



## Curriculum Map for Higher Maths Year 9

YEAR 9	Autumn 1	Autumn 2
<b>Topics</b>	<b>Number</b>	<b>Algebra</b>
<b>Substantive Knowledge – The Knowledge Taught By The Teacher</b>	<ul style="list-style-type: none"><li>Students will learn more about integers, place value, decimals, indices, reciprocals, powers and roots.</li><li>Students will learn about surds.</li><li>Students will learn about fractional and negative indices.</li><li>Students will learn about standard form.</li><li>Students will learn more about factors, multiples and primes.</li></ul>	<ul style="list-style-type: none"><li>Students will learn to substitute into and rearrange more complex formulae.</li><li>Students will learn to solve more complex linear equations.</li><li>Students will learn how to generate arithmetic sequences and find the <math>n</math>th term.</li></ul>
<b>Disciplinary Knowledge – Concepts, Investigations, Conjecture, Proof, Problem Modelling and Problem Solving</b>	<ul style="list-style-type: none"><li>Understand number is made up of integers, fractions and powers.</li><li>Understand the degrees of accuracy and standard units used for number.</li><li>Understand how answers can be accurate by using fractions and surds.</li></ul>	<ul style="list-style-type: none"><li>Understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors.</li><li>Solve problems using algebra.</li></ul>
<b>Skills</b>	<ul style="list-style-type: none"><li>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).</li><li>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.</li><li>How to work with very large and very small numbers.</li></ul>	<ul style="list-style-type: none"><li>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.</li><li>Substitute numerical values into formulae and expressions, including scientific formulae.</li><li>Generate terms of a sequence from either a term-to-term or a position-to-term rule.</li><li>Deduce expressions to calculate the <math>n</math>th term of linear sequences.</li></ul>
<b>Links To Prior Learning</b>	<ul style="list-style-type: none"><li>Building on applying operations to calculations including powers, roots and brackets from Year 8.</li></ul>	<ul style="list-style-type: none"><li>Building on algebraic substitution, powers, solving equations and factorising from year 8 in order to simplify more complex expressions, expanding and factorising with single/double brackets including negative numbers and powers, substitution into formulae, solving algebraic formulae, rearranging</li></ul>

		formulae, working with linear sequences.
<b>Literacy/ Numeracy</b>	<ul style="list-style-type: none"> <li>• Language of number especially powers.</li> <li>• Extension of deconstructing a written question into mathematical form from Year 8 to more complex problems.</li> </ul>	<ul style="list-style-type: none"> <li>• Language of algebra.</li> <li>• Extension of deconstructing a written question into mathematical form from Year 8 to more complex problems.</li> </ul>
<b>Cross Curricular</b>	<ul style="list-style-type: none"> <li>• Any areas which use number or powers.</li> <li>• Link to real life contexts where exact answers or standard form are required e.g. Science and engineering.</li> </ul>	<ul style="list-style-type: none"> <li>• Any areas which use algebra.</li> <li>• Link to real life contexts where algebraic formulae are used</li> </ul>
<b>Assessment</b>	<ul style="list-style-type: none"> <li>• Learning checks throughout with low stakes questioning and starters.</li> <li>• Summative assessment at the end of topic.</li> </ul>	<ul style="list-style-type: none"> <li>• Learning checks throughout with low stakes questioning and starters.</li> <li>• Summative assessment at the end of topic.</li> </ul>

<b>YEAR 9</b>	<b>Spring 1</b>	<b>Spring 2</b>
<b>Topics</b>	<b>Interpreting &amp; Representing Data Fractions, Ratio &amp; Percentages</b>	<b>Angles, Pythagoras' Theorem &amp; Trigonometry</b>
<b>Substantive Knowledge – The Knowledge Taught By The Teacher</b>	<ul style="list-style-type: none"> <li>• Students will learn about choosing suitable data techniques given the context.</li> <li>• Students will learn about discrete, continuous and grouped data.</li> <li>• Students will learn about averages and measures of central tendency.</li> <li>• Students will learn about Scatter Diagrams, lines of best fit and correlation.</li> <li>• Students will learn about back-to-back Stem and Leaf Diagrams.</li> <li>• Students will learn how to estimate the mean from a group frequency table.</li> <li>• Students will extend their knowledge of fractions and percentages as operators.</li> <li>• Students will extend their knowledge of decimal multipliers and their link to compound percentages.</li> </ul>	<ul style="list-style-type: none"> <li>• Students will learn about the properties of shapes.</li> <li>• Students will learn further about parallel lines and angle facts.</li> <li>• Students will learn about the interior and exterior angles of polygons.</li> <li>• Students will learn Pythagoras' Theorem.</li> <li>• Students will learn about trigonometry.</li> </ul>
<b>Disciplinary Knowledge – Concepts, Investigations, Conjecture, Proof, Problem Modelling and Problem Solving</b>	<ul style="list-style-type: none"> <li>• Understand the difference between discrete and continuous data.</li> <li>• Understand the importance of accuracy when constructing graphs and charts.</li> <li>• Interweaving percentages, ratio, decimals and fractions to solve problems.</li> </ul>	<ul style="list-style-type: none"> <li>• Understand the properties of shapes and angle rules in various contexts.</li> <li>• Understand the definitions of various shapes.</li> <li>• How to solve problems in polygons and similar and congruent shapes.</li> <li>• 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.</li> <li>• Understand geometric problems are solved on a coordinate axis.</li> <li>• The history of Pythagoras' Theorem.</li> <li>• The Unit Circle and its link to Trigonometry.</li> </ul>

<b>Skills</b>	<ul style="list-style-type: none"> <li>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).</li> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons.</li> <li>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).</li> <li>Know the formulae for: Pythagoras' theorem <math>a^2 + b^2 = c^2</math>, and the trigonometric ratios sine, cosine and tangent; apply them to find angles and lengths in right-angled triangles and in two dimensional figures.</li> <li>Know the exact values of <math>\sin \theta</math> and <math>\cos \theta</math> for <math>\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ</math> and <math>90^\circ</math>; know the exact value of <math>\tan \theta</math> for <math>\theta = 0^\circ, 30^\circ, 45^\circ</math> and <math>60^\circ</math>.</li> </ul>
<b>Links To Prior Learning</b>	<ul style="list-style-type: none"> <li>Building on representing data in pie charts, stem and leaf diagrams and scatter graphs from Year 8.</li> <li>Building on number work in Year 8 on fractions, decimals, ratio and percentages.</li> </ul>	<ul style="list-style-type: none"> <li>Building on applying 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).</li> </ul>
<b>Literacy/ Numeracy</b>	<ul style="list-style-type: none"> <li>Language of number, percentages, fractions, decimals and data.</li> <li>Continued deconstruction of a worded problem to the key mathematical information.</li> </ul>	<ul style="list-style-type: none"> <li>Language of geometry.</li> <li>Continued deconstruction of a worded problem to the key mathematical information.</li> </ul>
<b>Cross Curricular</b>	<ul style="list-style-type: none"> <li>Any areas which use statistical diagrams, percentages, fractions and decimals.</li> <li>Link to real life contexts especially in displaying data, correlation or finance.</li> </ul>	<ul style="list-style-type: none"> <li>Any areas which use angles and right-angled triangles.</li> <li>Link to real life contexts especially in engineering or Technology.</li> </ul>
<b>Assessment</b>	<ul style="list-style-type: none"> <li>Learning checks throughout with low stakes questioning and starters.</li> <li>Summative assessment at the end of topic.</li> </ul>	<ul style="list-style-type: none"> <li>Learning checks throughout with low stakes questioning and starters.</li> <li>Summative assessment at the end of topic.</li> </ul>

YEAR 9	Summer 1	Summer 2
<b>Topics</b>	<b>Graphs Area &amp; Volume</b>	<b>Transformations &amp; Constructions</b>
<b>Substantive Knowledge – The Knowledge Taught By The Teacher</b>	<ul style="list-style-type: none"> <li>• Students will learn about real-life graphs, linear graphs and their properties and coordinate geometry.</li> <li>• Students will learn about velocity - time graphs and their properties.</li> <li>• Students will learn about quadratic and cubic graphs and their properties.</li> <li>• Students will learn about the equation of a circle and its tangents.</li> <li>• Students will learn how to use graphs to solve equations.</li> <li>• Students will learn how to solve quadratic equations algebraically or graphically.</li> <li>• Students will learn how to calculate the circumference and area of a circle.</li> <li>• Students will learn how to calculate the volumes of a variety of 3D forms.</li> </ul>	<ul style="list-style-type: none"> <li>• Students will learn how to do constructions using a ruler and compasses.</li> <li>• Students will learn about loci and how to draw them.</li> <li>• Students will learn about bearings.</li> <li>• Students will learn about scale drawings, plans and elevations.</li> <li>• Students will learn how to enlarge an object from a centre using positive, negative and fractional scale factors.</li> <li>• Students will learn about column vectors and their manipulation.</li> </ul>
<b>Disciplinary Knowledge – Concepts, Investigations, Conjecture, Proof, Problem Modelling and Problem Solving</b>	<ul style="list-style-type: none"> <li>• Understand the importance of accuracy in drawing graphs.</li> <li>• Understand and use standard mathematical formulae; rearrange formulae to change the subject.</li> <li>• Understand rates of change and the link to gradients.</li> <li>• Know the history of Pi.</li> </ul>	<ul style="list-style-type: none"> <li>• Understand the link between 2D plans and elevations to 3D shapes.</li> <li>• Understand the concept of the length scale factor.</li> <li>• Understand the concept of locus.</li> <li>• Understand the properties of isosceles triangles and how they can link to bisectors.</li> <li>• Understand the concept of a vector.</li> </ul>
<b>Skills</b>	<ul style="list-style-type: none"> <li>• Identify and interpret gradients and intercepts of linear functions graphically and algebraically.</li> <li>• Identify and interpret roots, intercepts, turning points of quadratic functions graphically.</li> <li>• 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.</li> <li>• 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.</li> <li>• Know the formulae: circumference of a circle = <math>2\pi r = \pi d</math>, area of a circle = <math>\pi r^2</math>; calculate: perimeters of 2D shapes, including circles; areas of circles and composite shapes; surface area and volume of spheres, pyramids, cones and composite solids.</li> <li>• Calculate arc lengths, angles and areas of sectors of circles.</li> </ul>	<ul style="list-style-type: none"> <li>• Use scale factors, scale diagrams and maps.</li> <li>• 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.</li> <li>• Construct and interpret plans and elevations of 3D shapes.</li> <li>• Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors.</li> </ul>

<b>Links To Prior Learning</b>	<ul style="list-style-type: none"> <li>• Building on Pythagoras' Theorem and algebraic substitution, substitution into formulae and expressions, rearranging formulae.</li> <li>• Further developing volume and capacity of cubes and cuboids and area of 2D shapes including compound shapes and using substitution into formulae and rearranging in order to find volume of prisms, area and perimeter of circles including sectors of circles, surface area of cylinders and cones.</li> </ul>	<ul style="list-style-type: none"> <li>• Building on understanding of transformations.</li> </ul>
<b>Literacy/ Numeracy</b>	<ul style="list-style-type: none"> <li>• Language of geometry or quadratic equations.</li> <li>• Continued deconstruction of a worded problem to the key mathematical information.</li> </ul>	<ul style="list-style-type: none"> <li>• Language of scale, vectors and constructions.</li> <li>• Continued deconstruction of a worded problem to the key mathematical information.</li> </ul>
<b>Cross Curricular</b>	<ul style="list-style-type: none"> <li>• Any areas which use circles, quadratic functions or rates of change.</li> <li>• Link to real life contexts especially with the Sciences and Technology.</li> </ul>	<ul style="list-style-type: none"> <li>• Any areas which use scale drawings, enlargements, vectors or constructions.</li> <li>• Link to real life contexts especially with the Sciences and Technology.</li> </ul>
<b>Assessment</b>	<ul style="list-style-type: none"> <li>• Learning checks throughout with low stakes questioning and starters.</li> <li>• Summative assessment at the end of topic.</li> </ul>	<ul style="list-style-type: none"> <li>• Learning checks throughout with low stakes questioning and starters.</li> <li>• Summative assessment at the end of topic.</li> </ul>