Curriculum Map: Year: 10 Higher Subject: Maths

Topic	Key Knowledge *What will all students KNOW by the end of the topic?*	Key Skills *What key skills will be learnt/developed by the end of the topic? What will all students be able to DO by the end of the topic?*	Assessment Opportunities *What are the key pieces of assessment? How will students be assessed?*
Half Term 1	All students will develop their fluency, reasoning and problem-solving skills in: • Calculations, checking and rounding • Indices, roots, reciprocals and hierarchy of operations • Factors, multiples, primes, standard form and surds • Algebra: the basics, setting up, rearranging and solving equations	N2 apply the four operations, including formal written methods, to integers, decimals … both positive and negative; understand and use place value (e.g. working with very large or very small numbers, and when calculating with decimals) 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 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 N5 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) N6 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 N7 calculate with roots and with integer and fractional indices N8 calculate exactly with … surds; … simplify surd expressions involving squares (e.g. $\sqrt{12} = \sqrt{(4 \times 3)} = \sqrt{4} \times \sqrt{3} = 2\sqrt{3}$) N9 calculate with and interpret standard form A x 10n, where $1 \leq A < 10$ and n is an integer. N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); … N1 … use the symbols =, ≠, <, >, ≤, ≥	All students will: Complete a self-assessed topic-based test in class.

Curriculum Map: Year: 10 Higher Subject: Maths

		A1 use and interpret algebraic notation, including: • ab in place of a × b • 3y in place of y + y + y and 3 × y • a2 in place of a × a, a3 in place of a × a × a, a2b in place of a × a × b • in place of a ÷ b • coefficients written as fractions rather than as decimals • brackets A2 substitute numerical values into formulae and expressions, including scientific formulae A3 understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors A4 simplify and manipulate algebraic expressions … 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 A5 understand and use standard mathematical formulae; rearrange formulae to change the subject 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 and proofs A7 where appropriate, interpret simple expressions as functions with inputs and outputs; … A17 solve linear equations in one unknown algebraically …; A20 find approximate solutions to equations numerically using iteration A21 translate simple situations or procedures into algebraic expressions or formulae; derive an equation …, solve the equation and interpret the solution	
Half Term 2	All students will develop their fluency, reasoning and problem-solving skills in: • Sequences • Averages and range	All students will be able to: A23 generate terms of a sequence from either a term-to-term or a position-to-term rule A24 recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences and simple geometric progressions (rn where n is an integer, and r is a rational number > 0), recognise and use other sequences or a surd) A25 deduce expressions to calculate the nth term of linear sequences. G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)	All students will: Complete and end of term assessment on the skills from this term.

Curriculum Map: Year: 10 Higher Subject: Maths

	• Representing and interpreting data and scatter graphs • Fractions and percentages	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 S3 construct and interpret diagrams for grouped discrete data and continuous data i.e. histograms with equal and unequal class intervals … 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, mode and modal class) and spread (range, including consideration of outliers) … S5 apply statistics to describe a population 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 whilst knowing the dangers of so doing N1 order positive and negative integers, decimals and fractions; … 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; … 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 N8 calculate exactly with fractions … N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and or 0.375 and); change recurring decimals into their corresponding fractions and vice versa N11 identify and work with fractions in ratio problems N12 interpret fractions and percentages as operators N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate	
Half Term 3	All students will develop their fluency, reasoning and problem-solving skills in: • Ratio and proportion	All students will be able to: R2 use scale factors, scale diagrams and maps R3 express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1 R4 use ratio notation, including reduction to simplest form R5 divide a given quantity into two parts in a given part:part or whole:part 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)	All students will: Complete a self-assessed topic-based test in class.

Curriculum Map: Year: 10 Higher Subject: Maths

	• Polygons, angles and parallel lines • Pythagoras' Theorem and trigonometry	R6 express a multiplicative relationship between two quantities as a ratio or a fraction R7 understand and use proportion as equality of ratios R8 relate ratios to fractions and to linear functions 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 R10 solve problems involving direct proportion; N7 Calculate with roots and with integer and fractional indices N8 calculate exactly with fractions and surds … N15 round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures); … A4 simplify and manipulate algebraic expressions (including those involving surds) by collecting like terms … A5 understand and use standard mathematical formulae; … R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors G1 use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; … G3 … 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) G4 derive and apply the properties and definitions of: special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; … 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 G11 solve geometrical problems on coordinate axes G20 know the formulae for: Pythagoras' theorem a2 + b2 = c2, and the trigonometric ratios sine, cosine and tan; apply them to find angles and lengths in right-angled triangles … and in two dimensional figures 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°	

Curriculum Map: Year: 10 Higher Subject: Maths

Half Term 4	All students will develop their fluency, reasoning and problem-solving skills in: • Graphs: the basics and real-life graphs • Linear graphs and coordinate geometry • Quadratic, cubic and other graphs	All students will be able to: N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate A8 work with coordinates in all four quadrants A9 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 A10 identify and interpret gradients and intercepts of linear functions graphically and algebraically A11 identify and interpret roots, intercepts, turning points of quadratic functions graphically; … A12 recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function with $x \neq 0$, … A14 plot and interpret … graphs of non-standard functions in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration A15 calculate or estimate gradients of graphs and areas under graphs (including quadratic and non-linear graphs) and interpret results in cases such as distance–time graphs, velocity–time graphs … (this does not include calculus) 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 A17 solve linear equations in one unknown … (including those with the unknown on both sides of the equation); find approximate solutions using a graph A18 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 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 R10 solve problems involving direct … proportion, including graphical … representations R11 use compound units such as speed, … unit pricing, … R14 … recognise and interpret graphs that illustrate direct and inverse proportion	All students will: Complete and end of term assessment on the skills from this term.
Half Term 5	All students will develop their fluency, reasoning and problem-solving skills in: • Perimeter, area and circles	All students will be able to: N8 calculate exactly with … multiples of π; … N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology 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 N16 apply and interpret limits of accuracy, including upper and lower bounds	All students will: Complete a self-assessed topic-based test in class.

Curriculum Map: Year: 10 Higher Subject: Maths

	• 3D forms and volume, cylinders, cones and spheres • Accuracy and bounds • Transformations	A5 understand and use standard mathematical formulae; rearrange formulae to change the subject 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 R1 change freely between related standard units (e.g. time, length, area, volume/capacity, mass) … in numerical and algebraic contexts G1 use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries; … G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment G12 identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres G13 construct and interpret plans and elevations of 3D shapes. G14 use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc) G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders) 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 G18 calculate arc lengths, angles and areas of sectors of circles G7 identify, describe and construct congruent and similar shapes, including on a coordinate axis, by considering rotation, reflection, translation and enlargement (including fractional and negative scale factors) G8 describe the changes and invariance achieved by combinations of rotations, reflections and translations G24 describe translations as 2D vectors G25 apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; …	Complete a mock exam paper.
Half Term 6	All students will develop their fluency, reasoning and problem-solving skills in: • Constructions, loci and bearings	All students will be able to: R2 use scale factors, scale diagrams and maps R6 express a multiplicative relationship between two quantities as a ratio or a fraction 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	All students will: Complete and end of term assessment on the skills from this term.

Curriculum Map: Year: 10 Higher Subject: Maths

	• Solving quadratic and simultaneous equations • Inequalities • Probability	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) G8 describe the changes and invariance achieved by combinations of rotations, reflections and translations G12 identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres G13 construct and interpret plans and elevations of 3D shapes G15 measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings N1 order positive and negative integers, decimals and fractions; use the symbols =, ≠, <, >, ≤, ≥ N8 calculate exactly with … surds; … simplify surd expressions involving squares (e.g. √12 = √(4 × 3) = √4 × √3 = 2√3) A4 simplify and manipulate algebraic expressions (including those involving surds …) by: … factorising quadratic expressions of the form ax2 + bx + c A5 understand and use standard mathematical formulae; rearrange formulae to change the subject A9 … find the equation of the line through two given points, or through one point with a given gradient A11 identify and interpret roots … of quadratic functions algebraically … A18 solve quadratic equations (including those that require rearrangement) algebraically by factorising, by completing the square and by using the quadratic formula; … A19 solve two simultaneous equations in two variables (linear/linear or linear/quadratic) algebraically; find approximate solutions using a graph A21 … derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution. A22 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 P1 record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees P2 apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments P3 relate relative expected frequencies to theoretical probability, using appropriate language and the 0–1 probability scale 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	

Curriculum Map: Year: 10 Higher Subject: Maths

		P5 understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size P6 enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams P7 construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities P8 calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions P9 calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams	