Headings	Skills	Spec	Foundation	Higher
1. Number	Structure and calculation	N1	order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥	
1. Number	Structure and calculation	N2	apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative; understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals)	
1. Number	Structure and calculation	N3	recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions); use conventional notation for priority of operations, including brackets, powers, roots and reciprocals	
1. Number	Structure and calculation	N4	use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem	
1. Number	Structure and calculation	N5	apply systematic listing strategies	apply systematic listing strategies, ***including use of the product rule for counting (i.e. if there are m ways of doing one task and for each of these, there are n ways of doing another task, then the total number of ways the two tasks can be done is m × n ways)***
1. Number	Structure and calculation	N6	use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5	use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5; ***estimate powers and roots of any given positive number***
1. Number	Structure and calculation	N7	calculate with roots, and with integer indices	calculate with roots, and with integer ***and fractional*** indices
1. Number	Structure and calculation	N8	calculate exactly with fractions and multiples of π	calculate exactly with fractions, ***surds*** and multiples of π; ***simplify surd expressions involving squares (e.g. √12 = √(4 × 3) = √4 × √3 = 2√3) and rationalise denominators***
1. Number	Structure and calculation	N9	calculate with and interpret standard form A × 10^n, where 1 ≤ A < 10 and n is an integer	

Headings	Skills	Spec	Foundation	Higher
1. Number	Fractions, Decimals and Percentages	N10	work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8)	work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8); ***change recurring decimals into their corresponding fractions and vice versa***
1. Number	Fractions, Decimals and Percentages	N11	identify and work with fractions in ratio problems	
1. Number	Fractions, Decimals and Percentages	N12	interpret fractions and percentages as operators	
1. Number	Fractions, Decimals and Percentages	N13	use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate	
1. Number	Fractions, Decimals and Percentages	N14	estimate answers; check calculations using approximation and estimation, including answers obtained using technology	
1. Number	Fractions, Decimals and Percentages	N15	round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding	
1. Number	Fractions, Decimals and Percentages	N16	apply and interpret limits of accuracy	apply and interpret limits of accuracy, ***including upper and lower bounds***

Headings	Skills	Spec	Foundation	Higher
2. Algebra	Notation, vocabulary and manipulation	A1	use and interpret algebraic manipulation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b •a/ b in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets	
2. Algebra	Notation, vocabulary and manipulation	A2	substitute numerical values into formulae and expressions, including scientific formulae	
2. Algebra	Notation, vocabulary and manipulation	A3	understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors	
2. Algebra	Notation, vocabulary and manipulation	A4	simplify and manipulate algebraic expressions (including those involving surds) by: ● collecting like terms ● multiplying a single term over a bracket ● taking out common factors ● expanding products of two binomials ● factorising quadratic expressions of the form x2 + bx + c, including the difference of two squares; ● simplifying expressions involving sums, products and powers, including the laws of indices	simplify and manipulate algebraic expressions (including those involving surds ***and algebraic fractions***) by: ● collecting like terms ● multiplying a single term over a bracket ● taking out common factors ● expanding products of two ***or more*** binomials ● factorising quadratic expressions of the form x2 + bx + c, including the difference of two squares; ***factorising quadratic expressions of the form ax2 + bx + c*** ● simplifying expressions involving sums, products and powers, including the laws of indices
2. Algebra	Notation, vocabulary and manipulation	A5	understand and use standard mathematical formulae; rearrange formulae to change the subject	
2. Algebra	Notation, vocabulary and manipulation	A6	know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments	know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments, ***and proofs***
2. Algebra	Notation, vocabulary and manipulation	A7	where appropriate, interpret simple expressions as functions with inputs and outputs.	where appropriate, interpret simple expressions as functions with inputs and outputs; ***interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function' (the use of formal function notation is expected)***

Headings	Skills	Spec	Foundation	Higher
2. Algebra	Graphs	A8	work with coordinates in all four quadrants	
2. Algebra	Graphs	A9	plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form y = mx + c to identify parallel lines; find the equation of the line through two given points or through one point with a given gradient	plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form y = mx + c to identify parallel ***and perpendicular lines*** ; find the equation of the line through two given points or through one point with a given gradient
2. Algebra	Graphs	A10	identify and interpret gradients and intercepts of linear functions graphically and algebraically	
2. Algebra	Graphs	A11	identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically	identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically ***and turning points by completing the square***
2. Algebra	Graphs	A12	recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function y =1/ x with x ≠ 0	recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function y =1/ x with x ≠ 0, ***exponential functions y = k^x for positive values of k, and the trigonometric functions (with arguments in degrees) y = sin x, y = cos x and y = tan x for angles of any size***
2. Algebra	Graphs	A13		***sketch translations and reflections of a given function***
2. Algebra	Graphs	A14	plot and interpret graphs (including reciprocal graphs) and graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration	plot and interpret graphs (including reciprocal graphs ***and exponential graphs***) and graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration
2. Algebra	Graphs	A15		***calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts (this does not include calculus)***
2. Algebra	Graphs	A16		***recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point***

Headings	Skills	Spec	Foundation	Higher
2. Algebra	Solving Equations and inequalities	A17	solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph	
2. Algebra	Solving Equations and inequalities	A18	solve quadratic equations algebraically by factorising; find approximate solutions using a graph	solve quadratic equations ***(including those that require rearrangement)*** algebraically by factorising, ***by completing the square and by using the quadratic formula*** ; find approximate solutions using a graph
2. Algebra	Solving Equations and inequalities	A19	solve two simultaneous equations in two variables (linear/linear algebraically; find approximate solutions using a graph	solve two simultaneous equations in two variables (linear/linear ***or linear/quadratic)*** algebraically; find approximate solutions using a graph
2. Algebra	Solving Equations and inequalities	A20		***find approximate solutions to equations numerically using iteration***
2. Algebra	Solving Equations and inequalities	A21	translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution	translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution
2. Algebra	Solving Equations and inequalities	A22	solve linear inequalities in one variable; represent the solution set on a number line	solve linear inequalities in one ***or two*** variable***(s)*** , ***and quadratic inequalities in one variable*** ; represent the solution set on a number line, ***using set notation and on a graph***
2. Algebra	Sequences	A23	generate terms of a sequence from either a term-to-term or a position-to term rule	
2. Algebra	Sequences	A24	recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a rational number > 0)	recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a rational number > 0) ***or a surd) and other sequences***
2. Algebra	Sequences	A25	deduce expressions to calculate the nth term of linear sequences	deduce expressions to calculate the nth term of linear ***and quadratic*** sequences

Headings	Skills	Spec	Foundation	Higher
3. Ratio, Proportion and rates of change		R1	change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices, density, pressure) in numerical and algebraic contexts	
3. Ratio, Proportion and rates of change		R2	use scale factors, scale diagrams and maps	
3. Ratio, Proportion and rates of change		R3	express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1	
3. Ratio, Proportion and rates of change		R4	use ratio notation, including reduction to simplest form	
3. Ratio, Proportion and rates of change		R5	divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)	
3. Ratio, Proportion and rates of change		R6	express a multiplicative relationship between two quantities as a ratio or a fraction	
3. Ratio, Proportion and rates of change		R7	understand and use proportion as equality of ratios	
3. Ratio, Proportion and rates of change		R8	relate ratios to fractions and to linear functions	
3. Ratio, Proportion and rates of change		R9	define percentage as 'number of parts per hundred'; interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively; express one quantity as a percentage of another; compare two quantities using percentages; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics	
3. Ratio, Proportion and rates of change		R10	solve problems involving direct and inverse proportion, including graphical and algebraic representations	
3. Ratio, Proportion and rates of change		R11	use compound units such as speed, rates of pay, unit pricing, density and pressure	
3. Ratio, Proportion and rates of change		R12	compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors	

Headings	Skills	Spec	Foundation	Higher
3. Ratio, Proportion and rates of change		R13	understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y ; interpret equations that describe direct and inverse proportion	understand that X is inversely proportional to Y is equivalent to X is proportional to 1/Y ; ***construct and*** interpret equations that describe direct and inverse proportion
3. Ratio, Proportion and rates of change		R14	interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion	
3. Ratio, Proportion and rates of change		R15		***interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rate of change (gradients of chords and tangents) in numerical, algebraic and graphical contexts (this does not include calculus)***
3. Ratio, Proportion and rates of change		R16	set up, solve and interpret the answers in growth and decay problems, including compound interest	set up, solve and interpret the answers in growth and decay problems, including compound interest ***and work with general iterative processes***

Headings	Skills	Spec	Foundation	Higher
4. Geometry and Measures	Properties and Constructions	G1	use conventional terms and notation: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; use the standard conventions for labelling and referring to the sides and angles of triangles; draw diagrams from written description	
4. Geometry and Measures	Properties and Constructions	G2	use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); use these to construct given figures and solve loci problems; know that the perpendicular distance from a point to a line is the shortest distance to the line	
4. Geometry and Measures	Properties and Constructions	G3	apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons)	
4. Geometry and Measures	Properties and Constructions	G4	derive and apply the properties and definitions of special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles and other plane figures using appropriate language	
4. Geometry and Measures	Properties and Constructions	G5	use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)	
4. Geometry and Measures	Properties and Constructions	G6	apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs	
4. Geometry and Measures	Properties and Constructions	G7	identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional scale factors)	identify, describe and construct congruent and similar shapes, including on coordinate axes, by considering rotation, reflection, translation and enlargement (including fractional ***and negative*** scale factors)
4. Geometry and Measures	Properties and Constructions	G8		***describe the changes and invariance achieved by combinations of rotations, reflections and translations***
4. Geometry and Measures	Properties and Constructions	G9	identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment	

Headings	Skills	Spec	Foundation	Higher
4. Geometry and Measures	Properties and Constructions	G10		***apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results***
4. Geometry and Measures	Properties and Constructions	G11	solve geometrical problems on coordinate axes	
4. Geometry and Measures	Properties and Constructions	G12	identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres	
4. Geometry and Measures	Properties and Constructions	G13	construct and interpret plans and elevations of 3D shapes	
4. Geometry and Measures	Mensuration and Calculation	G14	use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)	
4. Geometry and Measures	Mensuration and Calculation	G15	measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings	
4. Geometry and Measures	Mensuration and Calculation	G16	know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)	
4. Geometry and Measures	Mensuration and Calculation	G17	know the formulae: circumference of a circle = 2πr = πd , area of a circle = πr2; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids	
4. Geometry and Measures	Mensuration and Calculation	G18	calculate arc lengths, angles and areas of sectors of circles	
4. Geometry and Measures	Mensuration and Calculation	G19	apply the concepts of congruence and similarity, including the relationships between lengths, in similar figures	apply the concepts of congruence and similarity, including the relationships between lengths, ***areas and volumes*** in similar figures
4. Geometry and Measures	Mensuration and Calculation	G20	know the formulae for: Pythagoras' theorem a2 + b2 = c2, and the trigonometric ratios, sin θ = opposite/ hypotenuse , cos θ = adjacent/ hypotenuse and tan θ = opposite/ adjacent; apply them to find angles and lengths in right-angled triangles in two dimensional figures	know the formulae for: Pythagoras' theorem a2 + b2 = c2, and the trigonometric ratios, sin θ = opposite/ hypotenuse , cos θ = adjacent/ hypotenuse and tan θ = opposite/ adjacent; apply them to find angles and lengths in right-angled triangles ***and, where possible, general triangles*** in two ***and three*** dimensional figures

Headings	Skills	Spec	Foundation	Higher
4. Geometry and Measures	Mensuration and Calculation	G21	know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60°	
4. Geometry and Measures	Mensuration and Calculation	G22		***know and apply the sine rule a/ sinA = b/sin B = c/sin C, and cosine rule a^2 = b^2 + c^2– 2bc cos A, to find unknown lengths and angles***
4. Geometry and Measures	Mensuration and Calculation	G23		***know and apply Area = 1/2 ab sin C to calculate the area, sides or angles of any triangle***
4. Geometry and Measures	Vectors	G24	describe translations as 2D vectors	
4. Geometry and Measures	Vectors	G25	apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors	apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors ***use vectors to construct geometric arguments and proofs***

Headings	Skills	Spec	Foundation	Higher
5. Probability		P1	record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees	
5. Probability		P2	apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments	
5. Probability		P3	relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 probability scale	
5. Probability		P4	apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one	
5. Probability		P5	understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size	
5. Probability		P6	enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams	
5. Probability		P7	construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities	
5. Probability		P8	calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions	
5. Probability		P9		***calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams***

Headings	Skills	Spec	Foundation	Higher
6. Statistics		S1	infer properties of populations or distributions from a sample, while knowing the limitations of sampling	
6. Statistics		S2	interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use	
6. Statistics		S3		***construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use***
6. Statistics		S4	interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: ● appropriate graphical representation involving discrete, continuous and grouped data ● appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)	interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: ● appropriate graphical representation involving discrete, continuous and grouped data **including box plots** ● appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers ***quartiles and inter-quartile range***)
6. Statistics		S5	apply statistics to describe a population	
6. Statistics		S6	use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of so doing	