Testbourne Community School

Mathematics Department Curriculum Overview Level 2 Document Key Stage 4 Year 10

Maths	Autumn 1 (Half term 1)	Autumn 1 continued (Half term 1)	Autumn 2 (Half term 2)	Autumn 2 continued (Half term 2)
Year 10H	**Curriculum (H)** **3 Number Properties 2** • Understand how to calculate and simplify using the rules for indices. Extend these to include negative and fractional indices. • Consolidate previous work on standard form understanding how to do the following:- • Write numbers in standard form converting to • and from ordinary numbers. • Calculate using numbers in standard form with • no calculator and with a calculator. • Calculations to include addition, subtraction, multiplication and division in and out of context. **4 Algebra 1** • Understand how to substitute positive and negative integers into formulae and expressions including terms with fractions, brackets and indices. • Understand how to substitute fractions and decimals into formulae and expressions including terms with fractions, brackets and indices. • Understand how to use various formulae for perimeter and areas of standard shapes including quadrilaterals, cuboids and prisms including cylinders. • Understand how to use these in context and use them to find missing lengths/areas given area and volumes. • Understand how to use the formulae for various compound measures such as speed, density and pressure. • Understand and use formulas related to unit pricing and rates of pay solving worded problems. **5 Fractions, decimals, %** • Understand how to interpret fractions, percentages and decimals as multipliers when solving problems and use these to solve problems using a calculator and where appropriate without a calculator. • Understand how to solve problems involving percentage increase/decrease and finding percentage increases/decreases following changes in values. • Understand how to solve original value (reverse percentage) problems after a percentage change and solve simple interest problems in financial • mathematics. • Understand how to work out the price after VAT and income after tax in problems in a variety of contexts. • Understand how to solve financial problems by working out the value of savings after a period of compound interest. • Understand how to identify and calculate a fraction of an amount. • Understand how to solve calculations where it is necessary to express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1	**Curriculum (H)** **6 Approximation** • Understand how to round numbers to a given or appropriate degree of accuracy. • Understand how to estimate answers to calculations and solve worded problems involving estimation. • Recognise that upper and lower bounds exist for • rounded values and understand how to show these limits using inequality notation. • Understand how to solve simple problems involving upper and lower bounds, extending to more complex questions. • Understand how to use a calculator to enter complex calculations and round the answer to a given degree of accuracy. **7 Algebra 2** • Understand how to simplify expressions involving surds and including those surds presented in double brackets • Understand how to factorise quadratic expressions of the form $ax^2 + bx + c$. • Understand how to simplify expressions involving algebraic fractions, involving factorising resultant quadratic expressions. • Understand how to simplify expressions involving fractional and/or negative powers using index laws. • Understand how to solve linear equations with the unknown on both sides, including those involving fractions. • Solve linear equations graphically	**Curriculum (H)** **8 Collecting & Interpreting Data** • Consider data sets with outliers and whether the outliers should be ignored or included and how they could affect measures of central tendency and range. • Understand how to take samples of data by random, stratified, systematic, quota and cluster. • Be able to understand when sampling can be representative of population data **9 Sequences and Graphs** • Understand how to use subscript notation for position-to-term and term-to- term rules. • Understand how to generate sequences from nth term rules and find nth terms of other sequences. E.g. 1, √2, 2, 2√2 or ½, 2/3, 3/4, …. • Understand how to find the nth term of a quadratic sequence and explore their properties. • Be able to recognise and use the nth term of a quadratic sequence. • Understand how to link the algebraic nth term of a quadratic sequence to its corresponding graphical representation. • Understand how to find the nth term and explain where it is has come from in relation to a pictorial sequence given including those representing quadratic sequences) **10 Proportion 1** • Understand ratio, simplify ratio, identify and produce equivalent ratio and understand how to divide in a given ratio both with and without a calculator. • Understand how to compare proportions when given a ratio of two quantities. • Use the ratio 1 : n for use with map scales and plans. • Understand and use the ratio n : 1. • Understand how to use ratios for problem solving including recipes and ratios for scale drawing, plans. • Link ratios to direct and inverse proportion questions. • Understand the use of ratio for repeated proportional change. • Understand how to convert between families of fractions and decimals including recurring decimals. • Understand how to prove and be able to convert any given recurring decimal to an exact fraction.	**Curriculum (H)** **11 Ratio and Scale** • Be able to use ratio to solve problems involving similar shapes; for length, areas and volumes. • Understand and use the effect of enlargement for perimeter, area and volume of shapes and solids. • Recognise that similar shapes maintain the same ratios between their sides. • Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides. • Understand the relationships between linear, area and volume scale factors of mathematically similar shapes and solids and solve related problems. • Understand that trigonometric functions are ratios of two sides of a right triangle containing the angle. **12 Shape Properties** • Understand how to find missing lengths in similar shapes. • Understand how to show angles are equal in similar shapes. • Prove properties of a triangle using understanding of Pythagoras' theorem. • Understand how to show that a triangle must contain a right angle given its side lengths. • Understand how to show why the base angles of an isosceles triangle are equal using SAS as an introduction to congruency of triangles covered in a subsequent unit of work.

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Maths	Spring 1 (Half term 3)	Spring 2 (Half term 4)	Summer 1 (Half term 5)	Summer 2 (Half term 6)
Year 10H	**Curriculum (H)** **13 Algebra 3** • Understand how to change the subject of a formula where the subject appears twice. • Understand how to use algebra to support and understand a proof. • Understand how to construct function machines given a function and vice versa. • Use and understand inverse functions. • Understand how to construct a proof **14 Transformations** • Review all 4 transformations. • Understand how to transform and describe combinations of transformations - what is the same and what is different? • Understand how to carry put Vector addition using diagrams and column vectors. • Understand how to multiply vectors by a scalar quantity. • Understand how to solve geometric problems involving vectors. **15 Probability** • Understand how to calculate the relative frequency given a problem and data. • Understand how to use the best estimate for relative frequency to calculate the expected number of outcomes. • Understand how to construct accurate tree diagrams for independent and dependent events. • Understand how to fill in missing probabilities from a tree diagram. • Understand how to use a tree diagram to calculate the probability of events occurring. **16 Triangles & Construction** • Understand how to use Pythagoras and trigonometry (SOHCAHTOA) in a wide variety of contexts, including their application on a co-ordinate grid and in bearings (find angles and sides in all contexts) and with angles of depression and elevation.	**Curriculum (H)** **16 Triangles & Construction (continued)** • Understand how to use Pythagoras and trigonometry in three dimensions i.e. in 3D shapes or on a tri-axial coordinate grid. • Understand and be able to recall, the the exact values of sinθ and cosθ for θ = 0, 30, 45, 60 and 90 degrees; • Understand and know the exact value of tanθ for θ = 0, 30, 45 and 60 degrees, (by understanding their derivation using trigonometry in equilateral triangles of side 2, and isosceles triangles of side 1 respectively). • Understand how to sketch the trigonometrical graphs of Sin, Cos and Tanθ, and identify where the key intercepts on the x and y axes are **17 Interpreting Data** • Review the drawing and interpretation of pie charts, frequency diagrams (frequency polygons) and scatter diagrams. • Understand how to draw cumulative frequency diagrams and box plots and interpret and solve related problems. Understand how to calculate the averages and range from grouped data. • Understand how to calculate the median and interquartile range from a list of data or from a cumulative frequency curve. • Understand and draw and use histograms for grouped data with equal and unequal class widths **18 Circles** • Understand how to calculate the area of a sector • Understand how to find the length of an arc. • Understand how to calculate areas and perimeters of compound shapes where a part of the shape is a part of a circle. **20 Solving equations and inequalities** • Understand how to solve quadratic equations using the formula giving solutions as exact solutions involving leaving answers in surd form and appropriately rounded decimal answers. • Understand how the solutions to a quadratic equation relate graphical representation when the y coordinate is zero.	**Curriculum (H)** **18 Circles (continued)** • Understand how to prove and use circle theorems including; angle subtended by an arc at the centre is equal to twice the angle subtended at any point on the circumference, angle subtended at the circumference by a semicircle is 90°, angles in the same segment are equal, opposite angles in a cyclic quadrilateral sum to 180°, a tangent at any point on a circle is perpendicular to the radius at that point, tangents from an external point are equal in length, the perpendicular from the centre to a chord bisects the chord and the alternate segment theorem. **19 Proportion 2** • Understand how to use reverse percentages in the context of compound interest and repeated growth and decay problems finding the % increase/growth/decay. • Understand and use and construct formulae for direct and inverse proportion problems. • Understand that if x is inversely proportional to y means that x is proportional to 1/y. • Understand how to find gradients of straight lines and interpret them in different contexts including, if appropriate, as speed or acceleration or rate of change. • Understand how to construct graphs given information and then interpret the gradient and intercept in a real life context. • Understand and be able to identify gradients and intercepts given algebraic equations **20 Solving equations and inequalities (continued)** • Consolidate and extend from year 9 the • following:- • Understand how to solve two linear simultaneous equations algebraically and graphically. • Understand how to solve quadratic equations by factorising, including those that need rearranging and relate this to a graphical solution. **20 Solving equations and inequalities (continued)** • Understand how to interpret worded questions which require creation of two linear simultaneous equations; be able to solve the equations and interpret the answer. • Be able to solve linear inequalities in one or two variables and represent the solution set on a graph or using set notation **21 Plotting and sketching graphs** • Understand how to find roots, x/y intercepts and turning points of quadratic functions by completing the square and recognise the connection between the algebra and the graphical representation. • Understand how to sketch a quadratic graph by finding the x and y axis crossings and other key points from the equation.	**Curriculum (H)** **21 Plotting and sketching graphs** • Understand how to draw/sketch graphs of cubic, reciprocal, quadratic and exponential functions and identify the key features. • Understand how to calculate or estimate gradients and areas under graphs and be able to interpret the results when appropriate. • Understand and use function notation. • Understand how to find estimated solutions to equations by interpreting their graph. • Understand how to plot, draw and interpret graphs of real life issues including speed time, distance time and acceleration. • Understand how to read and interpret real life graphs and be able to explain what the gradient of the graphs represent. **Revision** **Year 10 'Mock' Exams weeks** **Year 10 Work Experience week** **3 Number Properties 2 (consolidate and extend number)** • Understand the difference between a rational and irrational number, knowing that a rational number can be written in the form p/q where p and q are integers but where q is not equal to zero. • Understand and prove that all recurring decimals are rational. • Know that π is an irrational number. • Understand how to simplify irrational numbers in surd form using the rules of surds learnt previously. • Understand how to write $(3 - \sqrt{3})^2$ in the form $a + b\sqrt{3}$. • Understand how to rationalise a denominator including fractions with denominators written in the form $a + b\sqrt{c}$. • Understand how to use surds and π in exact calculations, without a calculator.