



Unit context	Topic name	Term	Skills developed	Prior Learning	Next link in curriculum
1	Algebraic Manipulation	Autumn	- Collecting like terms - Expanding and factorising single brackets - Solving linear equations and inequalities - Substituting into and rearranging formulae - Basic sequences and patterns	- KS2: use of simple formulae and substitution - KS3: algebraic notation, simplifying expressions, expanding single brackets - KS3: solving linear equations and inequalities - KS3: number skills (fractions, negatives, BIDMAS)	- KS4: Quadratic expressions and equations - KS4: Simultaneous equations and algebraic fractions - KS4: Functions and graphs - KS5 (A-level): Algebraic proof, advanced functions, calculus foundations, algebraic manipulation in differentiation and integration
1	Equations, inequalities and formulae	Autumn	- Solve one-step and two-step linear equations - Solve equations with unknowns on both sides - Solve equations involving brackets - Solve simple linear inequalities and represent on number lines - Form and solve simple inequalities in context - Substitute into and rearrange simple formulae	- KS2: use of inverse operations to solve simple equations - KS3: solving one- and two-step equations - KS3: algebraic notation and simplifying expressions - KS3: basic substitution into formulae - KS3: understanding inequality symbols ($<$, $>$, $\leq$, $\geq$)	- KS4: rearranging more complex formulae (including fractions and powers) - KS4: simultaneous equations - KS4: quadratic equations and inequalities - KS4: graphical representations of inequalities and regions - KS5 (A-level): algebraic manipulation in calculus, functions, modelling and proof
2	Quadratic expressions and equations	Autumn	- Expanding single and double brackets - Expanding and simplifying expressions including identities (e.g. $(x+a)(x+b)$) - Factorising quadratic expressions (including trinomial form) - Using the difference of two squares - Solving quadratic equations by factorising - Solving quadratic equations set equal to zero - Introduction to completing the square	- KS2: arithmetic with integers, squares and basic algebraic reasoning - KS3: expanding single brackets and simplifying expressions - KS3: forming and solving linear equations - KS3: factorising into single brackets - KS3: understanding square numbers and indices - KS3: substitution into expressions and formulae	- KS4: completing the square (formal method) - KS4: quadratic formula and non-factorisable quadratics - KS4: quadratic graphs and solving quadratics graphically - KS4: quadratic inequalities - KS5 (A-level): polynomial functions, algebraic proof, differentiation of quadratic functions and curve analysis



			Solving quadratic equations using multiple methods		
3	Percentages	Autumn	- Increasing and decreasing by a percentage - Calculating percentage of an amount - Percentage change (including reverse percentages) - Using multipliers for percentage problems - Solving multi-step percentage problems in context (e.g. growth, profit, VAT)	- KS2: fractions of amounts and simple percentages (10%, 25%, 50%) - KS3: fraction, decimal and percentage equivalence - KS3: multiplying and dividing by 10, 100, 1000 - KS3: use of calculators for percentages - KS3: ratio and proportion basics	- KS4: compound interest and repeated percentage change - KS4: exponential growth and decay - KS4: surds and indices in financial contexts - KS4: ratio and proportion problems (including direct and inverse proportion) - KS5 (A-level): exponential functions, logarithms, financial modelling and calculus-based growth models
4	Ratio and Scale	Autumn	- Using and simplifying ratio notation - Sharing quantities in a given ratio - Solving ratio problems in context - Understanding direct proportion - Using scale factors in similarity and enlargement contexts - Interpreting and using scale drawings and maps - Converting between units in ratio problems	- KS2: basic ratio language and sharing in simple ratios - KS3: simplifying ratios and dividing quantities into parts - KS3: multiplication and division with integers and fractions - KS3: equivalence of fractions, decimals and percentages - KS3: basic scale drawings and unit conversion - KS3: algebraic substitution and simple proportional reasoning	- KS4: compound measures (speed, density, pressure) - KS4: direct and inverse proportion (graphical and algebraic) - KS4: trigonometry and similarity in geometry - KS4: advanced ratio problems in contexts (e.g. gradients, vectors) - KS5 (A-level): calculus-based modelling, exponential growth, logarithms, mechanics (forces and vectors), and advanced proportional reasoning
5	Work with Fractions	Autumn	- Simplifying fractions and mixed numbers - Adding and subtracting fractions (including mixed numbers) - Multiplying fractions and integers - Multiplying fractions by fractions - Dividing fractions by integers and by fractions - Finding fractions of amounts	- KS2: equivalent fractions, simplifying and comparing fractions - KS2: adding and subtracting fractions with common denominators - KS3: finding fractions of amounts - KS3: multiplication and division of integers and fractions - KS3: using common multiples and factors	- KS4: ratio and proportion problems (including compound proportion) - KS4: percentages, repeated percentage change and growth/decay - KS4: algebraic fractions and manipulation of rational expressions - KS4: higher-level problem solving with fractions in geometry and statistics - KS5 (A-level): algebraic manipulation in



			Solving multi-step fraction problems in context	KS3: converting between mixed numbers and improper fractions	calculus, rational functions, integration and modelling
6	Non-calculator Methods	Autumn	- Efficient non-calculator methods for all four operations - Working with fractions, decimals and percentages fluently - Estimation and checking strategies - Standard form calculations - Applying BIDMAS with integers and negatives - Solving multi-step problems without a calculator	- KS2: all four operations with integers, fractions and decimals - KS3: BIDMAS and order of operations - KS3: fraction/decimal/percentage equivalence and calculations - KS3: rounding and estimation - KS3: introduction to standard form and indices - KS3: mental arithmetic strategies	- KS4: algebraic manipulation and non-calculator exam technique - KS4: indices and surds in exact form - KS4: standard form in compound measures and scientific contexts - KS4: bounds and error intervals - KS5 (A-level): logarithms, exponential functions, modelling and algebraic manipulation in calculus
7	Straight Line Graphs	Autumn/Spring	- Plotting and interpreting straight line graphs - Finding equations of lines in the form $y = mx + c$ - Finding gradients using graphs and coordinate pairs - Identifying y-intercepts and interpreting meaning - Solving equations using graphical methods - Finding equations of lines from graphs and given points - Finding midpoint of a line segment - Finding equations of lines given a point and gradient or two points - Understanding and using parallel lines (same gradient) - Interpreting real-life linear graphs	- KS3: plotting coordinates in all four quadrants - KS3: straight line graphs in $y = mx + c$ form (intro level) - KS3: substitution into expressions and equations - KS3: solving linear equations - KS3: understanding gradients as "steepness" - KS3: algebraic notation and rearranging simple formulae - KS3: ratio and proportion (link to gradient as rate of change)	- KS4: rearranging more complex formulae - KS4: simultaneous equations (graphical and algebraic) - KS4: quadratic graphs and solving graphically - KS4: non-linear graphs (exponential and reciprocal functions) - KS4: direct and inverse proportion graphs - KS5 (A-level): coordinate geometry, calculus (differentiation as gradient of curve), parametric equations and modelling
8	Probability	Spring	- Finding probability of single and combined events - Using sample space diagrams to list	- KS2: understanding chance (certain, likely, impossible) - KS3: expressing probabilities as fractions,	- KS4: conditional probability - KS4: Venn diagrams (set notation and proof)



			- outcomes • Calculating probability of independent events • Using tree diagrams (with and without replacement) • Working with mutually exclusive events • Using the fact probabilities sum to 1 • Estimating probability from experimental data • Calculating probabilities from tables and frequency trees	- decimals and percentages • KS3: listing outcomes systematically • KS3: basic Venn diagrams and set language (intro level) • KS3: fraction operations and ratio reasoning • KS3: multiplication of probabilities in simple contexts	• KS4: tree diagrams with conditional probability • KS4: combined events and probability distributions (including binomial) • KS4: statistical measures and interpreting data sets • KS5 (A-level): probability distributions (binomial, normal), hypothesis testing, and statistical modelling
9	Rounding and estimation	Spring	• Rounding to decimal places and significant figures • Estimating calculations using rounding • Using bounds in measurement and calculations • Calculating upper and lower bounds • Applying error intervals in problem solving • Checking reasonableness of answers using estimation	• KS2: rounding whole numbers and decimals • KS3: place value and ordering decimals • KS3: approximation and mental estimation strategies • KS3: basic measurement (length, mass, time) • KS3: understanding inequality symbols in simple contexts	• KS4: compound measures (speed, density, pressure) • KS4: standard form in scientific and real-world contexts • KS4: algebraic manipulation in bounds problems • KS4: error intervals in trigonometry and geometry • KS5 (A-level): numerical methods, modelling, calculus, and error analysis in applied mathematics
10	Perimeter, area and volume	Spring	• Calculating perimeter of 2D shapes (including compound shapes) • Finding area of rectangles, triangles and compound shapes • Using area of triangles ($\frac{1}{2}bh$) • Calculating volume of cuboids • Using formulae for area and volume in problem solving • Converting units (mm^2, cm^2, m^2, mm^3, cm^3, m^3)	• KS2: perimeter of simple shapes • KS2: area of rectangles using counting squares • KS3: area of triangles and parallelograms (intro level) • KS3: multiplication and division with measurements • KS3: understanding 2D vs 3D shape properties • KS3: unit conversion (length and area)	• KS4: surface area and volume of prisms and cylinders • KS4: Pythagoras' Theorem and trigonometry in geometric contexts • KS4: similarity and scale factor problems (area and volume scaling) • KS4: circle theorems and area/circumference of circles • KS5 (A-level): integration for area under



			Solving multi-step geometric problems in context		curves, volumes of revolution, vectors in 3D geometry
11	Interpret and represent data	Spring	- Constructing and interpreting bar charts, line graphs and pie charts - Interpreting frequency tables and grouped data - Calculating and interpreting averages (mean, median, mode) - Finding range and comparing data sets - Constructing and interpreting two-way tables - Interpreting and drawing scatter graphs - Describing correlation (positive, negative, no correlation) - Identifying outliers and their effect on averages - Drawing and interpreting frequency polygons and histograms (intro level)	- KS2: drawing and interpreting bar charts and line graphs - KS2: interpreting pie charts (simple fractions) - KS3: calculating mean, median, mode and range - KS3: simple probability and frequency tables - KS3: plotting coordinates in all four quadrants - KS3: ratio and proportion in real contexts - KS3: basic data collection and representation	- KS4: cumulative frequency and box plots - KS4: histograms (formal frequency density) - KS4: more complex scatter graphs and line of best fit - KS4: conditional probability and Venn diagrams - KS4: statistical sampling and inference - KS5 (A-level): statistical distributions, hypothesis testing, regression analysis, and data modelling
12	Non-Linear Graphs	Spring	- Recognising and sketching quadratic graphs - Plotting quadratic functions from tables and equations - Identifying key features of quadratic graphs (turning point, intercepts, symmetry) - Recognising cubic, reciprocal and exponential graphs - Comparing linear and non-linear graphs - Interpreting graphs in real contexts (distance-time, growth/decay)	- KS3: plotting coordinates in all four quadrants - KS3: straight line graphs and $y = mx + c$ - KS3: substitution into expressions and tables of values - KS3: recognising linear vs non-linear sequences - KS3: basic graph interpretation (bar charts, line graphs) - KS3: understanding square numbers and indices	- KS4: rearranging and solving quadratic equations algebraically - KS4: quadratic inequalities and completing the square - KS4: simultaneous equations (graphical and algebraic) - KS4: advanced graph transformations and functions (including composite and inverse functions) - KS5 (A-level): calculus (differentiation and integration), function analysis, exponential and logarithmic graphs, parametric equations and modelling



			Solving equations graphically using non-linear graphs		
13	Angles	Spring	- Using angle rules on straight lines and around a point - Calculating angles in triangles and quadrilaterals - Using alternate, corresponding and co-interior angles - Solving missing angle problems in parallel lines - Applying angle facts in polygons (interior and exterior angles) - Solving multi-step geometric reasoning problems	- KS2: measuring and identifying angles (right, acute, obtuse) - KS3: angle sum of triangles and quadrilaterals - KS3: properties of parallel lines (intro level) - KS3: basic geometric reasoning and construction - KS3: algebraic substitution and problem solving skills - KS3: ratio and proportional reasoning in shapes	- KS4: circle theorems and angle proofs - KS4: trigonometry in right-angled triangles - KS4: Pythagoras' Theorem and 3D geometry - KS4: similarity and congruence proofs - KS5 (A-level): advanced geometric proof, radians, calculus in polar/parametric contexts, and vector geometry
14	Graphs and Diagrams	Summer	- Interpreting and constructing statistical diagrams (bar charts, pie charts, scatter graphs) - Drawing and interpreting frequency tables and grouped data - Calculating and comparing statistical averages (mean, median, mode, range) - Interpreting scatter graphs and describing correlation - Drawing lines of best fit and making predictions - Interpreting real-life graphs (distance-time, conversion graphs) - Using and interpreting two-way tables - Identifying trends, patterns and outliers in data	- KS2: bar charts, pictograms and line graphs - KS3: mean, median, mode and range - KS3: plotting coordinates in all four quadrants - KS3: basic probability and frequency tables - KS3: interpreting simple scatter graphs - KS3: ratio and proportion in real contexts - KS3: algebraic substitution and graph reading skills	- KS4: cumulative frequency and box plots - KS4: histograms and frequency density - KS4: conditional probability and Venn diagrams - KS4: more advanced scatter graphs and regression lines - KS4: non-linear graphs and real-world modelling - KS5 (A-level): statistical distributions, hypothesis testing, regression analysis, and advanced data modelling
15	Vectors	Summer	- Understanding and using vector notation (column vectors) - Representing vectors graphically on a	- KS3: coordinates in all four quadrants - KS3: plotting straight line graphs - KS3: basic geometric properties of shapes	- KS4: circle theorems and formal geometric proof - KS4: similarity and congruence proofs



			grid • Adding and subtracting vectors • Multiplying vectors by a scalar • Describing and solving vector journeys • Using vectors to describe movement in shapes • Proving and solving geometric problems using vectors (including parallelograms) • Identifying parallel vectors and using vector reasoning	(parallel lines, parallelograms) • KS3: ratio and proportional reasoning • KS3: algebraic substitution and solving linear equations • KS3: understanding directed movement on a grid	• KS4: transformations and geometric reasoning • KS4: advanced coordinate geometry (gradients, equations of lines) • KS5 (A-level): vector equations of lines and planes, 3D vectors, mechanics, and physics applications
16	Factors, Powers and Surds	Summer	• Using prime factorisation to find HCF and LCM • Working with powers and indices (including negative and fractional indices) • Applying index laws to simplify expressions • Calculating and simplifying square roots • Simplifying surds by identifying square factors • Multiplying and simplifying expressions involving surds • Using standard form in calculations (revision and application)	• KS3: multiplication facts, factors and multiples • KS3: prime numbers and factor pairs • KS3: square and cube numbers • KS3: index notation and basic laws of indices • KS3: square roots and basic estimation • KS3: BIDMAS and order of operations • KS3: basic standard form introduction	• KS4: algebraic fractions and more complex algebraic manipulation • KS4: quadratic equations and completing the square • KS4: surds in algebraic and geometric contexts (including rationalising denominators) • KS4: functions and graphs involving indices and roots • KS5 (A-level): exponential and logarithmic functions, calculus, proof, and advanced algebraic manipulation
17	Pythagoras and Trigonometry	Summer	• Using Pythagoras' theorem in 2D and coordinate geometry • Solving problems in right-angled triangles • Using SOHCAHTOA to find missing sides • Using SOHCAHTOA to find missing angles	• KS3: angle facts and properties of triangles • KS3: coordinates in all four quadrants • KS3: square numbers and square roots • KS3: algebraic substitution and rearranging equations • KS3: ratio and proportion reasoning	• KS4: sine and cosine rules (non-right-angled triangles) • KS4: 3D trigonometry and Pythagoras problems • KS4: circle theorems and geometric proof • KS4: vectors in geometric contexts • KS5 (A-level): advanced trigonometric



			• Solving multi-step problems in context (including bearings and scale diagrams) • Using trigonometry in non-calculator and real-world contexts • Identifying when to use Pythagoras vs trigonometry	• KS3: basic understanding of right angles and 2D shapes	identities, radians, calculus applications in modelling, and vector geometry in 3D
18	Simultaneous Equations	Summer	• Solving simultaneous equations algebraically using elimination and substitution • Solving simultaneous equations graphically • Forming and solving simultaneous equations from contextual problems • Solving simultaneous equations involving one linear and one quadratic equation • Solving simultaneous equations involving three variables • Selecting and applying efficient solution methods in multi-step problems	• KS4 (Year 10): solving linear equations and rearranging formulae • KS4: quadratic equations and graphs • KS4: straight line graphs and graphical solutions of equations • KS3: substitution into expressions and formulae • KS3: algebraic manipulation and simplifying expressions • KS3: coordinates and graph interpretation • KS3: solving one- and two-step equations	• KS4: functions and graphical modelling • KS4: algebraic proof and advanced algebraic manipulation • KS4: non-linear graphs and intersections of functions • KS5 (A-level): systems of equations, matrices, numerical methods, simultaneous equations involving functions, and mathematical modelling

Key

Number	Geometry	Ratio & proportion	Algebra	Statistics
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