Testbourne Community School

Mathematics Department Curriculum Overview Level 2 Document Key Stage 3 Year 8

Maths	Autumn 1 (Half term 1)	Autumn 2 (Half term 2)	Spring 1 (Half term 3)	Spring 2 (Half term 4)	Summer 1 (Half term 5)	Summer 2 (Half term 6)
Year 8H	**Curriculum (H)** **1 Number Properties 1** • Understand the division, multiplication, addition and subtraction of integers, decimals and fractions including understanding the effects of multiplying and dividing by numbers less than 1. • Understand how to place integers, decimals, fractions and directed numbers in order of size including where fraction to decimal conversion needs to be done. • Understand the written methods for +/-/x/÷ with integers, decimals to 3 or 4 decimal places, negative numbers and fractions. • Understand how to put the symbols =, ≠, , ≤, ≥ between pairs of numbers. • Understand how to order fractions with different denominators. • Understand how to find a fraction half-way between two others. • Consolidate the use of BIDMAS in more complex calculations. **2 Geometry & Measures** • Understand the names of and relationship between angles in parallel lines and use this to solve problems using properties of angles, of parallel and intersecting lines. • Understand how to solve problems in triangles and special quadrilaterals using their properties and justifying and explaining reasoning with diagrams and text. • Understand how to derive the formula for finding the sum of interior angles of any polygon (2D shape) is 180 x (n-2) where n represents the number of sides. • Understand that the sum of exterior angles = 360° and therefore 360 ÷ n (where n represents the number of sides) = the size of an exterior angle and 360 ÷ an exterior angle = n (the number of sides of the shape) • Understand how to draw the nets of cylinders, pyramids and cones. **3 Number Properties 2** • Understand how to identify the prime factors for a specified number by expressing a number as a product of its prime factors giving answers in product index form. • Understand how to use the prime factors to find the HCF and LCM of sets of numbers. and apply prime factor decomposition in order to solve problems. • Understand index notation for integer powers and use the rules for multiplication and division of integer powers. • Understand that a number to the power of 1 is itself and to the power of 0 is 1. **4 Algebra 1** • Understand how to substitute positive and negative integers into formulae and expressions and Substitute negative integers into formulae and expressions including expressions with squared terms. • Be able to extend this to substitute fractions and decimals into formulae and expressions. • Understand how to use formulae for perimeter and area of standard shapes.and derive and use the formulae for the volume and surface area of standard prisms including a cylinder.	**Curriculum (H)** **5 Fractions, decimals, %** • Understand how to find a percentage of a number with and without a calculator and how a single multiplier can be used. • Understand how to find 50%, 25%, 10%, 5% and use these to find other percentages without a calculator. • Understand how to Increase and decrease by a percentage with and without a calculator and understand how a single multiplier can be used. • Understand how to solve problems involving percentage change. Understand that fractions, percentages and decimals can be interchanged use fractions, percentages and decimals to compare proportions. • Understand how convert between fractions, percentages and decimals and use the most appropriate method in any given question. • Understand how to solve original value problems (reverse percentages) and simple interest in financial mathematics. • Understand how to work out the price after VAT, the income after tax and the value of savings after a period of compound interest. • Understand how to calculate a fraction of an amount. • Recognise fractions less than 1 and fractions greater than 1. **6 Approximation** • Understand how to round numbers to the nearest integer, 10, 100, 1000. • Understand how to round to a given number of decimal places and round to a given number of significant figures. • Understand how to estimate answers to calculations using rounding to one significant figure and solve worded estimation problems. • Be able to use a calculator to enter complex calculations and round the answer to a given degree of accuracy. • Start to appreciate that no measurement can be 100% accurate and find possible upper and lower limits to rounded measurements in simple cases. **7 Algebra 2** • Understand and use the vocabulary of expression, equation, term and factor. • Understand how to simplify expressions involving sums products and powers. • Understand how to expand a single bracket with a letter and number outside the bracket. • Know how to factorise a single bracket with a letter and number as the common factor. • Understand how to expand double brackets to give a quadratic expression of form $x^2 + bx + c$. and how to solve linear equations with the unknown on both sides and brackets. **8 Collecting & Interpreting Data** • Be able to construct frequency tables where discrete data is grouped and estimate the mean when discrete data is represented in a frequency table. • Understand how to find the location of the median and mode of data in grouped frequency tables and calculate the range. • Consider how to deal with outliers contained within given data.	**Curriculum (H)** **9 Sequences and Graphs** • Understand how to generate a sequence by spotting a pattern or using a term-to-term rule given algebraically or in words. • Using a term-to-term rule to generate the different terms of a sequences. • Find a position-to-term nth term rule for linear arithmetic sequences, algebraically and in words. • Recognise sequences, triangular, square and cube numbers and simple arithmetic progressions. • Recognise the Fibonacci sequence. • Recognise simple geometric sequences. • Using a position-to-term rule (e.g. 6n - 4) generate the different terms of a sequence and extend this to rules such as n^2, $2n^2 + 1$. • Start to deduce rules for sequences such as 3, 12, 27, 48 ($3n^2$) and 2, 5, 10, 17 ($n^2 + 1$) by making the connection with the square number sequence. **10 Proportion 1** • Understand what a ratio actually means and reduce a ratio to its lowest form. • Understand equivalent ratios how to divide quantities in a given ratio with and without a • calculator. • Understand how to compare proportions when given a ratio of two quantities. • Start to appreciate that a ratio or fraction can be used to represent a multiplicative relationship between two quantities given as a ratio. • Understand how to use ratio to calculate amounts in a variety of contexts. • Use the ratio 1 : n for with map scales and plans. • State the meaning of the term proportion and calculate proportional amounts in a variety of contexts using methods including the unitary method. • Understand how to convert between families of terminating fractions and decimals and convert only simple recurring decimals to fractions and understand that all recurring decimals can be represented as exact fractions. **11 Ratio and Scale** • Understand how to Construct scale drawings. • Understand how to use and interpret scale drawings, Interpret scales on a range of measuring instruments • Interpret map/model scales as a ratio and estimate lengths using a scale diagram. • Give a bearing between the points on a map or scale plan, solve and interpret bearings problems and scaled drawings. • Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides and solve simple problems related to similar enlarged shapes. **12 Shape Properties** • Understand how to label correctly diagrams and use correct geometric notation. • Know how to draw accurately triangles from a written description. • Understand how to identify from correctly labelled diagrams, congruent shapes, similar shapes and those with line and a given order of rotational symmetry.	**Curriculum (H)** **13 Algebra 3** • Understand how to change the subject of a formula including those with powers and roots. • Be able to argue mathematically that algebraic expressions are equivalent. • Understand an algebraic proof. • Understand algebraic input and output function machines including those with two stage operations and fractions. • Understand how to construct function machines given a function and vice versa. • Understand the difference between an identity and an equation. **14 Transformations** • Understand how to complete rotations and describe rotations. • Understand how to complete and describe reflections, given a reflection line and equations of lines. • Understand how to complete and describe enlargements with positive scale factors, extending to simple fractional scale factors. **15 Probability** • Understand how to calculate missing probabilities by subtracting known probabilities from 1. • Carry out experiments and record results and understand what the results show, e.g. does something have a high or low probability based on results? • Through carrying out different experiments and analysing results appreciate that the estimate of a probability will be more accurate the more results you have. • Understand how to represent outcomes of events systematically and use Venn diagrams correctly to represent sets of data understanding the terminology for intersection and union etc. **16 Triangles & Construction** • Be able to recall and apply Pythagoras' theorem. • Find a long or short side (2 sides given). • Solve problems is a variety of contexts including problems where a diagram is not given. • Understand and recall common Pythagorean triples.	**Curriculum (H)** **16 Triangles & Construction (continued)** • Recall standard constructions and use them to solve a variety of problems requiring the use of these constructions. **17 Interpreting Data** • Understand how to draw and interpret a scatter graph and stem and leaf diagram. • Understand how to collect, record and group data. • Understand how to calculate the mean, mode, median and range from a list of data, a frequency table and grouped data. • Understand how to draw bar charts and pie charts. **18 Circles** • Be able to label a circle with all its properties. • Understand how to calculate and solve problems relating to the area and circumference of a circle. • Understand how to split a compound shape into 2 or more identified shapes and calculate their areas and perimeter including where the shapes or context involves a circle or parts of a circle. **19 Proportion 2** • Understand how to solve a direct or inverse proportion problem when the information is given graphically. • Understand how to solve a direct or inverse proportion problem when the information is given as a formula. • Be able to solve numerical problems which are direct or inverse proportion. • Understand how to solve compound interest problems. • Be able to use repeated percentage change for growth and decay problems.	**Curriculum (H)** **20 Solving equations and inequalities** • Understand how to solve equations up to and including the variable on both sides, both algebraically and by drawing a graph. • Understand how to solve linear inequalities in one variable and represent the solution set on a number line and by using set notation. • Be able to create an equation from a worded problem and find the solution and interpret the answer using a graph a as necessary. Understand how to solve a quadratic equation graphically **21 Plotting and sketching graphs** • Understand how to draw the graph of y = mx + c by using intercept and then plotting other points by using the gradient. • Understand how to use conversion and other similar graphs. • Understand how to find the equation of a line given two points or one point and the gradient. • Understand how to draw graphs of quadratic functions using a table of values and find the turning point and the roots graphically. Be able to find the equation of the line of symmetry of the quadratic graph. • Know that when mm' = -1 two lines are perpendicular. • Understand that lines in the form y = mx + c will always result in a straight line and that the c gives the y-intercept and m is the gradient. • Plot quadratic graphs and recognise that they will always result in a parabola. • Calculate the gradient of a given straight line. • Calculate the gradient of a straight line given 2 coordinates. • Understand how to find the equation a straight line by calculating the gradient and y-intercept. • Understand that as the line gets steeper the gradient increases and m increases.