

Year 8 Mathematics Progression Grid	Number	Algebra	Ratio, proportion and rates of change	Geometry and measures	Statistics and probability
Emerging	<ul style="list-style-type: none"> <li>Understand and use place value</li> <li>Order positive and negative integers</li> <li>Know the symbols =, ≠, &lt;, &gt;, ≤, ≥</li> <li>Know the square numbers</li> <li>Use all four operations on positive and negative integers</li> <li>To use priority of operations (BIDMAS)</li> <li>Can recognise fractional areas</li> <li>Number bonds up to 100</li> <li>Know the first 6 cube numbers and their roots, and the first 12 triangular numbers</li> <li>Use technical language such as prime numbers, factors, multiple, common factors and lowest common multiple.</li> <li>Express one quantity as a fraction of another</li> <li>Define percentage as 'number of parts per hundred'</li> </ul>	<ul style="list-style-type: none"> <li>Know basic algebraic notation including: <math>ab</math> in place of <math>a \times b</math>; <math>3y</math> in place of <math>y + y + y</math> and <math>3 \times y</math>; <math>a^2</math> in place of <math>a \times a</math>, <math>a^2b</math> in place of <math>a \times a \times b</math>; <math>a/b</math> in place of <math>a \div b</math>.</li> <li>Uses technical language such as algebraic expressions, equations and formulae</li> <li>Substitute numerical values into algebraic expressions</li> <li>Continue simple arithmetic and geometric sequences</li> <li>Generate terms of a sequence from a term-to-term rule</li> <li>Use and apply simple Formulae</li> <li>Work with coordinates in the first quadrant</li> </ul>	<ul style="list-style-type: none"> <li>Use ratio notation</li> <li>To write a ratio in its simplest form</li> <li>To express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1</li> </ul>	<ul style="list-style-type: none"> <li>Know the conventions for a 2D coordinate grid</li> <li>Describe positions on the full coordinate grid (all four quadrants)</li> <li>Know that area of a rectangle = <math>l \times w</math></li> <li>Know the meaning of faces, edges and vertices</li> <li>Know the names of special triangles and quadrilaterals</li> <li>Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons</li> <li>Draw diagrams from a written description</li> <li>Identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres</li> <li>Measure line segments and angles in geometric figures</li> <li>Use standard units of measure (length, area, volume/capacity, mass, time, money, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Understand the what is meant by the mean, median, mode and range.</li> <li>Calculate and interpret the mean, median, mode and range</li> <li>Interpret and construct bar charts and pictograms</li> </ul>
Developing (in addition to Emerging)	<ul style="list-style-type: none"> <li>Express one quantity as a percentage of another</li> <li>Can list the first multiples of integers</li> <li>Can list factors of an integer</li> <li>Can find the HCF and LCM of two integer numbers</li> <li>Can find equivalent fractions by multiplying</li> <li>Written 3-digit addition and subtraction involving decimals.</li> <li>To multiply 2 and 3 digit integers, or decimal numbers.</li> <li>To be able to round numbers to the nearest whole, 10, 100 and 1000, as well as to a given number of decimal places.</li> <li>Check calculations using approximation and estimation</li> </ul>	<ul style="list-style-type: none"> <li>Simplify and manipulate algebraic expressions by collecting like terms and multiplying a single term over a bracket</li> <li>Use function machines with inputs and outputs</li> <li>Express missing number problems algebraically</li> <li>Substitute numerical values into formulae and expressions, including scientific formula</li> <li>Use algebraic methods to solve linear equations in one variable</li> <li>Work with coordinates in all four quadrants</li> <li>Find the <math>n</math>th term of a sequence and generate terms of a sequence from a position-to-term rule</li> <li>To solve one sided equations.</li> <li>To show the values represented by an inequality using a number line.</li> </ul>	<ul style="list-style-type: none"> <li>Use scale factors, scale diagrams and maps</li> <li>To change freely between related standard units (time, length, area, volume/capacity and mass)</li> <li>To divide a given quantity into two parts in a given ratio</li> <li>Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction</li> </ul>	<ul style="list-style-type: none"> <li>Apply the properties of angles at a point, angles on a straight line, vertically opposite angles</li> <li>Calculate perimeters of 2D shapes</li> <li>Know that area of a parallelogram = <math>b \times h</math></li> <li>Know that the area of a trapezium = <math>\frac{1}{2}(a + b) \times h</math></li> <li>Use, read, write and convert between standard units, converting measurements of length, mass, volume and time</li> <li>Derive and apply the properties and definitions of special types of quadrilaterals, including square, rectangle, parallelogram, trapezium, kite and rhombus; and triangles</li> <li>To determine the order of rotational symmetry and number of lines of symmetry in a 2D shape.</li> </ul>	<ul style="list-style-type: none"> <li>Construct and interpret pie charts</li> <li>Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale</li> <li>Understand that the probabilities of all possible outcomes sum to 1</li> </ul>
Secure (in addition to Developing)	<ul style="list-style-type: none"> <li>Round numbers and measures to an appropriate degree of accuracy (nearest significant figure)</li> <li>Use all four operations with positive and negative decimals and fractions</li> <li>Compare and order fractions, including fractions <math>&gt; 1</math></li> <li>Order positive and negative integers, decimals and fractions</li> <li>Solve problems involving percentage change, including percentage increase/decrease</li> <li>Express numbers as a product of prime factors</li> <li>Use standard measures of mass, length, time and money.</li> </ul>	<ul style="list-style-type: none"> <li>Factorise algebraic expressions by removing common factors</li> <li>Change the subject of a formula</li> <li>Recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in <math>x</math> and <math>y</math> and the Cartesian plane</li> <li>Use linear and quadratic graphs to estimate values of <math>y</math> for given values of <math>x</math> and vice versa and to find approximate solutions of simultaneous linear equations</li> <li>To solve equations involving brackets.</li> <li>To solve a one sided inequality.</li> </ul>	<ul style="list-style-type: none"> <li>To solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics</li> <li>Solve problems involving direct and inverse proportion, including graphical and algebraic representations</li> <li>To compare proportions using fractions, decimals or percentages</li> <li>To compare value for money using the unitary method.</li> </ul>	<ul style="list-style-type: none"> <li>Solve problems involving the calculation and conversion of units of measure</li> <li>Identify properties of, and describe the results of, translations, rotations and reflections applied to given figures</li> <li>Identify and construct congruent triangles, and construct similar shapes by enlargement, with and without coordinate grids</li> <li>To calculate the area and perimeter of compound shapes.</li> <li>To calculate the surface area and volume of a cuboid.</li> <li>Derive and 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); recognise and use the perpendicular distance from a point to a line as the shortest distance to the line</li> <li>To find the area and circumference of a circle.</li> </ul>	<ul style="list-style-type: none"> <li>Understand how to find the mean from a frequency table</li> <li>Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities</li> <li>Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs.</li> </ul>

<p><b>Advanced (in addition to Secure)</b></p>	<ul style="list-style-type: none"> <li>• Apply the four operations, including formal written methods, to simple fractions (proper and improper), and mixed numbers</li> </ul>	<ul style="list-style-type: none"> <li>• To solve equations with an unknown on both sides.</li> <li>• Simplify algebraic expressions involving indices.</li> <li>• Reduce a given linear equation in two variables to the standard form <math>y = mx + c</math>; calculate and interpret gradients and intercepts of graphs of such linear equations numerically, graphically and algebraically</li> </ul>	<ul style="list-style-type: none"> <li>• Use compound units such as speed, unit pricing and density to solve problems</li> </ul>	<ul style="list-style-type: none"> <li>• To calculate the surface area and volume of a prism.</li> <li>• To find the area and perimeter of semi and quarter circles.</li> <li>• Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem, and use known results to obtain simple proofs</li> <li>• Use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles</li> </ul>	<ul style="list-style-type: none"> <li>• Understand how to find the mean from a grouped frequency table</li> </ul>
<p><b>Excelling (in addition to Advanced)</b></p>	<ul style="list-style-type: none"> <li>• Count and perform simple sums with numbers in different base systems</li> </ul>	<ul style="list-style-type: none"> <li>• Expand binomials</li> <li>• To solve double sided inequalities</li> </ul>		<ul style="list-style-type: none"> <li>• To find the area or arc length of a sector of a circle.</li> <li>• To find the radius or diameter of a circle given the area/circumference.</li> </ul>	<ul style="list-style-type: none"> <li>• Enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagram</li> </ul>