

## MATHEMATICS

Teacher in charge - Mr S Edwards

### Aims

- To build on the skills, concepts and knowledge developed during Year 7
- To continue to involve pupils in activities which will nurture confidence and enthusiasm for Mathematics
- To give all pupils the opportunity to develop their potential to the full

### Course Description

The Year 8 course is focused on pedagogic progression designed to build upon learning in Year 7. The faculty have developed differentiated schemes of work to cater for all abilities. Pupils follow an appropriate scheme of work based on their previous attainment. Lessons are taught using a wide variety of teaching techniques to encompass many different learning strategies.

Learning Objectives Foundation Path	Learning Objectives Higher Path
<p><b>Number</b></p> <ul style="list-style-type: none"> <li>• use the concepts and vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples, highest common factor and lowest common multiple</li> <li>• use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5</li> <li>• recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions</li> <li>• order positive and negative integers, decimals and fractions</li> <li>• use the symbols =, ≠, &lt;, &gt;, ≤, ≥</li> <li>• round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)</li> <li>• estimate answers; check calculations using approximation and estimation, including answers obtained using technology</li> <li>• recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions)</li> <li>• understand and use place value (e.g. when working with very large or very small numbers, and when calculating with decimals)</li> <li>• apply the four operations, including formal written methods, to integers and decimals</li> <li>• use conventional notation for priority of operations, including brackets</li> <li>• recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions) apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers</li> <li>• express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1</li> <li>• define percentage as 'number of parts per hundred'</li> <li>• express one quantity as a percentage of another</li> <li>• apply the four operations, including formal written methods, to simple fractions (proper and improper), and mixed numbers</li> <li>• interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively</li> <li>• compare two quantities using percentages</li> <li>• solve problems involving percentage change, including percentage increase/decrease</li> </ul>	<p><b>Number</b></p> <ul style="list-style-type: none"> <li>• round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures)</li> <li>• estimate answers; check calculations using approximation and estimation, including answers obtained using technology</li> <li>• recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions)</li> <li>• work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8)</li> <li>• interpret fractions and percentages as operators</li> <li>• work with percentages greater than 100%</li> <li>• solve problems involving percentage change, including original value problems, and simple interest including in financial mathematics</li> <li>• calculate exactly with fractions</li> </ul>

Learning Objectives Foundation Path	Learning Objectives Higher Path
<p><b>Ratio, Proportion and Rates of Change</b></p> <ul style="list-style-type: none"> <li>• use ratio notation, including reduction to simplest form</li> <li>• divide a given quantity into two parts in a given part:part or part:whole ratio</li> </ul>	<p><b>Ratio, Proportion and Rates of Change</b></p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• identify and work with fractions in ratio problems</li> <li>• understand and use proportion as equality of ratios</li> <li>• express a multiplicative relationship between two quantities as a ratio or a fraction</li> <li>• use compound units (such as speed, rates of pay, unit pricing)</li> <li>• change freely between compound units (e.g. speed, rates of pay, prices) in numerical contexts</li> <li>• relate ratios to fractions and to linear functions</li> </ul>
<p><b>Geometry and Measures</b></p> <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 with reflection and/or rotation symmetries</li> <li>• use the standard conventions for labelling and referring to the sides and angles of triangles</li> <li>• draw diagrams from written description</li> <li>• identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres</li> <li>• 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</li> <li>• use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money, etc.)</li> <li>• use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate</li> <li>• change freely between related standard units (e.g. time, length, area, volume/capacity, mass) in numerical contexts</li> <li>• measure line segments and angles in geometric figures</li> <li>• apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles</li> <li>• use standard units of measure and related concepts (length, area, volume/capacity)</li> <li>• calculate perimeters of 2D shapes</li> <li>• know and apply formulae to calculate area of triangles, parallelograms, trapezia</li> <li>• calculate surface area of cuboids</li> <li>• know and apply formulae to calculate volume of cuboids</li> <li>• understand and use standard mathematical formulae</li> <li>• work with coordinates in all four quadrants</li> <li>• understand use lines parallel to the axes, <math>y = x</math> and <math>y = -x</math></li> <li>• solve geometrical problems on coordinate axes</li> <li>• identify, describe and construct congruent shapes including on coordinate axes, by considering rotation, reflection and translation</li> <li>• describe translations as 2D vectors</li> </ul>	<p><b>Geometry and Measures</b></p> <ul style="list-style-type: none"> <li>• measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings</li> <li>• identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement</li> <li>• interpret plans and elevations of 3D shapes</li> <li>• use scale factors, scale diagrams and maps</li> <li>• understand and use alternate and corresponding angles on parallel lines</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>• compare lengths, areas and volumes using ratio notation</li> <li>• calculate perimeters of 2D shapes, including circles</li> <li>• identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference</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></li> <li>• calculate areas of circles and composite shapes</li> <li>• know and apply formulae to calculate volume of right prisms (including cylinders)</li> </ul>

Learning Objectives Foundation Path	Learning Objectives Higher Path
<p><b>Algebra</b></p> <ul style="list-style-type: none"> <li>understand and use the concepts and vocabulary of expressions, equations, formulae and terms</li> <li>use and interpret 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^3</math> in place of <math>a \times a \times a</math>, <math>a/b</math> in place of <math>a \div b</math>, brackets</li> <li>simplify and manipulate algebraic expressions by collecting like terms and multiplying a single term over a bracket</li> <li>where appropriate, interpret simple expressions as functions with inputs and outputs</li> <li>substitute numerical values into formulae and expressions</li> <li>use conventional notation for priority of operations, including brackets</li> <li>generate terms of a sequence from a term-to-term rule</li> <li>recognise and use relationships between operations, including inverse operations (e.g. cancellation to simplify calculations and expressions)</li> <li>solve linear equations in one unknown algebraically</li> </ul>	<p><b>Algebra</b></p> <ul style="list-style-type: none"> <li>use and interpret algebraic notation, including: <math>a^2b</math> in place of <math>a \times a \times b</math>, coefficients written as fractions rather than as decimals</li> <li>understand and use the concepts and vocabulary of factors</li> <li>simplify and manipulate algebraic expressions by taking out common factors and simplifying expressions involving sums, products and powers, including the laws of indices</li> <li>substitute numerical values into scientific formulae</li> <li>rearrange formulae to change the subject</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> <li>solve linear equations with the unknown on both sides of the equation</li> <li>find approximate solutions to linear equations using a graph</li> <li>plot graphs of equations that correspond to straight-line graphs in the coordinate plane</li> <li>identify and interpret gradients and intercepts of linear functions graphically</li> <li>recognise, sketch and interpret graphs of linear functions and simple quadratic functions</li> <li>plot and interpret graphs and graphs of non-standard (piece-wise linear) functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance and speed</li> </ul>
<p><b>Statistics</b></p> <ul style="list-style-type: none"> <li>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 and know their appropriate use</li> <li>interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean and mode) and spread (range)</li> </ul>	<p><b>Statistics</b></p> <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</li> <li>use and interpret scatter graphs of bivariate data</li> <li>recognise correlation</li> <li>interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)</li> <li>apply statistics to describe a population</li> </ul>
<p><b>Probability</b></p> <ul style="list-style-type: none"> <li></li> </ul>	<p><b>Probability</b></p> <ul style="list-style-type: none"> <li>relate relative expected frequencies to theoretical probability, using appropriate language and the 0 - 1 probability scale</li> <li>record describe and analyse the frequency of outcomes of probability experiments using tables</li> <li>construct theoretical possibility spaces for single experiments with equally likely outcomes and use these to calculate theoretical probabilities</li> <li>apply the property that the probabilities of an exhaustive set of outcomes sum to one</li> <li>apply systematic listing strategies</li> <li>record describe and analyse the frequency of outcomes of probability experiments using frequency trees</li> <li>enumerate sets and combinations of sets systematically, using tables, grids and Venn diagrams</li> <li>construct theoretical possibility spaces for combined experiments with equally likely outcomes and use these to calculate theoretical probabilities</li> <li>apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments</li> </ul>

### Grouping

Pupils in Year 8 stay in their groups from Year 7 and will be continually monitored over the year to ensure they remain in the correct group. Classes cover work that is appropriate for the ability of the group. The progress of each pupil is carefully monitored to ensure that they are in the correct group. Our aim is to teach every pupil according to their ability and to ensure that they are extended as much as possible.

### Homework

40 minutes of homework is set weekly and recorded on Show My Homework. Most homework is set on Sparxmaths. At the start of the year, pupils are given a training lesson on how to use Sparxmaths and a letter is sent to parents explaining how it works. If none has been set, the expectation is that pupils review their work. Where necessary, longer pieces of homework are set and pupils are given an appropriate length of time to complete the work.

### Assessment

Work is regularly marked and collated in individual evidence folders to assist pupils' progress. These are recorded for each pupil as part of each individual's 'Progression Passport'. A formal End of Year assessment will take place.