pupils move from concrete	Develops into GCSE surface area of prisms, volume of cuboids and prisms, volume of cylinders, surface area and volume of cones, spheres and pyramids, compound solids, and unit conversion involving area and volume.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				models to abstract prisms. Secure pupils are challenged with missing dimensions, compound solids and problems requiring comparison of different possible methods.	
8 Term 3	Linear graphs		Revisits Coordinates and Expressions and equations. Pupils use reading and plotting coordinates, substitution into formulae and algebraic notation before plotting straight-line graphs and finding equations of lines.	Coordinate tables and pre-drawn axes support the transition from plotting points to recognising straight-line structure. Horizontal, vertical and diagonal lines are modelled first, then gradient and intercept are highlighted consistently. Step-by-step graphing frames are available where needed. Secure pupils are challenged to identify equations from features, compare lines and	Links to GCSE straight-line graphs, gradient, intercepts, equations of lines, real-life graphs, conversion graphs, distance-time graphs, and finding approximate solutions using graphs.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				explain how changes in an equation affect the graph.	
8 Term 3	Transformations		Revisits Coordinates and 2D Shapes. Pupils use coordinate grids and shape properties when translating and reflecting shapes. This then prepares them for rotation and enlargement later.	Tracing paper, coordinate grids and physical movement are used to make reflections, rotations, translations and enlargements visible. Each transformation is taught with a consistent checklist and precise vocabulary, with centres, mirror lines and vectors highlighted where needed. Secure pupils are challenged to describe transformations fully, combine transformations and identify invariant properties without relying on tracing paper.	Leads into GCSE translation, reflection, rotation, enlargement, describing transformations, combinations of transformations, scale factor, and later links to similarity, congruence and vectors.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
8 Term 3	Angles		Revisits Angles and 2D Shapes. Pupils build on angles on a line, angles around a point, vertically opposite angles and angles in triangles before moving on to angles in quadrilaterals, parallel lines and polygons.	Parallel-line and polygon diagrams are kept uncluttered, with known angle facts colour-coded and marked before calculations begin. Worked examples model how to annotate a diagram and select a relevant rule, with sentence stems for written reasoning where needed. Secure pupils are challenged to combine multiple facts, form equations and prove angle relationships using accurate geometric language.	Builds towards GCSE angle facts, angles in triangles and quadrilaterals, angles on parallel lines, interior and exterior angles of polygons, bearings, constructions, Pythagoras/trigonometry, and Higher circle theorems.
8 Term 3	Statistical diagrams		Revisits Handling data and statistical diagrams, Angles, and Fractions, decimals and percentages. Pupils use averages and range,	Statistical representations are built from organised data tables so pupils can see where values come	Links to GCSE tables, charts and graphs, pie charts, line graphs, scatter graphs, averages, range, sampling, frequency

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			interpreting charts, drawing angles, angles around a point, and fractions of amounts when drawing and interpreting pie charts, line graphs and stem-and-leaf diagrams.	from. Pre-drawn axes, scale prompts, protractors and partially completed diagrams support accurate construction where needed. Worked examples model interpretation as well as drawing. Secure pupils are challenged to compare different representations, identify limitations and make justified conclusions from the same data set.	tables, grouped data, and at Higher, cumulative frequency, box plots and histograms.
8 Term 3	Inequalities		Revisits Number sense and calculations and Expressions and equations. Pupils use number lines and solving one-step or multi-step equations before reading, drawing and solving linear inequalities.	Number lines are used alongside equation-solving methods so pupils can connect an inequality to its solution set. Open and closed endpoints are modelled explicitly, with symbol-language matching	Develops into GCSE inequality notation, solving linear inequalities, representing solutions on number lines, integer solutions, inequalities with brackets, and at Higher, more complex algebraic inequalities.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				activities and step-by-step layouts where needed. Secure pupils are challenged to solve multi-step inequalities, interpret integer solutions and explain how an inequality differs from an equation.	
8 Term 3	Brackets		Revisits Brackets and Expressions and equations from Year 7. Pupils build on expanding single brackets and simplifying expressions before expanding double brackets.	Area models and algebra tiles are used to connect double brackets to earlier single-bracket work before pupils move to symbolic expansion. Terms are colour-coded and organised in grids to reduce omissions, with partially completed expansions available where needed. Secure pupils are challenged to compare methods, simplify efficiently and work backwards from	Leads into GCSE expanding single brackets, expanding double brackets, factorising, solving equations with brackets, quadratic factorisation, algebraic proof, and expanding more than two brackets at Higher.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				expanded expressions to identify possible factorisations.	
8 Term 3	Algebraic fractions		Revisits Fractions, Fractions, decimals and percentages, Brackets, and Expressions and equations. Pupils use adding, subtracting, multiplying and dividing fractions, mixed numbers, factorising into one bracket, and simplifying algebraic fractions by cancelling common factors.	Numeric fractions are revisited first so pupils can connect familiar fraction rules to algebraic expressions. Common factors are highlighted and factorisation is modelled before cancellation, with structured numerator-denominator layouts available where needed. Secure pupils are challenged to identify restrictions, simplify more complex expressions and explain why terms cannot be cancelled unless they are factors.	Links to GCSE simplifying algebraic fractions, factorising to cancel common factors, adding and subtracting algebraic fractions, and at Higher, solving equations involving algebraic fractions. The Higher scheme explicitly includes algebraic fractions in its later algebra unit.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
8 Term 3	Recurring decimals		Revisits Number sense and calculations and Fractions, decimals and percentages. Pupils use written division methods and conversion between fractions, decimals and percentages before learning recurring decimal notation and converting fractions to recurring decimals.	Long-division layouts and repeating digit patterns are modelled visually so pupils can distinguish terminating and recurring decimals. Dot notation is introduced alongside the written pattern, with fraction-decimal conversion examples chunked into clear stages. Secure pupils are challenged to predict recurring cycles, compare recurring values and explain connections between denominator structure and decimal behaviour.	Builds towards GCSE converting fractions to recurring decimals, recognising terminating vs recurring decimals, and at Higher, converting recurring decimals to fractions using algebraic methods. It also strengthens links between fractions, decimals and percentages.
9 Term 1	Fractions and percentages	Each KPI is assessed through an end of topic assessment.	Revisits Year 7 Fractions, Year 7 Fractions, decimals and percentages, and Year 8 Percentages. Pupils return to equivalent fractions, ordering	Fraction walls, bar models, number lines and percentage multipliers are revisited selectively according to	Links directly to GCSE fractions, decimals and percentages, percentage increase and decrease, percentage change,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
		KPI 9.1 Fractions and Percentages. KPI 9.2 Probability. KPI 9.3 Standard form & Inequalities. KPI 9.4 Quadratic Equations and formulae. KPI 9.5 Constructions & Circles KPI 9.6 Round, 3D Shapes & Pythagoras	fractions, multiplying fractions, finding fractions of amounts, converting between FDP, and finding percentages of amounts.	need, allowing pupils to connect representations before using efficient GCSE-style methods. Calculation frames support operations with fractions and percentage change where needed. Secure pupils are challenged to move fluently between forms, select efficient methods and solve multi-step reverse-percentage and recurring-decimal problems.	reverse percentages, simple and compound interest, and wider multiplicative reasoning. These skills also support probability, ratio, proportion and financial mathematics.
9 Term 1	Probability	KPI 9.7 Ratio and Proportion KPI 9.8 Linear Graphs	Revisits Year 7 Probability, Year 7 Fractions, Year 7 FDP, and Year 8 Venn diagrams. Pupils reuse probability as fractions/decimals/percentages, mutually exclusive events, fractions of amounts and percentages of amounts.	Sample spaces, frequency tables and tree diagrams are built gradually from concrete or visual situations so the structure of combined events is clear. Branch probabilities and totals	Builds towards GCSE theoretical probability, experimental probability, relative frequency, sample spaces, Venn diagrams, tree diagrams, mutually exclusive outcomes, independent and dependent events, and, at Higher, conditional

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
		KPI 9.9 Compound Measures & Distance-Time Graphs KPI 9.10 Quadratic Graphs KPI 9.11 Angles and Bearings KPI 9.12 Transformations & Similarity and Congruence		are checked explicitly, with partially completed diagrams available where needed. Secure pupils are challenged to compare theoretical and experimental probability, solve multi-stage problems and justify whether events are mutually exclusive or independent.	probability. The Higher scheme explicitly includes Venn diagrams, tree diagrams, union/intersection notation and conditional probability.
9 Term 1	Standard form	KPI 9.13 Handling Data and Statistical Diagrams KPI 9.14 Vectors	Expands Year 8 Standard form and revisits Year 8 Indices. Pupils use positive and negative powers of ten, index rules, and calculator notation to multiply, divide, add and subtract in standard form.	Powers-of-ten grids and index-law reminders connect Year 8 standard form to calculations with very large and small numbers. Operations are modelled separately before being combined, and calculator displays are interpreted explicitly. Structured layouts support alignment for addition	Links to GCSE powers of ten, positive and negative indices, writing large and small numbers in standard form, calculator displays, and calculations involving standard form. At Higher, this links with indices, roots, surds and scientific contexts.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				and subtraction where needed. Secure pupils are challenged to solve multi-step contextual problems and judge the reasonableness and order of magnitude of answers.	
9 Term 1	Inequalities		Revisits Year 8 Inequalities, Year 7/8 Equations, and Year 7 Number lines. Pupils build from drawing inequalities on number lines and solving single inequalities to solving inequalities with unknowns on both sides and double inequalities.	Number lines and balance-style equation models are used to link new inequalities to familiar equation solving. Boundary values, open and closed endpoints and double inequalities are modelled explicitly, with symbol prompts available where needed. Secure pupils are challenged with unknowns on both sides, integer solution sets and problems requiring	Leads into GCSE solving linear inequalities, representing solution sets on number lines, integer solutions, inclusive and exclusive inequalities, and, at Higher, more complex inequalities linked to algebraic and graphical methods.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				them to form and interpret inequalities from context.	
9 Term 1	Quadratic Equations		Expands Year 8 Brackets and revisits Year 7/8 Expressions and equations. Pupils use expanding double brackets and factorising into one bracket as the foundation for factorising and solving quadratic equations.	Algebra tiles, area grids and factor-pair tables are used to connect quadratic factorisation to earlier bracket work. The link between factors and roots is modelled step by step, with partially completed factorisations available where needed. Secure pupils are challenged to recognise structure quickly, solve less routine quadratics and explain why the zero-product property leads to two possible solutions.	Prepares pupils for GCSE expanding and factorising quadratics, solving quadratic equations, roots/solutions, quadratic formula, simultaneous equations involving quadratics, and solving equations graphically. Higher also develops this into completing the square and interpreting quadratic graphs.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
9 Term 1	Formulae		Revisits Year 7 Expressions and equations, Year 8 Equations, and earlier substitution work. Pupils build on solving multi-step equations, equations with the variable on both sides, and equations with variables in the denominator to rearrange formulae.	Substitution and rearrangement are separated initially so pupils can focus on one process at a time. Formulae are colour-coded to identify the subject, operations and inverse operations, with balance-style layouts and step-by-step frames available where needed. Secure pupils are challenged to rearrange multi-step formulae, handle variables in denominators and apply formulae flexibly in unfamiliar contexts.	Links to GCSE substitution, using mathematical and scientific formulae, rearranging formulae, changing the subject, and applying formulae in geometry, compound measures and motion contexts. This becomes especially important in topics such as speed, density, pressure and kinematics.
9 Term 1	Constructions		Revisits practical geometry skills from Year 7 2D Shapes, Year 8 Angles, and general drawing/measurement skills. The explicit building blocks are	Construction methods are modelled live in small, visible steps, with the purpose of each arc explained rather than taught as a sequence to	Builds towards GCSE ruler and compass constructions, perpendicular bisectors, angle bisectors, loci, scale drawings,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			using a ruler and using a pair of compasses.	copy. Enlarged diagrams, pre-marked starting points and equipment checks support accuracy where needed. Secure pupils are challenged to complete constructions from minimal instructions, combine constructions and justify why the resulting points or lines satisfy the required conditions.	plans/elevations and bearings. These skills also support geometry problem solving and accurate diagram work.
9 Term 1	Circles		Expands Year 8 Circles, Year 8 Area, and Year 8 Surface area and volume. Pupils revisit identifying parts of circles, circumference, area of circles, surface area of prisms and volume of prisms, then extend this to sectors and cylinders.	Labelled circle diagrams, paper sectors and prior area models are used to connect circumference and area to arcs, sectors and cylinders. Formulae are introduced with clear substitution frames and units highlighted. Diagrams can be annotated with known	Links to GCSE circumference, area of a circle, radius, diameter, arcs, sectors, and composite shapes involving circles. Later GCSE work extends this to cylinders, cones and spheres, and at Higher to circle theorems, circle

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				and required values where needed. Secure pupils are challenged with reverse problems, composite shapes and exact calculations involving pi.	geometry, and sometimes equations of circles.
9 Term 2	Rounding		Revisits Year 7 Number sense and calculations and Year 8 Rounding. Pupils use rounding integers, rounding decimals, and rounding to significant figures before moving on to truncation and error intervals.	Number lines and boundary diagrams are used to make rounding, truncation and error intervals visible. Worked examples explicitly connect a stated degree of accuracy to lower and upper bounds, with interval templates available where needed. Secure pupils are challenged to form bounds from less familiar rounded values, compare possible errors and apply accuracy	Leads into GCSE rounding to decimal places and significant figures, estimation, checking answers, limits of accuracy, upper and lower bounds, and error intervals. The Higher scheme specifically includes accuracy and bounds as a later unit.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				reasoning within multi-step calculations.	
9 Term 2	3D Shapes		Revisits Year 8 3D Shapes and links to Year 8 Surface area and volume. Pupils use properties of 3D shapes, including faces, edges, vertices and nets, before moving into plans and elevations.	Physical solids, nets and isometric representations are used to strengthen spatial understanding before pupils interpret plans and elevations. Viewpoints are modelled explicitly and faces can be highlighted to connect a solid to its 2D view. Grid templates support drawing where needed. Secure pupils are challenged to reconstruct solids from views and reason about hidden or missing information.	Links to GCSE faces, edges and vertices, nets, plans and elevations, prisms, cylinders, cones, spheres, volume, surface area, and 3D geometry. It also supports later work on similarity in 3D and volume scale factors.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
9 Term 2	Pythagoras' theorem		Revisits Year 8 Indices, Year 8 Equations, Year 7/8 2D Shapes, and right-angle knowledge from Angles. Pupils use roots, powers and solving equations as the key building blocks for finding missing lengths.	Squares drawn on the sides of right-angled triangles make the relationship in Pythagoras' theorem visible before pupils use the formula abstractly. The hypotenuse is identified consistently and substitution is modelled in clear stages, with calculator steps provided where needed. Secure pupils are challenged with reverse problems, exact answers, coordinate contexts and multi-step applications including 3D situations.	Builds directly into GCSE right-angled triangle problems, finding missing lengths, coordinate geometry, trigonometry, and, at Higher, 3D Pythagoras and exact/surd answers. The Foundation scheme links Pythagoras with trigonometry and right-angled triangles.
9 Term 2	Ratio and proportion		Revisits Year 7 Proportion, Year 8 Ratio, Year 8 Money, and Year 7/8 Factors, multiples and primes. Building blocks include highest common factor and	Bar models, ratio tables and double number lines are used to represent direct and inverse relationships before	Links to GCSE sharing in a ratio, equivalent ratios, best buys, recipes, currency conversion, direct proportion, inverse

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			operations with money, then pupils extend into direct and inverse proportion word problems and currency conversion.	pupils move to formal methods. Currency and proportion problems are chunked to identify the multiplicative relationship first, with unitary-method prompts available where needed. Secure pupils are challenged to choose between methods, solve multi-step contextual problems and explain how direct and inverse proportion differ.	proportion, unitary method, scale factors, similarity, and multiplicative reasoning. The Edexcel schemes also connect proportion to graphs and compound measures.
9 Term 2	Linear graphs		Expands Year 8 Linear graphs and revisits Year 7/8 Coordinates. Pupils use reading and plotting coordinates, plotting horizontal/vertical/diagonal lines, and plotting straight-line graphs before finding and interpreting equations of lines.	Coordinate tables, pre-drawn axes and consistent highlighting of gradient and intercept support pupils in linking equations to straight-line graphs. Worked examples model plotting from tables before moving to $y = mx$	Develops into GCSE straight-line graphs, gradient, intercepts, equations of lines, parallel and perpendicular lines, coordinate geometry, real-life graphs, conversion graphs, and graphical solutions to equations.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				+ c, with gradient triangles used where helpful. Secure pupils are challenged to derive equations, compare parallel and perpendicular lines and solve problems without relying on a full table of values.	
9 Term 2	Compound measures		Revisits Year 7 Measures, Year 8 Money, Year 8 Equations, and Year 8 Ratio/Proportion. Pupils use substitution into formulae, rearranging formulae, solving equations, converting units, and calculating with time before working with speed and rates.	Formula triangles, unit-conversion tables and labelled diagrams are used as temporary scaffolds to organise speed, density and pressure relationships. Problems are chunked into identifying quantities, choosing a formula, converting units and calculating. Secure pupils are challenged to rearrange formulae independently,	Links to GCSE speed, distance, time, density, mass, volume, pressure, rates of pay, unit pricing, and compound unit conversions. The Foundation scheme's multiplicative reasoning unit explicitly includes speed, rates of pay, unit pricing, density and pressure.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				combine unit conversions and solve multi-step contextual problems where the required compound measure is not stated directly.	
9 Term 2	Motion-time graphs		Builds on Year 9 Compound measures, but also revisits Year 8 Linear graphs, Year 7/8 Coordinates, and speed work from measures/proportion. Pupils use calculating with speed and finding equations of straight-line graphs to interpret distance-time graphs.	Journey descriptions and segmented graphs are used to connect graph features to real movement before calculations are introduced. Gradient is linked explicitly to speed and each section is annotated with what is happening, with reading frames available where needed. Secure pupils are challenged to interpret unfamiliar journeys, calculate missing values and connect distance-time	Builds towards GCSE distance-time graphs, speed-time graphs, velocity-time graphs, gradient as speed or acceleration, area under a graph as distance, and interpreting journeys. Higher work includes estimating gradients and areas under graphs, including non-linear graphs.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				reasoning to later speed-time graph ideas.	
9 Term 3	Quadratic graphs		Expands Year 8 Linear graphs, Year 8 Brackets, and earlier substitution work from Expressions and equations. Pupils use substitution into formulae and plotting straight-line graphs, then connect this to quadratic equations and graphical solutions.	Tables of values and structured coordinate grids support accurate plotting before pupils focus on the shape and features of quadratic graphs. Roots, intercepts, turning points and symmetry are highlighted consistently and linked back to quadratic equations. Secure pupils are challenged to sketch from key features, estimate solutions graphically and compare how changes to an equation affect the parabola.	Links to GCSE plotting quadratic graphs, recognising parabolas, roots, turning points, intercepts, solutions from graphs, and comparing quadratic graphs with linear or other graphs. Higher extends this into sketching quadratics, turning points, circle graphs, cubic graphs and graphical solutions.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
9 Term 3	Angles and bearings		Revisits Year 7 Angles, Year 8 Angles, and Year 7/8 2D Shapes. Building blocks include angles on a line and around a point, vertically opposite angles, angles in triangles/quadrilaterals, angle facts, parallel lines, and measuring/drawing angles.	Clear diagrams, protractors and north-line conventions are modelled explicitly, with three-figure bearings built from familiar angle facts. Pupils annotate diagrams before calculating, using colour-coded parallel-line facts and step-by-step bearing prompts where needed. Secure pupils are challenged to solve multi-stage bearings problems, form equations and justify solutions using precise geometric reasoning.	Builds towards GCSE angle facts, angles on parallel lines, interior and exterior angles of polygons, bearings, scale drawings, constructions, trigonometry, and Higher circle theorems.
9 Term 3	Transformations		Expands Year 8 Transformations and revisits Year 7/8 Coordinates and 2D Shapes. Pupils return to translation and reflection, then extend into	Tracing paper, coordinate grids and vector notation are used selectively to support accurate transformations while	Leads into GCSE reflection, rotation, translation, enlargement, describing transformations, combined

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			rotation, enlargement and mixed transformations.	maintaining a consistent description checklist. Centres, mirror lines and scale factors are highlighted and pupils move from performing transformations to describing them independently. Secure pupils are challenged with combined transformations, fractional scale factors and problems requiring them to infer the transformation from object and image.	transformations, scale factor, centre of enlargement, and links to similarity, congruence, coordinates and vectors.
9 Term 3	Similarity and congruence		Revisits Year 8 Ratio, Year 8 Transformations, Year 8 Angles, and Year 7/8 2D Shapes. Similarity builds from direct proportion and scale factor ideas; congruence builds from shape properties,	Overlaying shapes, colour-coding corresponding sides and angles, and using scale-factor tables make similarity and congruence relationships explicit.	Links to GCSE similar shapes, corresponding sides and angles, scale factors, congruence criteria such as SSS, SAS, ASA and RHS, and solving problems involving missing lengths. It also

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
			corresponding sides and corresponding angles.	Pupils distinguish what changes and what stays invariant before applying numerical methods, with ratio prompts available where needed. Secure pupils are challenged to justify similarity or congruence, find missing lengths efficiently and connect linear scale factors to later area and volume relationships.	prepares pupils for links between length, area and volume scale factors.
9 Term 3	Handling data and statistical diagrams		Revisits Year 7 Handling data and statistical diagrams and Year 8 Statistical diagrams. Pupils use reading/plotting coordinates, averages and range, interpreting charts, frequency tables, two-way tables and averages from frequency tables, then extend into scatter graphs, grouped data and frequency polygons.	Data is organised in tables before pupils construct scatter graphs, grouped diagrams and frequency representations. Pre-drawn axes, scale prompts and calculator support reduce non-essential barriers where needed, while worked	statistical diagrams Builds towards GCSE frequency tables, bar charts, pie charts, scatter graphs, line graphs, averages, range, sampling, population, bias, grouped data, and, at Higher, cumulative frequency, box plots and histograms.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				examples model how to describe correlation and interpret averages. Secure pupils are challenged to critique representations, identify outliers, compare distributions and justify conclusions rather than simply read individual values.	
9 Term 3	Vectors		Revisits Year 8 Transformations, especially translation, and Year 7/8 Coordinates, column vectors describe movement, direction and magnitude on a grid.	Arrows on coordinate grids are used to establish direction and magnitude before pupils move to column-vector notation. Components are linked explicitly to horizontal and vertical movement, with vector addition and subtraction modelled visually and algebraically. Secure pupils are challenged to combine vectors,	Links to GCSE column vectors, translation vectors, magnitude, direction, scalar multiples, parallel vectors, adding and subtracting vectors, and, at Higher, vectors and geometric proof. The Foundation scheme includes vector notation and operations, while Higher extends this to geometric proof.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment (KPIs: Diagnostic + Summative)	Cumulative Links (What is revisited?)	Adaptive Teaching (How all pupils access learning)	Future Links (KS4/KS5)
				identify scalar multiples and reason about parallel vectors in geometric problems without relying on a drawn grid.	

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
KS4	Number and Place value	Pupils need secure knowledge of integer place value, ordering whole numbers and decimals, even and odd numbers, negative numbers in context, the four operations, multiplying and dividing by powers of 10, rounding, estimation and inverse operations.	4 operations of number, Rounding and Estimation. BIDMAS and place	pupils will be able to apply 4 Operations and Estimation to wordy questions in context and be able to justify if it is an over or under estimate.	integer, digit, place value, decimal, negative number, positive number, operation, estimate, approximation, inverse operation, order, inequality symbol, significant figure, decimal place
KS4	Indices, Roots, Reciprocals , Surds and BIDMAS	Pupils need times tables, square and cube numbers, square roots and cube roots, order of operations, brackets, negative numbers, powers of 10, calculator use, and the idea that powers and roots are inverse operations. The Foundation scheme explicitly expects pupils to recall squares/cubes and use index notation before moving into index laws and roots.	Rules of indices including fractional and negative indices, Standard form, Surds,	Pupils will be able to apply Standard Form and Surds in context.	index, indices, power, base, exponent, square, cube, root, square root, cube root, reciprocal, surd, rational, irrational, BIDMAS, hierarchy of operations
KS4	Number properties - Factors, Multiples, Primes	Pupils need multiplication and division facts, odd/even numbers, divisibility, factor pairs, multiples, common factors, common multiples, prime numbers and systematic listing. These underpin HCF, LCM and prime factor decomposition.	HCF, LCM, Prime factor decompositions,	Solve problems using HCF, LCM and Prime Factors	factor, multiple, prime number, composite number, common factor, common multiple, HCF, LCM, prime factorisation, product of prime factors, divisibility, divisor, Venn diagram
KS4	Expressions	Pupils need number fluency, negative numbers, order of operations, inverse operations, algebraic notation, using letters	Manipulate and Simplify Algebraic Expressions, Expand and Simplify	Pupils will be able to form an Algebraic Expression, show that	expression, term, like terms, coefficient, variable, constant, simplify, collect,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
		for unknowns, simplifying arithmetic expressions, substitution and collecting like terms. The Edexcel algebra section expects prior knowledge of negative numbers, hierarchy of operations, inverse operations and numerical index laws.	Brackets, Factories Brackets, Difference of Two Squares. Simplify Algebraic Fractions.	Mathematical Expressions are equivalent.	expand, factorise, bracket, identity, formula, algebraic notation
KS4	Solving equations.	Pupils need to understand expressions, variables, equality, inverse operations, substitution, simplifying expressions, collecting like terms, expanding brackets and using number operations accurately, including negatives and fractions.	Solve Linear Equations with; unknowns on both sides, brackets and Fractional Coefficients. Rearranging equations. Simultaneous Equations, Solving Quadratics by Factorizing, Quadratic Formula and Completing the Square. Iteration. Inequalities	Pupils will be able to form and solve an equation. Identify an appropriate method to solve a quadratic equation. Use algebra to solve a problem in context.	equation, solve, solution, unknown, variable, inverse operation, balance method, linear equation, simultaneous equation, quadratic equation, coefficient, constant, rearrange, subject
KS4	Fractions	Pupils need numerator and denominator language, equivalent fractions, simplifying, common factors, common multiples, HCF/LCM, mixed numbers, improper fractions, fraction of an amount, and the four operations with whole numbers and decimals.	4 Operations, Equivalence, Converting Fractions to Decimals and back again. Fraction Amounts.	Pupils will be able to apply fraction skills to questions in context.	fraction, numerator, denominator, equivalent fraction, simplify, improper fraction, mixed number, unit fraction, reciprocal, common denominator, cancel, operator

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
KS4	Linear Graph	Pupils need coordinates in all four quadrants, plotting points, reading scales, substitution into equations, solving simple equations, recognising linear patterns, and understanding gradient informally as "steepness" or rate of change.	Distance time graphs. Drawing linear graphs, $y=mx+c$, identifying perpendicular/parallel graphs.	Pupils will be able to draw a graph using a variety of methods including Intercept Gradient method and Cover Up method. Be able to interpret a Distance Time graph and identify Direct Proportion from a graph. Pupils will be able to use graphs to solve Simultaneous Equations.	linear graph, straight line, coordinate, axis, quadrant, gradient, intercept, y-intercept, equation of a line, function, solution, parallel, midpoint, coordinate geometry
KS4	Sequences	Pupils need number patterns, times tables, addition/subtraction with negatives, term-to-term rules, substitution into expressions, simple algebraic notation and linear relationships.	linear Sequences, Quadratic Sequences and Geometric Sequences. Fibonacci Sequence and Substitution.	Pupils will be able to generate a Linear or Quadratic sequence. Pupils will be able to find the nth term of a Linear or Quadratic sequence and use the nth term to solve a problem. Pupils will be able to understand the difference between a GP and an AP.	sequence, term, term-to-term rule, position-to-term rule, nth term, arithmetic sequence, geometric sequence, common difference, Fibonacci-type sequence, generate, progression
KS4	Percentages		Percentage Amounts, Percentage	Pupils will be able to solve a variety of	percentage, percent, multiplier, percentage

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
		Pupils need fractions, decimals, place value, equivalent FDP forms, multiplying and dividing by 10/100/1000, finding fractions of amounts, proportion, and calculator fluency.	Increase/Decrease. Percentage Change, Compound Interest and Depreciation, Reverse Percentages	problems, including finance problems, using different percentage calculations.	increase, percentage decrease, percentage change, reverse percentage, original value, simple interest, compound interest, profit, loss
KS4	Ratio and Proportions & Similarity	Pupils need multiplication/division fluency, fractions, equivalent fractions, simplifying using HCF, scaling, unitary method, proportional reasoning, area/length units, and basic shape properties. Similarity also requires scale factor, corresponding sides and corresponding angles.	Simplifying Ratio, Ratio Amounts, 3 Part Ratios, Scales, Compound Measures, Direct and Inverse Proportion, Capture Recapture. Similar Shapes.	Pupils will be able to tackle a variety of contextual problems using Ratio and Proportion. They will be able to apply Capture Recapture appropriately and solve problems using Direct and Inverse proportion. Pupils will be able to use the principles of Similarity to find missing lengths/area and volumes.	ratio, proportion, equivalent ratio, direct proportion, inverse proportion, unitary method, scale factor, similar, enlargement, corresponding sides, corresponding angles, linear scale factor
KS4	Polygons and Angles	Pupils need names and properties of 2D shapes, line segments, vertices, parallel and perpendicular lines, acute/obtuse/reflex angles, angles on a straight line, angles around a point, triangle angle facts and basic equation solving for missing angles.	Angles in Polygon, Angles and Parallel lines, Properties of Shape, Bearings, Constructing angles. Simple Circle Theorems.	Pupils will be able to use all the different properties of Angles to solve multistep problems, in a range of problems. The angle rules will be applied to	polygon, regular polygon, irregular polygon, interior angle, exterior angle, parallel lines, transversal, corresponding angles, alternate angles, co-interior

Year	Knowledge Topics/Unit of work? What pupils will ‘know’	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to ‘do’.	Concepts developed What pupils will ‘understand’.	Key Vocabulary Tier 3
				bearings. Pupils will start to use circle theorems to solve problems.	angles, vertically opposite angles, quadrilateral
KS4	Pythagoras and Trigonometry	Pupils need right-angled triangle knowledge, square and square root skills, rearranging simple formulae, basic angle facts, surd form, coordinates in all four quadrants, and rounding to an appropriate degree of accuracy. The Foundation scheme specifically lists simple rearranging, angle facts, surds and plotting coordinates as prior knowledge for Pythagoras and trigonometry.	Pythagoras, Trigonometry in right and triangles, Sine Rule and Cosine Rule.	Pupils will be able to identify the appropriate skill to use when solving a problem that uses Pythagoras and Trigonometry and then apply it to the problem.	right-angled triangle, hypotenuse, opposite, adjacent, Pythagoras’ theorem, trigonometry, sine, cosine, tangent, angle of elevation, angle of depression, ratio, exact value
KS4	Perimeter, Area and Volume, Bounds	Pupils need measuring length, metric units, perimeter, area of rectangles/triangles/parallelograms/trapezia, properties of 3D shapes, substitution into formulae, rounding, estimation and unit conversion. The Higher scheme notes that students should know 3D forms, perimeter/area by measuring sides, metric units and substitution before this unit.	Area of Squares, Rectangles, Triangles, Trapezium and Circles. Volume of Prisms, Cylinders and Cones and Spheres. Perimeter and Area of Sectors. Upper and Lower bounds.	Pupils will be able to use areas and volumes to work out questions in a range of contexts. Pupils will be able analyse critically the validity of their results.	perimeter, area, volume, surface area, compound shape, prism, cylinder, cone, sphere, cuboid, accuracy, bounds, upper bound, lower bound, error interval, degree of accuracy
KS4	Probability	Pupils need fractions, decimals and percentages, comparing numbers, sample spaces, systematic listing, mutually exclusive outcomes, Venn diagrams, two-way tables and basic set language such as “and/or”.	Sample Space Diagrams, Venn Diagrams, Frequency Trees, Two Way Tables and Tree Diagrams. AND Rule and	Pupils will be able to calculate the probability of an Event happening by using Tree Diagrams, AND/OR Rule and Two-	probability, outcome, event, sample space, theoretical probability, experimental probability, relative frequency, mutually

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
			the OR Rule to work out Probability.	Way Tables. Pupils will be able to analyse the reliability of their results and justify the probability of events happening or not happening. Pupils will understand the importance of working systematically to find all outcomes.	exclusive, independent event, dependent event, tree diagram, Venn diagram, union, intersection
KS4	Direct and inverse proportion	Pupils need ratio, simplifying ratios, unitary method, multiplication/division fluency, graph reading, substitution into formulae, linear graphs and proportional reasoning. They should already understand direct proportion as equality of ratios before extending to inverse proportion.	Direct and Inverse Proportion, Graphically and Algebraically.	Pupils will recognize when values are in Direct Proportion Algebraically and Graphically. Pupils will be able to set up and use equations to solve problems on Proportion.	direct proportion, inverse proportion, constant of proportionality, multiplier, proportional relationship, unitary method, rate, variable, equation, graph form, $y = kx$, inverse relationship
KS4	Averages and Range	Pupils need addition, division, ordering data, reading tables, finding totals, interpreting frequency, comparing numbers and understanding data values. They also need experience of simple charts and lists of data.	Pupils will be able to interpret a scatter graphs considering outliers and one the line of best fit to interpolate results. Pupils will understand the difference between	Pupils will be able interpret, compare and comment on different distributions and consider outliers. They will recognize the advantages and disadvantages of	mean, median, mode, range, average, modal class, frequency, frequency table, grouped data, discrete data, continuous data, midpoint, estimate, outlier

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
			causation and correlation. Compare and interpret box plots and understand the advantages of interquartile range over range. Pupils will be able to interpret Histograms.	different measures of Averages.	
KS4	Representing and Interpreting Data and Scatter Graphs	Pupils need reading scales, plotting coordinates, interpreting tables, tally charts, bar charts, line graphs, pie charts, averages, range, frequency tables and proportional reasoning for interpreting sectors. The Foundation scheme lists graph scales, coordinates, tally charts, time notation and midpoint knowledge as prior knowledge for graphs/tables/charts.	Scatter graphs, time-series graphs histograms and cumulative frequency graphs.	Pupils will be able to interpret a scatter graphs considering outliers and one the line of best fit to interpolate results. Pupils will understand the difference between causation and correlation. Compare and interpret box plots and understand the advantages of interquartile range over range. Pupils will be able to interpret Histograms.	data, qualitative data, quantitative data, discrete data, continuous data, bar chart, pie chart, frequency polygon, histogram, scatter graph, correlation, line of best fit, interpolation, extrapolation, outlier
KS4	Sampling and Questionnaires	Pupils need data collection, populations and samples, averages, range, charts, frequency tables, percentage/fraction reasoning, and	Questionnaires, Sampling Techniques and Stratified Sampling.	Pupils will be able to construct and critically analyse a	sample, population, census, sampling method, random sample, stratified sample,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
		awareness of bias or misleading representations.		Questionnaire/Survey. They will understand the limitations of their data and be able to comment how a sample size and collection method will lead to possible bias.	bias, questionnaire, response, data collection, primary data, secondary data, representative sample
KS4	Circle Theorems	Pupils need circle vocabulary, angle facts, isosceles triangle facts, angles on a straight line, angles around a point, parallel line angles, quadrilateral properties, algebraic equation solving and proof reasoning.	Circle Theorems, parts of a Circle.	Pupils will be able to apply Circle Theorems to Geometric Problems.	circle theorem, radius, diameter, chord, tangent, circumference, arc, sector, segment, cyclic quadrilateral, angle at the centre, angle at the circumference, alternate segment theorem, perpendicular bisector
KS4	Transformations	Pupils need coordinates, 2D shape properties, reflection symmetry, rotation, translation, scale factor, enlargement, vectors as movement, and accurate use of tracing paper or grid methods.	Rotation, Reflection, Enlargement and Transformation.	Pupils will be able to use a variety of Scale Factors including Negative and Fractional. They will be able to describe fully a Transformation using correct subject specific language. Pupils will be able to apply a Combination of Transformations.	transformation, reflection, rotation, translation, enlargement, object, image, mirror line, centre of rotation, centre of enlargement, scale factor, vector, invariant, congruent

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
KS4	Non-Linear Graphs -	Pupils need substitution into formulae, plotting coordinates, drawing axes and scales, linear graphs, solving equations, recognising roots/intercepts, expanding brackets, squaring negative numbers and using tables of values. The Foundation quadratic graphs unit lists prior knowledge such as squaring negatives, substitution, plotting coordinates, expanding brackets and collecting like terms.	Quadratic, Cubic and other Graphs. Transformation of Graphs	Pupils will be able to plot and sketch a variety of nonlinear graphs. Pupils will be able to apply transformations to a variety of functions.	non-linear graph, quadratic graph, cubic graph, reciprocal graph, exponential graph, curve, function, root, intercept, turning point, asymptote, parabola, sketch, solution
KS4	Plans, Elevations, Constructions, Loci, Similarity and Bearings	Pupils need properties of 2D and 3D shapes, nets, scale drawing, accurate ruler/protractor/compass use, angle measuring, perpendicular and parallel lines, coordinates, Pythagoras, trigonometry, ratio, scale factor and similarity.	Construct Triangles, Construct Loci, Similarity Problems and Congruency. Draw Bearings	Pupils will be able to Construct Bearings and find Return Bearings, understand that triangles satisfy SSS, SAS, ASA and RHS to solve problems including proofs with Congruency and Similarity. Pupils will be able to draw a shape in 3D from its Plan and Elevations.	plan, front elevation, side elevation, construction, compass, ruler, perpendicular bisector, angle bisector, locus, equidistant, bearing, three-figure bearing, scale drawing, similar, congruent
KS4	Vectors and Geometric Proof	Pupils need translations, coordinates, column vector notation, direction and magnitude, addition/subtraction of directed movements, scalar multiples, Pythagoras, ratio, and properties of triangles and	Vectors and Geometric Proof	Pupils will understand and use Vector notation, including Column Notation. They will be able to represent	vector, column vector, magnitude, direction, scalar, scalar multiple, resultant, parallel vector, collinear, equal vector, position vector,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
		quadrilaterals. The Higher scheme states that pupils should already have used vectors to describe translations and know Pythagoras and triangle/quadrilateral properties.		combination of Vectors pictorially. Pupils will be able to calculate the resultant of two Vectors and produce proofs to prove points are Collinear and lines are Parallel	geometric proof, congruence, ratio
KS4	Reciprocal and Exponential Graphs; Gradient and Area under Graphs	Pupils need linear graphs, quadratic/cubic/reciprocal graph recognition, substitution, tables of values, plotting coordinates, interpreting gradient, compound measures, distance-time graphs, speed-time graphs, area of trapezia/triangles/rectangles, and proportional reasoning.	Reciprocal and Exponential Graphs; Gradient and Area under Graphs	Pupils will be able to sketch and interpret graphs of the Reciprocal and Exponential Function, Estimate the Area Under a Quadratic Graph using the Trapezium Rule. Interpret the rate of change demonstrated on a graph. To be able to find and interpret the Gradient of a Non- Linear Graph.	reciprocal graph, exponential graph, gradient, rate of change, tangent, chord, area under a graph, estimate, trapezium rule, interval, asymptote, function, curve
KS4	Proof	Pupils need algebraic notation, simplifying expressions, expanding/factorising, identities, equation solving, angle facts, properties of shapes, congruence, similarity,	Proof	Pupils will be able to use and apply a variety of Algebraic and Geometric proofs using known facts.	proof, algebraic proof, geometric proof, identity, counterexample, derive, show that, equivalent expression, generalise,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
		vectors, and the ability to justify each step logically.			justify, reason, deduction, assumption, conclusion
Year	Knowledge Topics/Unit of work? What pupils will 'know'	Assessment KPIs: Diagnostic + Summative	Cumulative Links What is revisited?	Adaptive Teaching How all pupils access learning	Future Links KS5
KS4	Number and Place value	Summative assessments after every topic based on the scheme of work. Covering all content from that topic. Year 10 exam week: 2x 1h30m exams covering all content. Year 11 mock exam week: 3x 1h30min exams covering all content Year 11 2nd mock: 2x 1h30m exams covering all content.	Revisits KS3 number sense and calculations, including integer and decimal place value, negative numbers, the four operations, multiplying and dividing by powers of 10, rounding and estimation. These foundations are consolidated at GCSE so pupils can apply them accurately in more complex numerical and contextual problems.	Place-value grids, number lines and clearly modelled written methods are used to make number structure explicit before pupils move to more complex contextual questions. Estimation is modelled as a checking strategy, with key information highlighted and calculations chunked where needed. Calculator and non-calculator methods are compared so pupils can choose	Underpins all A Level work. Secure place value, accuracy, negative numbers, decimals and calculator fluency are needed for algebra, functions, numerical methods, statistics and mechanics.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				appropriately. Secure pupils are challenged to justify whether an estimate is an over- or underestimate, select efficient methods and explain the reasonableness of answers.	
KS4 KS4	Indices, Roots, Reciprocals , Surds and BIDMAS		Revisits KS4 Number and Place Value through negative numbers, place value, powers of 10, calculator use, rounding and the hierarchy of operations. It also builds on KS3 indices, square and cube numbers, roots and standard form, extending these ideas to negative and fractional indices, reciprocals and surds.	Powers, roots and reciprocals are linked through visual patterns, repeated multiplication and inverse-operation models before pupils work abstractly. Index laws are introduced one at a time using colour-coded worked examples, with reference grids and calculator guidance available where needed. Surds and standard form are connected to familiar	Links strongly to algebra and functions, exponentials and logarithms, differentiation and integration. A Level pupils manipulate powers, roots, rational indices, exponential functions, logarithms and algebraic expressions.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
				roots and powers of ten. Secure pupils are challenged to combine several index laws, manipulate surds fluently and justify each stage of multi-step calculations.	
KS4	Number properties - Factors, Multiples, Primes		Revisits KS4 Number and Place Value through multiplication, division and systematic calculation, and KS4 Indices through index notation when writing prime factor decompositions. It also revisits KS3 factors, multiples, divisibility, prime numbers, HCF and LCM before applying these to more demanding problems.	Factor lists, multiplication grids, divisibility tests and structured factor trees are used to make number properties visible before pupils move to prime factor notation. HCF and LCM methods are modelled side by side so pupils can identify which process is required, with partially completed trees available where needed. Secure pupils are challenged to choose efficient	Links mainly to proof, algebraic manipulation, binomial expansion and some probability work. Factorising, divisibility, counterexamples and structured reasoning are important in A Level proof and algebra.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				strategies, solve less familiar contextual problems and justify results using divisibility, prime factors and counterexamples.	
KS4	Expressions		Revisits KS4 Number and Place Value through negative numbers and the order of operations, KS4 Indices through the laws of indices, and KS4 Number Properties through common factors used in factorising. It develops the KS3 algebra work on notation, substitution, collecting like terms, expanding and factorising.	Algebra tiles, area models and colour-coded notation are used to connect numerical structure to algebraic expressions. Simplifying, expanding and factorising are modelled as related processes, with one algebraic change per line and worked examples available where needed. Algebraic fractions are introduced by linking cancellation to common factors. Secure pupils are challenged to	Directly links to A Level algebra and functions, where students simplify, expand, factorise, manipulate rational expressions, use functions, and model with algebra.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
				recognise structure, prove expressions are equivalent and manipulate expressions containing several operations or different algebraic forms.	
KS4	Solving equations.		Revisits KS4 Expressions, particularly simplifying, expanding, factorising and using algebraic notation. It also draws on KS4 Number and Place Value for accurate work with negative numbers and inverse operations. Where fractional coefficients arise, pupils revisit KS3 fraction skills before applying them within equations.	Balance models, inverse-operation diagrams and consistent line-by-line layouts support pupils in understanding that equations preserve equality. Linear equations are secured before brackets, fractional coefficients, simultaneous equations, quadratics and inequalities are introduced in carefully sequenced steps. Method-choice prompts and partially completed examples	Leads into A Level linear, quadratic and polynomial equations, inequalities, function intersections, and numerical methods such as iteration and Newton-Raphson.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
				are available where needed. Secure pupils are challenged to select the most efficient solving method, form equations from context and explain why each algebraic transformation preserves the solution.	
KS4	Fractions		Revisits KS4 Number and Place Value through the four operations and place value, KS4 Number Properties through HCF and LCM when simplifying or finding common denominators, and KS4 Indices, Roots and Reciprocals through reciprocal relationships. It extends the KS3 work on equivalent fractions, mixed numbers and	Fraction walls, bar models and number lines are used to reinforce equivalence and the relationship between numerator and denominator before formal calculations are revisited. Common denominators and the four operations are modelled explicitly, with multiplication grids and calculation frames available	Supports A Level rational expressions, algebraic fractions, partial fractions, probability, binomial expansion, and exact algebraic manipulation. Fractions also appear throughout calculus and statistics.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			calculations with fractions.	where needed. Fraction-decimal conversions are linked to division. Secure pupils are challenged to move flexibly between representations, choose efficient methods and apply fraction skills accurately in multi-step contextual problems.	
KS4	Linear Graph		Revisits KS4 Expressions and Solving Equations through substitution, rearranging and forming equations, and KS4 Number and Place Value through accurate use of scales and negative numbers. It also revisits KS3 coordinates and straight-line graphs before developing	Coordinate grids, tables of values and gradient triangles are used to connect equations, coordinates and the shape of straight-line graphs. Plotting is modelled before pupils move to gradient-intercept and other efficient methods, with pre-drawn axes and	Direct link to coordinate geometry. A Level students use equations of straight lines, gradients, parallel/perpendicular lines, and straight-line models in contexts such as temperature conversion and distance-time graphs.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			gradient, intercepts and equations of lines.	partially completed tables available where needed. Distance-time graphs are linked to familiar movement contexts. Secure pupils are challenged to derive equations, identify parallel and perpendicular lines and solve simultaneous equations graphically without relying on fully scaffolded tables.	
KS4	Sequences		Revisits KS4 Expressions through algebraic notation and substitution, KS4 Solving Equations when finding unknown terms, and KS4 Linear Graphs through linear relationships. KS4 Indices also supports work with geometric sequences. These ideas	Visual patterns, difference tables and term-position tables are used to connect numerical sequences to algebraic rules. Linear sequences are secured before quadratic and geometric sequences are introduced, with first and second	Directly links to A Level sequences and series, including arithmetic sequences, geometric sequences, series sums, sigma notation, binomial expansion and modelling with series.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			extend the KS3 work on term-to-term and position-to-term rules.	differences highlighted and substitution modelled explicitly. Partially completed tables support pupils where needed. Secure pupils are challenged to derive and use nth-term rules, distinguish arithmetic and geometric structure and solve problems where missing terms or positions must be inferred.	
KS4	Percentages		Revisits KS4 Fractions through fraction-decimal-percentage equivalence and fractions of amounts, and KS4 Number and Place Value through decimal multiplication and calculator fluency. It also revisits KS3 proportion before extending to	Hundred grids, bar models and fraction-decimal-percentage equivalences are used to secure percentage meaning before pupils use multiplier methods. Increase, decrease, change, compound interest and reverse percentages are	Links to A Level geometric sequences, exponential growth and decay, compound interest models, and statistics contexts involving proportions and percentages.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
			percentage change, multipliers, compound interest, depreciation and reverse percentages.	modelled in separate stages, with calculator key sequences and structured layouts available where needed. Secure pupils are challenged to choose between mental, written and multiplier methods, compare alternative approaches and solve multi-step financial problems where the original amount is not given.	
KS4	Ratio and Proportions & Similarity		Revisits KS4 Fractions and Percentages through equivalent forms, multiplicative reasoning and finding parts of quantities, and KS4 Number Properties through common factors when simplifying ratios. KS4 Linear Graphs supports	Bar models, ratio tables, double number lines and scale diagrams are used to make multiplicative relationships explicit before pupils work algebraically. Direct and inverse proportion are contrasted visually, and similarity is	Links to modelling, direct/inverse proportion, trigonometry, vectors, mechanics, and scaling arguments. A Level also uses proportional relationships in functions and applied contexts.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			proportional relationships. Similarity also revisits KS3 scale factor, corresponding sides and corresponding angles.	supported by highlighting corresponding sides and scale factors. Unit conversions and compound-measure questions are chunked where needed. Secure pupils are challenged to select an appropriate representation, solve multi-step proportion and capture-recapture problems, and connect linear scale factors to area and volume relationships.	
KS4	Polygons and Angles		Revisits KS4 Solving Equations when algebra is used to find unknown angles and KS4 Ratio, Proportion and Similarity through corresponding sides and angles. As the first major GCSE angle unit,	Clear diagrams, practical angle measurement and colour-coded angle facts are used to support recognition before pupils combine properties in multi-step problems.	Supports A Level trigonometry, coordinate geometry, vectors and mechanics diagrams. Angle facts become important when resolving vectors, working with forces, and using trigonometric identities.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			it also revisits KS3 angle facts, polygons, parallel lines, bearings and properties of 2D shapes.	Parallel-line rules, polygon angles, bearings and early circle theorems are introduced through worked examples with annotations and equation prompts where needed. Mini whiteboards are used to identify misconceptions quickly. Secure pupils are challenged to work from minimal information, form equations and justify each stage using precise geometric language rather than relying on visual appearance.	
KS4	Pythagoras and Trigonometry		Revisits KS4 Indices, Roots, Reciprocals and Surds through squares, roots and exact values, KS4 Solving Equations	Right-angled triangles are labelled consistently so pupils can identify the hypotenuse, known	Directly links to A Level trigonometry, including sine, cosine, tangent, radians, trig graphs, trig identities, sine/cosine rules

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			through rearranging formulae, and KS4 Polygons and Angles through angle facts. Ratio and proportional reasoning also support trigonometric ratios. This extends KS3 Pythagoras and right-angled triangle work.	values and required value before selecting a method. Squares on triangle sides, ratio diagrams and worked examples connect Pythagoras and trigonometry to prior knowledge, with formula prompts and calculator guidance available where needed. Secure pupils are challenged to decide independently between Pythagoras, trigonometric ratios, sine rule and cosine rule, work with exact values and solve multi-step problems in less familiar contexts.	and modelling. It also supports vectors and mechanics.
KS4	Perimeter, Area and Volume, Bounds		Revisits KS4 Number and Place Value through rounding, estimation and accuracy, KS4	Squared paper, nets, labelled diagrams and physical or visual solids are used to connect perimeter, area and	Links to integration, area under curves, numerical integration, mechanics, and optimisation problems using differentiation.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			Expressions and Solving Equations through substitution into formulae, and KS4 Polygons, Angles, Pythagoras and Trigonometry when working with compound shapes. It also develops KS3 perimeter, area, volume, circles and unit conversion before introducing bounds.	volume formulae to the dimensions being measured. Formulae are modelled with clear substitution frames and units highlighted, while complex shapes are decomposed into simpler parts where needed. Bounds are supported through number lines and error-interval diagrams. Secure pupils are challenged with reverse problems, compound shapes, upper and lower bound calculations and questions requiring evaluation of whether an answer is realistic.	Bounds and accuracy connect to A Level numerical methods and evaluating the accuracy of solutions.
KS4	Probability		Revisits KS4 Fractions and Percentages when expressing and calculating	Sample spaces, Venn diagrams, frequency trees, two-way tables and tree diagrams are	Directly links to A Level probability, including Venn diagrams, tree diagrams, conditional probability,

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
			probabilities, KS4 Number Properties through systematic listing, and KS4 Ratio and Proportion through relative frequencies and proportional reasoning. It also revisits KS3 probability, sample spaces, Venn diagrams and two-way tables before extending to tree diagrams and combined events.	built systematically so pupils can see how outcomes are organised. The AND and OR rules are linked explicitly to diagram structure, with partially completed representations and fraction-decimal-percentage prompts available where needed. Secure pupils are challenged to decide which representation is most efficient, analyse reliability, identify missing probabilities and justify conclusions in multi-stage problems using precise probability language.	independent events, distributions and hypothesis testing.
KS4	Direct and inverse proportion		Revisits KS4 Ratio, Proportion and Similarity as the main foundation for	Ratio tables, double number lines and graphs are used to contrast direct and	Links to A Level modelling with functions, especially straight-line direct proportion, reciprocal

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			proportional reasoning, KS4 Linear Graphs when interpreting proportional relationships graphically, and KS4 Solving Equations when forming and rearranging proportional formulae. Percentage multipliers from KS4 Percentages also support growth and change contexts.	inverse proportion before pupils form equations. Worked examples model identifying the proportional relationship, finding the constant and substituting values, with equation frames available where needed. Graphical and algebraic representations are connected throughout. Secure pupils are challenged to recognise proportion from unfamiliar information, move fluently between graphs and equations and explain how changes in one variable affect the other.	functions for inverse proportion, and exponential models for growth/decay.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
KS4	Averages and Range		Revisits KS4 Number and Place Value for accurate calculation, KS4 Fractions and Percentages when working with frequency and proportional data, and KS4 Probability through tables and frequencies. It also revisits KS3 averages, range and frequency tables before extending comparison of distributions and grouped data.	Lists, frequency tables and visual data displays are used to revisit mean, median, mode and range before pupils compare distributions. Calculation frames and calculator support reduce arithmetic load where the statistical interpretation is the focus. Box plots, histograms and outliers are annotated explicitly to support comparison. Secure pupils are challenged to select appropriate measures, explain the effect of outliers and justify which average or measure of spread gives the most useful comparison.	Links to A Level statistics, especially data interpretation, measures of location and spread, outliers, standard deviation, distributions and interpretation of the large data set.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
KS4	Representing and Interpreting Data and Scatter Graphs		Revisits KS4 Averages and Range when comparing distributions, KS4 Linear Graphs through coordinates, scales and interpreting trends, and KS4 Fractions, Percentages and Ratio when constructing or interpreting proportional diagrams such as pie charts. It extends KS3 statistical diagrams into scatter graphs, time series, histograms and cumulative frequency.	Pre-drawn axes, scale prompts and structured tables support accurate construction of scatter graphs, time-series graphs, histograms and cumulative frequency graphs. Worked examples model how to interpret correlation, outliers and lines of best fit, with sentence stems available where needed for written conclusions. Secure pupils are challenged to compare different representations, critique misleading choices of scale, interpolate or extrapolate appropriately and distinguish correlation from causation using	Directly links to A Level data presentation and interpretation, including histograms, box plots, cumulative frequency diagrams, scatter diagrams, regression lines, correlation and outliers.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				evidence from the data.	
KS4	Sampling and Questionnaires		Revisits KS4 Averages and Range and KS4 Representing and Interpreting Data when deciding what data is needed and how it should be summarised. Fractions and Percentages are also revisited in proportional and stratified sampling. It builds on KS3 data collection and develops understanding of populations, samples, bias and questionnaire design.	Examples of good and poor questionnaire questions are compared so pupils can identify bias, ambiguity and unsuitable response options before constructing their own. Population, sample and sampling methods are represented with simple diagrams and tables, with proportional calculations for stratified sampling modelled step by step. Secure pupils are challenged to critique sampling methods, quantify stratified	Directly links to A Level statistical sampling, including population, sample, sampling methods, informal inference and understanding that different samples can lead to different conclusions.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
				samples accurately and explain how sample size, question design and collection method may affect the reliability of conclusions.	
KS4	Circle Theorems		Revisits KS4 Polygons and Angles through angle facts, parallel lines and properties of shapes, KS4 Solving Equations when unknown angles are found algebraically, and KS4 Perimeter, Area and Volume through circle vocabulary. Pythagoras and Trigonometry may also support geometric reasoning. These ideas are combined to justify and apply circle theorems.	Circle vocabulary and core angle facts are revisited through labelled diagrams before individual circle theorems are introduced. Each theorem is modelled with consistent markings and short reasoning chains, with theorem banks, partially completed proofs and algebra prompts available where needed. Secure pupils are challenged to identify which theorem is relevant from minimal	Links mainly to proof, coordinate geometry of circles, trigonometry and geometric reasoning. A Level includes the equation of a circle and circle-based coordinate geometry.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				information, combine several theorems in one problem and construct clear geometric arguments that justify every step.	
KS4	Transformations		Revisits KS4 Linear Graphs through coordinates, KS4 Ratio, Proportion and Similarity through scale factor and enlargement, and KS4 Polygons and Angles through properties of shapes. It also revisits KS3 translation, reflection, rotation and enlargement before extending to more formal descriptions and combined transformations.	Coordinate grids, tracing paper and clearly marked centres, mirror lines and vectors are used selectively to support accurate transformations. A consistent description checklist reinforces the information required for rotation, reflection, translation and enlargement, while fractional and negative scale factors are modelled visually before independent work. Secure pupils are challenged to combine	Links to A Level functions and graphs, especially graph transformations, composite functions, inverse functions and curve sketching. It also supports coordinate geometry and vectors.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				transformations, infer a transformation from object and image and explain invariant features using precise subject-specific language.	
KS4	Non-Linear Graphs -		Revisits KS4 Expressions and Solving Equations through substitution, expansion and roots, KS4 Sequences through quadratic patterns, and KS4 Linear Graphs through plotting, intercepts and equations. KS4 Transformations supports transformations of graphs, while Indices supports powers in quadratic, cubic and other non-linear functions.	Tables of values and structured coordinate grids support accurate plotting before pupils focus on the characteristic shapes of quadratic, cubic and other non-linear graphs. Roots, intercepts, turning points and transformations are highlighted consistently and linked to familiar algebraic expressions. Pre-drawn axes and partially completed tables are available where needed. Secure	Directly links to A Level algebra and functions, quadratic/cubic/polynomial graphs, reciprocal graphs, exponential graphs, curve sketching, differentiation, integration and numerical methods.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				pupils are challenged to sketch from key features, apply graph transformations fluently and connect changes in an equation to changes in the graph.	
KS4	Plans, Elevations, Constructions, Loci, Similarity and Bearings		Revisits KS4 Ratio, Proportion and Similarity through scale drawings and similar shapes, KS4 Polygons and Angles through bearings and accurate angle work, and KS4 Pythagoras and Trigonometry for unknown lengths and angles. Perimeter, Area and Volume and Transformations also support 3D representations and geometric constructions.	Physical and visual 3D models, nets, scale drawings and enlarged construction diagrams are used to support spatial reasoning and accurate use of equipment. Compass constructions, loci, bearings and plans/elevations are modelled in visible stages, with starting points or partial diagrams available where needed. Corresponding sides and congruence conditions are	Links more indirectly to A Level through trigonometry, vectors, coordinate geometry, mechanics diagrams and modelling. Bearings and scale diagrams support vector direction, forces and kinematics.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				highlighted consistently. Secure pupils are challenged to combine construction and similarity ideas, work from minimal instructions and justify congruence, similarity and bearing solutions precisely.	
KS4	Vectors and Geometric Proof		Revisits KS4 Transformations through translation vectors, KS4 Ratio, Proportion and Similarity through scalar multiples and proportional division, and KS4 Polygons and Angles through geometric properties. Pythagoras and Circle Theorems support geometric reasoning. These strands are combined to develop	Arrows on coordinate grids are used to reinforce direction and magnitude before pupils manipulate column vectors algebraically. Vector addition, subtraction and scalar multiplication are modelled both visually and symbolically, with routes through shapes highlighted where needed. Geometric proof is built from	Direct link to A Level vectors, including 2D and 3D vectors, unit vectors, magnitude, direction, position vectors, vector addition, scalar multiples and use of vectors in pure maths and mechanics.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
			vector manipulation and geometric proof.	short, justified vector statements. Secure pupils are challenged to construct efficient vector proofs, show that points are collinear or lines are parallel and explain why different vector routes must give equivalent expressions.	
KS4	Reciprocal and Exponential Graphs; Gradient and Area under Graphs		Revisits KS4 Indices, Roots and Reciprocals through reciprocal and exponential forms, KS4 Linear Graphs through gradient and coordinate interpretation, and KS4 Direct and Inverse Proportion through proportional equations. Non-Linear Graphs provide the graph-sketching foundation, while Perimeter, Area and Volume supports	Key graph families are compared visually so pupils can recognise reciprocal and exponential behaviour before interpreting them in context. Tangents, gradient triangles and shaded regions are used to make rate of change and area under a graph explicit, while the trapezium rule is modelled in a	Very strong link to A Level. Reciprocal and exponential graphs lead to functions, exponentials/logarithms and modelling; gradient links to differentiation; area under graphs links to integration, numerical integration and kinematics.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
			area-under-a-graph methods.	structured table where needed. Secure pupils are challenged to estimate gradients and areas from unfamiliar graphs, interpret results contextually and connect graphical features to changing rates rather than simply applying procedures.	
KS4	Proof		Revisits and brings together the full KS4 algebra and geometry curriculum. Algebraic proof draws on Number Properties, Expressions and Solving Equations; geometric proof revisits Polygons and Angles, Circle Theorems, Similarity, Transformations and Vectors. Pupils also build on the justification and	Proof is modelled through short chains of statements where each step is justified using known algebraic or geometric facts. Colour-coding and sentence stems distinguish given information, deductions and conclusions, while worked examples contrast valid proof with examples that	Direct link to A Level proof, where students use proof by deduction, proof by exhaustion, disproof by counterexample and proof by contradiction. The specification also emphasises mathematical argument, logical deduction and constructing proofs.

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
				reasoning developed throughout KS3 and earlier KS4 topics.	only demonstrate a single case. Secure pupils are challenged to choose an appropriate proof structure, use identities and geometric facts fluently, identify counterexamples and communicate a complete logical argument without relying on unsupported assumptions.	
KS5	Knowledge (Topics / contexts) What pupils will 'know' .	Skills acquired What pupils will be able to 'do' .		Concepts developed What pupils will 'understand' .		Assessment (KPIs)
Year 12 Core	Algebraic Expressions	Index laws, expanding brackets, factorising, negative and fractional indices, surds, rationalising denominators.		Pupils will multiply and divide integer powers, expand a single term over brackets and collect like terms, expand the product of two or three expressions, factorise linear, quadratic and simple cubic		Summative assessments after every topic based on the scheme of work. Covering all content from that topic.

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
			expressions, know and use the laws of indices, simplify and use the rules of surds, rationalise denominators.	Mathematics A-Level <u>Year 12 mock week:</u> 1x 2h Pure Maths exam covering all content. 1x 1h30min Applied Maths exam covering all content <u>Year 13 mock exam week:</u> 2x 2h Pure Maths exams covering all content. 1x 2h Applied Maths exam covering all content Further Mathematics A-Level <u>Year 12 mock week:</u> 1x 2h Pure Maths exam covering all content. 1x 1h40min Applied Maths exam covering all content	
	Quadratics	Solving quadratic equations, completing the square, functions, quadratic graphs, the discriminant, modelling with quadratics.	Pupils will solve quadratic equations using factorisation, the quadratic formula and completing the square, read and use $f(x)$ notation when working with functions, sketch the graph and find the turning point of a quadratic expression, use and apply models that involve quadratic functions.		
	Equations and inequalities	Linear simultaneous equations, quadratic simultaneous equations, linear inequalities, quadratic inequalities, inequalities on graphs, regions.	Pupils will solve linear simultaneous equations using elimination or substitution, solve simultaneous equations: one linear and one quadratic, interpret algebraic solutions of equations graphically, solve linear inequalities, solve quadratic inequalities, interpret inequalities graphically, represent linear and quadratic inequalities graphically.		
	Graphs and transformations	Cubic graphs, quartic graphs, reciprocal graphs, points of intersection, translating graphs, stretching graphs, transforming functions.	Pupils will sketch cubic, quartic and reciprocal graphs, use intersection points of graphs to solve equations, translate graphs, sketch graphs, transform graphs of unfamiliar graphs.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Straight line graphs	$y=mx+c$, equations of straight lines, parallel and perpendicular lines, length and area, modelling with straight lines.		Pupils will calculate the gradient of a line joining a pair of points, understand the link between the equation of a line and its gradient and intercept, find the equation of a line given either the gradient and one point or two points on the line, find the point of intersection for a pair of straight lines, know and use the rules for parallel and perpendicular gradients, solve length and area problems on coordinate grids, use straight line graphs to construct mathematical models.	<u>Year 13 mock exam week:</u> 1 x 2h Pure Maths exams covering all content. 2 x 1.5h Applied Maths exam covering all content	
	Circles	Midpoints and perpendicular bisectors, equation of a circle, intersections of straight lines and circles, use tangent and chord properties, circles and triangles.		Pupils will find the midpoint of a line segment, find the equation of the perpendicular bisector to a line segment, know how to find the equation of a circle, solve geometric problems involving straight lines and circles, use circle properties to solve problems on coordinate grids, find the angle in a semicircle and solve other problems involving circles and triangles.		
	Algebraic Methods	Algebraic fractions, dividing polynomials the factor theorem, mathematical proof, methods of proof.		Pupils will cancel factors in algebraic fractions, divide a polynomial by a linear expression, use the factor theorem to factorise a cubic expression, construct mathematical proofs using algebra, use		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				proof by exhaustion and disproof by counter-example.		
	The binomial expansion	Pascal's triangle, factorial notation, the binomial expansion, solving binomial problems, binomial estimation.		Pupils will use Pascal's triangle to identify binomial coefficients and use them to expand simple binomial expressions, use combinations and factorial notation, use the binomial expansion to expand brackets, find individual coefficients in a binomial expansion, make approximations using the binomial expansion.		
	Trigonometric ratios	The cosine rule, the sine rule, area of triangles, solving triangle problems, graphs of sine cosine and tangent, transforming trigonometric graphs.		Pupils will use the cosine rule to find a missing side or angle, use the sine rule to find a missing side or angle, find the area of a triangle using an appropriate formula. Solve problems involving triangles, sketch the graphs of the sine, cosine, tangent functions and simple transformations of these functions.		
	Trigonometric identities and equations	Angles in all four quadrants, exact values of trigonometric ratios, trigonometric identities, simple trigonometric equations, harder trigonometric equations, equations and identities.		Pupils will calculate the sine, cosine and tangent of any angle, know the exact trigonometric ratios for 30,45 and 60 degrees, know and use the relationships between $\tan = \sin/\cos$ and $\sin^2 + \cos^2 = 1$, solve simple trigonometric equations, solve more complicated trigonometric		

Year	Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
			equations, some of which produce quadratics.		
	Vectors	Vectors, representing vectors, magnitude and direction, position vectors, solving geometric problems, modelling with vectors.	Pupils will use vectors in two dimensions, use column vectors and carry out arithmetic operations on vectors, calculate the magnitude and direction of a vector, understand and use position vectors, use vectors to solve geometric problems, understand vector and magnitude and use vectors in speed and distance calculations, use vectors to solve problems in context.		
	Differentiation	Gradients of curves, finding the derivative, differentiating simple, differentiating quadratics, differentiation functions with two or more terms, gradients tangents and normal, increasing and decreasing functions, second order derivatives, stationary points, sketching gradient functions, modelling with differentiation.	Pupils will find the derivative of simple functions, solve problems involving gradients, tangents, and normals, identify increasing and decreasing functions, find second order derivatives or simple functions, find stationary points of functions and determine their nature, sketch the gradient function of a given function, model real-life situations with differentiation.		
	Integration	Simple integration, indefinite integrals, finding functions, definite integrals, areas under curves,	Pupils will find y given dy/dx , integrate polynomials, find $f(x)$ given $f'(x)$ and a point		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
			areas under the x-axis, areas between curves and lines.	on the curve, evaluate definite integrals, find the area bounded by a curve and the x-axis, find areas bounded by curves and straight lines.		
	Exponentials and logarithms	Exponential functions, e, exponential modelling, logarithms, solving equations using logarithms, working with natural logarithms, logarithms and non-linear data.		Pupils will sketch exponential graphs and be able to transform them, differentiate e^{kx} and understand its importance, use and interpret models that use exponential functions, recognise the relationships between exponents and logarithms, recall and apply the laws of logarithms, solve exponential equations, describe and use the natural log function, use logarithms to estimate the values of constants in non-linear models.		
Year 12 Statistics	Data collection	Populations and samples, sampling, non-random sampling, types of data, the large data set.		Pupils will understand 'population', 'sample' and 'census' and comment on the advantages and disadvantages of each, understand the pros and cons of simple random sampling, systematic sampling, stratified sampling, quota sampling, and opportunity sampling, define qualitative quantitative, discrete and continuous data and understand grouped data, understand the large data set and how to collect data from it, identify types of data and calculate simple statistics.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
	Measures of location and spread	Measures of central tendency, other measures of location, measures of spread, variance and standard deviation, coding.	Pupils will calculate measures of central tendency such as the mean, median and mode, calculate measures of location such as percentiles and deciles, calculate measures of spread such as range, interquartile range and interpercentile range, calculate variance and standard deviation, understand and use coding.			
	Representations of data	Outliers, box plots, cumulative frequency, histograms, comparing data.	Pupils will identify outliers in data sets, draw and interpret box plots, draw and interpret cumulative frequency diagrams and histograms, compare two data sets.			
	Correlation	Correlation, linear regression.	Pupils will draw and interpret scatter diagrams for bivariate data, interpret correlation and understand that it does not imply causation, interpret the coefficients of a regression line equation for bivariate data, understand when you can use a regression line to make predictions.			
	Probability	Calculating probabilities, Venn diagrams, mutually exclusive and independent events, tree diagrams.	Pupils will calculate probabilities for single events, draw and interpret Venn diagrams, understand mutually exclusive and independent events, and determine whether two events are independent, use and understand tree diagrams.			

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Statistical distributions	Probability distributions, the binomial distribution, cumulative probabilities.		Pupils will understand and use simple discrete probability distributions including the discrete uniform distribution, understand the binomial distribution as a model and comment on appropriateness, calculate individual probabilities for the binomial distribution, calculate cumulative probabilities for the binomial distribution.		
	Hypothesis testing	Hypothesis testing, finding critical values, one-tailed tests, two-tailed tests.		Pupils will understand the language and concept of hypothesis testing, understand that a sample used to make an inference about a population, find critical values of a binomial distribution using tables, carry out one and two-tailed tests for the proportion of the binomial distribution and interpret the results.		
Year 12 Mechanics	Modelling in mechanics	Constructing a model, modelling assumptions, quantities and units, working with vectors.		Pupils will understand how the concept of a mathematical model applies to mechanics, understand and be able to apply some of the common assumptions used in mechanical models, know SI units for quantities and derived quantities used in mechanics, know the difference between scalar and vector quantities.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Constant acceleration	Displacement-time graphs, velocity-time graphs, constant acceleration formulae 1, constant acceleration formulae 2, vertical motion under gravity.		Pupils will understand and interpret displacement-time and velocity-time graphs, derive the constant acceleration formulae and use them to solve problems, use the constant acceleration formulae to solve problems involving vertical motion under gravity.		
	Forces and motion	Force diagrams, forces as vectors, forces and acceleration, motion in 2 dimensions, connected particles, pulleys.		Pupils will draw force diagrams and calculate resultant forces by adding vectors, understand and use Newton's first law, understand and use Newton's second law $F=ma$, apply Newton's second law to vector forces and acceleration, understand and use Newton's third law, solve problems involving connected particles.		
	Variable acceleration	Functions of time, using differentiation, maxima and minima problems.		Pupils will understand that displacement, velocity and acceleration may be given as functions of time, use differentiation to solve kinematics problems, use calculus to solve problems involving maxima and minima, use integration to solve kinematics problems, use calculus to derive constant acceleration formulae.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
Year 13 Core	Algebraic methods	Proof by contradiction, algebraic fractions, partial fractions, repeated factors, algebraic division.		Pupils will use proof by contradiction to prove true statements, multiply and divide two or more algebraic fractions, add or subtract two or more algebraic fractions, convert an expression with linear factors into the denominator into partial fractions, convert an expression with repeated linear factors in the denominator into partial fractions, divide algebraic expressions, convert an improper fraction into partial fraction form.		
	Functions and graphs	The modulus function, functions and mappings, composite functions, inverse functions, $y=f(x)$ and $y=f(x)$, combining transformations, solving modulus problems.		Pupils will understand and use the modulus function, understand mappings and functions and use domain and range, combine two or more functions to make a composite function, know how to find the inverse of a function graphically and algebraically, sketch the graphs of the modulus functions $y= f(x) $ and $y=f(x)$, apply a combination of two or more transformations to the same curve, transform the modulus function.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Sequences and series	Arithmetic sequences, arithmetic series, geometric sequences, geometric series, sum to infinity, sigma notation, recurrence relations, modelling with series.		Pupils will find the n th term of an arithmetic sequence, prove and use the formula for the sum of the first n terms of an arithmetic series, find the n th term of a geometric sequence, prove and use the formula for the sum of a finite geometric series, prove and use the formula for the sum to infinity of a convergent geometric series, use sigma notation to describe series, generate sequences from recurrence relations, model real-life situations with sequences and series.		
	Binomial expansion	Expanding $(1+x)^n$, expanding $(a+bx)^n$, using partial fractions.		Pupils will expand $(1+x)^n$ for any rational constant n and determine the range of values of x for which the expansion is valid, expand $(a+bx)^n$ for any rational constant n and determine the range of values for which the expansion is valid. Use partial fractions to expand fractional expressions.		
	Radians	Radian measure, arc length, areas of sectors and segments, solving trigonometric equations, small angle approximations.		Pupils will convert between degrees and radians and apply this to trigonometric graphs and their transformations, know exact values of angles measured in radians, find an arc length using radians, find area of sectors and segments using radians, solve trigonometric equations in radians, use approximate equations in radians, use		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				approximate trigonometric values when theta is small.		
	Trigonometric functions	Secant cosecant and cotangent, graphs of secx cosecx and cotx, using secx cosecx and cotx, trigonometric identities, inverse trigonometric functions.		Pupils will understand the definitions of secant, cosecant and cotangent and their relationship to cosine sine and tangent, understand the graphs of each of these and their domain and range, simplify expressions, prove simple identities and solve equations involving secant cosecant and cotangent, prove and use $\sec^2 = 1 + \tan^2 x$ and $\operatorname{cosec}^2 = 1 + \cot^2$, understand and use inverse trigonometric functions and their domain and ranges.		
	Trigonometry and modelling	Addition formulae, using the angle addition formulae, double-angle formulae, solving trigonometric equations, simplifying $a\cos x + b\sin x$, proving trigonometric identities, modelling with trigonometric functions.		Pupils will prove and use the addition formulae, understand and use the double-angle formulae, solve trigonometric equations using these formulae, write expressions of the form $a\cos x + b\sin x$ in the forms $R\cos$ or $R\sin$, prove trigonometric identities using a variety of identities, use trigonometric functions to model real-life situations.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Parametric equations	Parametric equations, using trigonometric identities, curve sketching, points of intersection, modelling with parametric equations.		Pupils will convert parametric equations into Cartesian form by substitution and trigonometric identities, understand and use parametric equations of curves and sketch parametric curves, solve coordinate geometry problems involving parametric equations and use parametric equations in modelling in a variety of contexts.		
	Differentiation	Differentiating $\sin x$ and $\cos x$, differentiating exponentials and logarithms, the chain rule, the product rule, the quotient rule, differentiating trigonometric functions, parametric differentiation, implicit differentiation, using second derivatives, rates of change.		Pupils will differentiate trigonometric functions, exponentials and logarithms, functions using the chain, product and quotient rules, parametric equations, functions which are defined implicitly, use the second derivative to describe the behaviour of a function, solve problems involving connected rates of change and construct simple differential equations.		
	Numerical methods	Locating roots, iteration, the Newton-Raphson method, applications to modelling.		Pupils will locate roots of $f(x)=0$ by considering changes of sign, use iteration to find an approximation to the root of the equation $f(x)=0$, use the Newton-Raphson procedure to find approximations to the solutions of equations of the form $f(x)=0$, use numerical methods to solve problems in context.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Integration	Integrating standard functions, integrating $f(ax+b)$, using trigonometric identities, reverse chain rule, integration by substitution, integration by parts, partial fractions, finding areas, the trapezium rule, solving differential equations, modelling with differential equations.		Pupils will integrate standard mathematical functions including trigonometric and exponential functions and use the reverse of the chain rule to integrate functions of the form $f(ax+b)$, use trigonometric identities in integration, use the reverse of the chain rule to integrate more complex functions, integrate functions by making a substitution, using integration by parts and using partial fractions, use the trapezium rule to approximate the area under a curve, use integration to find the exact area under a curve, solve simple differential equations and model real-life situations with differential equations.		
	Vectors	3D coordinates, vectors in 3D, solving geometric problems, application to mechanics.		Pupils will understand 3D Cartesian coordinates, use vectors in three dimensions, use vectors to solve geometric problems, model 3D motion in mechanics with vectors.		
Year 13 Statistics	Regression, correlation and hypothesis testing.	Exponential models, measuring correlation, hypothesis testing for zero correlation.		Pupils will understand exponential models in bivariate data, use a change of variable to estimate coefficients in an exponential model, understand and calculate the product moment correlation coefficient,		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				carry out a hypothesis test for zero correlation.		
	Conditional probability	Set notation, conditional probability, conditional probabilities in Venn diagrams, probability formulae, tree diagrams.		Pupils will understand set notation in probability, understand conditional probability, solve conditional probability problems using two-way tables and Venn diagrams, use probability formulae to solve problems, solve conditional probability using tree diagrams.		
	The normal distribution	The normal distribution, finding probabilities of normal distributions, the inverse normal distribution function, the standard normal distribution, finding mu and sigma, approximating a binomial distribution, hypothesis testing with the normal distribution.		Pupils will understand the normal distribution and the characteristics of a normal distribution curve, calculate values on a standard normal curve, find percentage points on a standard normal curve, find unknown means and/or standard deviations for a normal distribution, approximate a binomial distribution using a normal distribution, select appropriate distributions and solve real-life problems in context, carry out a hypothesis test for the mean of a normal distribution.		
Year 13 Mechanics	Moments	Moments, resultant moments, equilibrium, centres of mass, tilting.		Pupils will calculate the turning effect of a force applied to a rigid body, calculate the resultant moment of a set of forces acting		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				on a rigid body, solve problems involving uniform rods in equilibrium, solve problems involving non-uniform rods and rods on the point of tilting.		
	Forces and friction	Resolving forces, inclined planes, friction.		Pupils will resolve forces into components, use the triangle law to find a resultant force, solve problems involving smooth or rough inclined planes, understand friction and the coefficient of friction.		
	Projectiles	Horizontal projection, horizontal and vertical components, projection at any angle, projectile motion formulae.		Pupils will model motion under gravity for an object projected horizontally, resolve velocity into components, solve problems involving particles projected at an angle, derive the formulae for time of flight, range and greatest height and the equation of the path of a projectile.		
	Applications of forces	Static particles, modelling with statics, friction and static particles, static rigid bodies, dynamics and inclined planes, connected particles.		Pupils will find an unknown force when a system is in equilibrium, solve statics problems involving weight, tension and pulleys, understand and solve problems involving limiting equilibrium, solve problems involving motion on rough or smooth inclined planes and connected particles that require the resultant force.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Further kinematics	Vectors in kinematics, vector methods with projectiles, variable acceleration in one dimension, differentiating vectors, integrating vectors.		Pupils will work with vectors for displacement, velocity and acceleration when using the vector equations of motion, use calculus with harder functions of time involving variable acceleration, differentiate and integrate vectors with respect to time.		
Year 12 Further Core	Complex numbers	Imaginary and complex numbers, multiplying complex numbers, complex conjugation, roots of quadratic equations, solving cubic and quartic equations.		Pupils will understand and use the definitions of imaginary and complex numbers, add and subtract complex numbers, multiply complex numbers, understand the definition of a complex conjugate, divide complex numbers, solve quadratic equations that have complex roots, solve cubic or quartic equations that have complex roots.		
	Argand diagrams	Argand diagrams, modulus and argument, modulus-argument form of complex numbers, loci in the argand diagram, regions in the argand diagram.		Pupils will show complex numbers on an Argand diagram, find the modulus and argument of a complex number, write a complex number in modulus-argument form, represent loci on an Argand diagram, represent regions on an Argand diagram.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Series	Sums of natural numbers, sums of squares and cubes.		Pupils will use standard results for summation of series in $1, r, r^2$ and r^3 . Pupils will evaluate and simplify the summation of series in the form $f(r)$ where $f(r)$ is linear, quadratic or cubic.		
	Roots of polynomials	Roots of a quadratic equation, roots of a cubic equation, roots of a quartic equation, expressions relating to the roots of a polynomial, linear transformations of roots.		Pupils will derive and use the relationships between the roots of quadratic, cubic, and quartic equations, evaluate expressions relating to the roots of polynomials, find the equation of a polynomial whose roots are a linear transformation of the roots of a given polynomial.		
	Volumes of revolution	Volumes of revolution around the x-axis, Volumes of revolution around the y-axis, adding and subtracting volumes, modelling with volumes of revolution.		Pupils will find the volume of revolution when a curve is rotated around the x or y-axis, find more complicated volumes of revolution, model real-life objects using volumes of revolution.		
	Matrices	Introduction to matrices, matrix multiplication, determinants, inverting a 2×2 matrix, inverting a 3×3 matrix, solving systems of equations using matrices.		Pupils will understand the concept of a matrix, define the zero and identity matrices, multiply a matrix by a scalar, multiply matrices, calculate the determinant of a matrix, find the inverse of a matrix, use matrices to solve systems of equations, interpret simultaneous equations geometrically.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Linear transformations	Linear transformations in two dimensions, reflections and rotations, enlargements and stretches, successive transformations, linear transformations in three dimensions, the inverse of a linear transformation.		Pupils will understand the properties of linear transformations and represent them using matrices, perform reflections and rotations using matrices, carry out enlargements and stretches using matrices, find the coordinates of invariant points and the equations of invariant lines, carry out successive transformations using matrix products, understand linear transformations in three dimensions, use inverse matrices to reverse linear transformations.		
	Proof by induction	Proof by mathematical induction, proving divisibility results, proving statements involving matrices.		Pupils will understand the principle of proof by mathematical induction and prove results about sums of series, prove results about divisibility using induction, prove results about matrices using induction.		
	Vectors	Equation of a line in three dimensions, equation of a plane in three dimensions, scalar product, calculating angles between lines and planes, points of intersection, finding perpendiculars.		Pupils will understand and use the vector and Cartesian forms of the equation of a straight line in three dimensions and the equation of a plane, calculate the scalar product for two 3D vectors, calculate the angle between: two vectors, two lines, a line and a plane, or two planes. They will understand and use the scalar product form of the equation of a plane, determine		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
				whether two lines meet and determine the point of intersection, calculate the perpendicular distance between: two lines, a point and a line, or a point and a plane.		
Year 13 Further Core	Complex numbers	Exponential form of complex numbers, multiplying and dividing complex numbers, De Moivre's theorem, trigonometric identities, sums of series, nth roots of a complex number, solving geometric problems.		Pupils will express a complex number in exponential form, multiply and divide complex numbers in exponential form, understand de Moivre's theorem, use de Moivre's theorem to derive trigonometric identities and to find sums of series, know how to solve completely equations of the form $Z^n - a - ib = 0$, use complex roots of unity to solve geometric problems.		
	Series	The method of differences, higher derivatives, Maclaurin series, series expansions of compound functions.		Pupils will understand and use the method of differences to sum finite series, find and use higher derivatives of functions, know how to express functions as an infinite series in ascending powers using Maclaurin series expansion, be able to find the series expansions of compound functions.		
	Methods in calculus	Improper integrals, the mean value of a function, differentiating inverse trigonometric functions,		Pupils will evaluate improper integrals, understand and evaluate the mean value		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do' .	Concepts developed What pupils will 'understand' .	Key Vocabulary Tier 3
		integrating with inverse trigonometric functions, integrating using partial fractions.		of a function, integrate rational functions using trigonometric substitutions, integrate using partial fractions.		
	Volumes of revolution	Volumes of revolution around the x-axis, Volumes of revolution around the y-axis, volumes of revolution of parametrically defined curves, modelling with volumes of revolution.		Pupils will find the volume of revolution around the x and y-axis, for curves defined parametrically and model real-life applications of volumes of revolution.		
	Polar coordinates	Polar coordinates and equations, sketching curves, area enclosed by a polar curve, tangents to polar curves.		Pupils will understand and use polar coordinates, convert between polar and Cartesian coordinates, sketch curves with r given as a function of θ , find the area enclosed by a polar curve, find tangents parallel to, or at right angles to, the initial line.		
	Hyperbolic functions	Introduction to hyperbolic functions, inverse hyperbolic functions, identities and equations, differentiating hyperbolic functions, integrating hyperbolic functions.		Pupils will understand the definitions of hyperbolic functions, sketch the graphs of hyperbolic functions, understand and use the inverse hyperbolic functions, prove identities and solve equations using hyperbolic functions, differentiate and integrate hyperbolic functions.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Methods in differential equations	First-order differential equations, second-order homogeneous differential equations, second-order non-homogeneous differential equations, using boundary conditions.		Pupils will solve first-order differential equations using an integrating factor, solve second-order differential equations using the auxiliary equation, solve second-order non-homogeneous differential equations using the complimentary function and the particular integral, find particular solutions to differential equations using given boundary conditions.		
	Modelling with differential equations	Modelling with first-order differential equations, simple harmonic motion, damped and forced harmonic motion, coupled first-order simultaneous differential equations.		Pupils will model real-life situations with first-order differential equations, use differential equations to model simple harmonic motion, model damped and forced oscillations using differential equations, model real-life situations using coupled first-order differential equations.		
Further Statistics	Discrete random variables	Expected value of a discrete random variables, variables of a discrete random variable, expected value and variance of a function of X, solving problems involving random variables.		Pupils will find the expected value of a discrete random variable X, find the expected value of X^2 , find the variance of a discrete random variable, use the expected value and variance of a function of X, solve problems involving random variables.		
	Poisson distributions	The Poisson distribution, modelling with the Poisson distribution, adding Poisson distributions, mean and variance of a Poisson distribution, mean		Pupils will use the Poisson distribution to model real-world situations, use the additive property of the Poisson		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
		and variance of the binomial distribution, using the Poisson distribution to approximate the binomial distribution.		distribution, understand and use the mean and variance of the Poisson and binomial distributions, use the Poisson distribution as an approximation to the binomial distribution.		
	Geometric and negative binomial distributions	The geometric distribution, mean and variance of a geometric distribution, the negative binomial distribution, mean and variance of the negative binomial.		Pupils will understand and use the geometric distribution, calculate and use the mean and variance of the geometric distribution, understand and use the negative binomial distribution, calculate and use the mean and variance of the negative binomial distribution.		
	Hypothesis testing	Testing for the mean of a Poisson distribution, finding critical regions for a Poisson distribution, hypothesis testing for the parameter p of a geometric distribution.		Pupils will use hypothesis tests to test for the mean of a Poisson distribution, find critical regions of a Poisson distribution using tables, use hypothesis tests to test for the parameter p in a geometric distribution, find critical regions of a geometric distribution.		
	Central Limit Theorem	The central limit theorem, applying the central limit theorem to other distributions.		Pupils will understand and apply the central limit theorem to approximate the sample mean of a random variable, apply the central limit theorem to other distributions.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Chi-squared tests	Goodness of fit, degrees of freedom and the chi-squared family of distributions, testing a hypothesis, testing the goodness of fit with discrete data, using contingency tables, apply goodness-of-fit tests to geometric distributions.		Pupils will form hypotheses about how well a distribution fits as a model for an observed frequency distribution and measure goodness of fit of a model to observed data, understand degrees of freedom and use the chi-squared family of distributions, be able to test a hypothesis, apply goodness-of-fit tests to discrete data and geometric distributions, use contingency tables.		
	Probability generating functions	Probability generating functions, probability generating functions of standard distributions, mean and variance of a distribution, sums of independent random variables.		Pupils will understand the use of probability generating functions, use them for standard deviation, mean and variance and know the probability generating function of the sum of independent random variables.		
	Quality of tests	Type 1 and type 2 errors, finding type 1 and type 2 errors using the normal distribution, calculate the size and power of a test, the power function.		Pupils will know about type 1 and type 2 errors, find type 1 and type 2 using the normal distribution, calculate the size and power of a test, draw a graph of the power function for a test.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
Further Decision	Algorithms	Using and understanding algorithms, flow charts, bubble sort, quick sort, Bin-packing algorithms, order of an algorithm.		Pupils will use and understand an algorithm given in words, understand how flow charts can be used to describe algorithms, carry out a bubble sort and a quick sort, carry out the three bin-packing algorithms and understand their strengths and weaknesses, determine the order of an algorithm.		
	Graphs and networks	Modelling with graphs, graph theory, special types of graph, representing graphs and networks using matrices, the planarity algorithm.		Pupils will know how graphs and networks can be used to create mathematical models, be familiar with basic terminology used in graph theory, know some special types of graph, understand how graphs and networks can be represented using matrices, use the planarity algorithm to determine whether or not a given graph is planar.		
	Algorithms on graphs	Kruskal's algorithm, Prim's algorithm, applying Prim's algorithm to a distance matrix, using Dijkstra's algorithm to find the shortest path, Floyd's algorithm.		Pupils will use Kruskal's algorithm to find a minimum spanning tree, use Prim's algorithm on a network to find a minimum spanning tree, apply Prim's algorithm to a distance matrix, use Dijkstra's algorithm to find the shortest path between two vertices in a network, use Floyd's algorithm.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	Route inspection	Eulerian graphs, using the route inspection algorithm, networks with more than four odd nodes.		Pupils will use the orders of nodes to determine whether a graph is Eulerian semi-Eulerian or neither, use the route inspection algorithm to find the shortest route in a network and in networks with more than four odd nodes.		
	The travelling salesman problem	The classical and practical travelling salesman problems, using a minimum spanning tree method to find an upper bound, using a minimum spanning tree method to find a lower bound, using the nearest neighbour algorithm to find an upper bound.		Pupils will explain the differences between the classical and practical problems, use minimum spanning tree method to find an upper and lower bound, use the nearest neighbour algorithm to find an upper bound.		
	Linear programming	Linear programming problems, graphical methods, locating the optimal point, solutions with integer values.		Pupils will formulate a problem as a linear programming problem, illustrate two-variable linear programming problems graphically, locate the optimal point in a feasible region using the objective line method, use the vertex testing method to locate the optimal point, determine solutions that need integer values.		

Year		Knowledge Topics/Unit of work? What pupils will 'know'	Prior Knowledge (KS2/Previous learning)	Skills acquired What pupils will be able to 'do'.	Concepts developed What pupils will 'understand'.	Key Vocabulary Tier 3
	This simplex algorithm	Formulating linear programming problems, the simplex method, problems requiring integer solutions, two-stage simplex method, the Big-M method.		Pupils will understand and use slack and surplus variables, solve maximising and minimising linear programming problems, use the simplex tableaux method to solve linear programming problems requiring integer solutions, understand and use the two-stage simplex method for maximising and minimising problems which may include inequality constraints, understand and use the Big-M method for maximising and minimising problems which may include inequality constraints.		
	Critical path analysis	Modelling a project, dummy activities, early and late event times, critical activities, the float of an activity, Gannt charts, resource histograms, scheduling diagrams.		Pupils will model a project by an activity network using a precedence table, use dummy activities, identify and calculate early and late event times in activity networks, identify the critical activities, calculate the total float on an activity, calculate and use Gannt charts, construct resource histograms and scheduling diagrams.		

