Testbourne Community School

Mathematics Department Curriculum Overview Level 2 Document Key Stage 4 Year 11

Maths	Autumn 1 (Half term 1)	Autumn 1 continued (Half term 1)	Autumn 2 (Half term 2)	Autumn 2 continued (Half term 2)
Year 11H	**Curriculum (H)** **3 Number Properties 2** • Recap and extend work from Year 10 as follows:- • State the difference between a rational and irrational number. • Understand 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 in year 10. • Understand how to write $(3 – \sqrt{3})^2$ in the form $a + b\sqrt{3}$. • Understand how to rationalise a denominator when working with surds including fractions with denominators written in the form $a + b\sqrt{c}$ • Understand how to surds and π in exact calculations, without a calculator. **21 Plotting and Sketching Graphs** • Recap and extend work from Year 10 as follows:- • Understand how to find the 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 such as the roots and line of symmetry. **4 Algebra 1** • Recap and extend work from Year 10 as follows:- • Understand how to substitute positive and negative integers into formulae and expressions including terms with indices. • Understand how to substitute fractions and decimals into formulae and expressions including terms with indices brackets and fractions. • Understand how to substitute surds into formulae including formulae for areas and volumes. • Understand how to use formulae for perimeter and area of standard shapes. • Understand how to use formulae so that for a given volume, find a missing length or given area find a missing side. • Understand how to use the formulae for the volume of standard prisms. • Extend the use of compound measures such as speed and density and additionally pressure. • Understand how to use unit pricing to solve worded problems including which is better value (best buy problems)	**Curriculum (H)** **5 Fractions, decimals, %** • Recap the equivalence of fractions, decimals and percentages. • Recap percentage increase/decrease, one number as a percentage of another and reverse percentages (finding the original value given the new value after a percentage increase or decrease. • Recap the understanding of solving problems including simple interest, compound interest and include depreciation/appreciation of assets and growth and decay problems. • Understand how to carry out calculations relating to loans and other financial transactions where percentage rates are used. • Understand how to use calculator and non-calculator methods when working with fractions and percentages using single multipliers for percentages where applicable. **6 Approximation** • Recap and extend work on Limits of accuracy and upper and lower bounds as follows:- • Recap identifying upper and lower bounds of given measurements and the degree of accuracy used in the measurement. • Understand how to write error intervals as a result of rounding and truncation. • Understand how to solve more problems/complex problems involving upper and lower bounds in a wider variety of contexts. • Understand how to calculate % error. **7 Algebra 2** • Understand how to simplify complex algebraic fractions and other expressions including those where factorising a quadratic and subsequent cancelling down is required. • Understand how to expand and simplify three binomials. • Understand how to rationalise expressions involving fractions with surds as the denominator. • Recap writing expressions in the form $a\sqrt{b}+c$ by completing the square **.8 Collecting & Interpreting Data** • Recap Venn diagram work including being able to use the symbols for union and intersection and 'not' (complement) for Venn diagrams involving 2 and 3 intersecting sets or subsets and solve problems relating to the information contained in Venn Diagrams. • Include Venn diagram problems related to probability and extend to those where algebra is used. • Understand key features about time series graphs. • Understand how to use moving averages and plot on time series graphs. **9 Sequences and Graphs** • Be able to recognise all different types of sequences and confidently use the correct language to describe them (for example Fibonacci, arithmetic, geometric). • Recognise and manipulate sequences of the form ar^n (a times r to the power of n) when n is a integer and r is a positive rational number or a surd. For example, ,the nth term of a sequence is root 2 to the power of n, show that the 7th term is 8 root 2. **Revision**	**Curriculum (H)** **Revision** **Mock I Exams** **10 Proportion 1 & 11 Ratio & Scale** • Recap the application of ratio by solving problems • leading to students being able to:- • 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 the use of ratios for problem solving including recipes, scale drawing, plans and direct and inverse proportion questions. • Use of ratio for repeated proportional change. • Recap the following skills and extend as applicable:- • Convert between families of fractions and decimals including recurring decimals. • Understand that for a decimal to terminate the factors of the denominator must be 2 and/or 5. All other factors will lead to a recurring decimal. • Express a multiplicative relationship between two quantities as a fraction/ratio. • Know that equivalent ratios can be expressed as equivalent fractions. **12 Shape Properties** • Recall which of the standard shapes are always similar. • Understand how similar and congruent shapes are produced as a result of certain transformations. • Understand how solve geometric problems demonstrating that students are:- • Able to find missing lengths in similar shapes. • Able to show angles are equal in similar shapes. • Able to prove properties of a triangle using understanding of Pythagoras' theorem. • Able to use algebraic notation to support geometric proofs. • Apply mathematical reasoning, explaining and justifying inferences and deductions. • Show step-by-step deduction in solving a geometrical problem; state constraints and give starting points when making deductions	**Curriculum (H)** **13 Algebra 3** • Understand how to change the subject of a formula involving algebraic fractions. • Recap and extend understanding and use of function notation covered in year 10, evaluating a function given a value. • Understand and be able to use composite functions. • Understand that f(x) followed by g(x) gives the composite function gf(x). • Recognise that fg(x) and gf(x) will not be the same. • Be able to work out the inverse function given a function **14 Transformations** • Racap basics of vectors; column representation and diagrammatic representation. • Understand how to solve geometrical problems in 2D using vector methods and prove properties such as parallel vectors, the presence of a trapezium, a parallelogram and show points lie on a straight line (collinear). **16 Triangles & Construction** • Understand how to apply the sine rule and cosine rule to find missing lengths and angles in any triangle or shape based problems. • Understand how to apply Area = 1/2ab sinC to calculate the area, sides or angles of any triangle. • Understand and apply to further extended problems the relationship between Linear and Area & Volume scale factors between shapes that are mathematically similar.

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Maths	Spring 1 (Half term 3)	Spring 1 (Half term 3)	Spring 2 (Half term 4)	Summer 2 (Half term 5)	Summer 2 (Half term 6)
Year 11H	**Curriculum (H)** **15 Probability** • Understand what the term 'conditional probability' means and the implications of with or without replacement when calculating probabilities. • Understand when a problem involves conditional probability. • Select the necessary information from two-way tables, Venn diagrams and tree diagrams to calculate conditional probabilities. • Additionally evaluate probabilities from tree diagrams in terms of expressions rather than • fractions (e.g., initial probabilities are given in terms of x) • Recap calculating the relative frequency of an event given a problem and data and use the best estimate for relative frequency to calculate the expected number of outcomes. **17 Interpreting Data** • Recap drawing histograms for grouped data with unequal class widths. • Understand how to find an estimate of the median or other information from a histogram. • Understand how to extract information from a histogram and use a histogram to compare distributions. • Recap drawing cumulative frequency diagrams and box plots. • Recap understanding of and calculating the interquartile range and median from a list of data or a cumulative frequency curve or box plot. • Solve further extended problems by extracting or completing cumulative frequency diagrams/box plots and histograms. • Understand how to compare two distributions in order to make decisions about a hypothesis by comparing the range or the inter-quartile range if available, and a suitable measure of average, such as the mean or median. **18 Circles** • Understand how to find the equation of a circle given the radius and the centre. • Understand how to find an equation of a line that is perpendicular to the radius. • Understand how to work out the coordinates of the points of intersection of a given circle and a given straight line. • Understand how to use the fact that the angle between the tangent and radius is 90° to work out the gradient of a tangent and hence the equation of a tangent at a given point and solve other related problems.	**Curriculum (H)** **19 Proportion 2** • Understand how to use the gradient of a straight line graph as the rate of change. • Interpret the meaning of the gradient as the rate of change of the variable on the vertical axis compared to the horizontal axis. • Understand and draw graphs to represent direct and inverse proportion. • Match direct and inverse proportion graphs to their equations and vice versa. **20 Solving equations and inequalities** • Understand how to solve quadratic equations algebraically by completing the square and recap solving by using the formula. Solutions to include exact solutions involving surds. • Understand how to relate solutions to quadratic equations to the graphical representation. • Understand how to solve equations numerically using iteration. • Understand how to use a systematic method to find approximate solutions of equations where there is no simple analytical method. • Understand how to use suffix notation in recursive formulae and find approximate solutions using recursive formulae. • Understand how to solve quadratic inequalities by algebraic or graphical methods. • Understand how to draw graphs of straight lines and curves in different contexts and interpret the gradient of a straight line, gradient of a chord and gradient of tangent at a point on a curve and recognise that the first is 'average' but the second is instantaneous rate of change. • Understand how to solve two simultaneous equations (One linear and one quadratic) algebraically or graphically. • Understand how to solve equations involving algebraic fractions **Revision** **Mock I (Third Paper)**	**Curriculum (H)** **21 Plotting and sketching graphs** • Understand how plot and draw graphs of y = cosx, y =sinx and y = tanx for angles (in degrees) of any magnitude. • Understand how to sketch graphs of lines, quadratics, exponentials, reciprocals and trig functions. • Be able to sketch translations and reflections of functions and graphs of transformed functions such as y = f(x-1), y =f(x) + 2, y = f(x - 1) + 2 given the sketch of y = f(x) and know that given a diagram of a sketch and its transformation how to find the equation. • Understand how to sketch y = f(-x) and y = -f(x) given the sketch of y = f(x) and be able to find the equation of the graph given the graph and its transformation. • Understand how to find the gradient of a curve at a given point by drawing a tangent and calculating its value. • Find the area between a curve and the x axis of a graph by using the trapezium rule or other method. Interpret this area in context (Kinematics graphs). • Understand how to recognise and apply the transformations that can be done to a graph and understand how to sketch a graph once it has been reflected, translated, stretched in different directions. **Revision and School Mock II** **21 Plotting and sketching graphs** • Use completing the square covered previously to find max/min points of a quadratic. • Understand for example how the graph $y = x^2$ has been transformed to get $y = (x + a)^2 + b$. **Revision**	**Curriculum (H)** **Revision** **Final Exam 1**	**Curriculum (H)** **Revision** **Final Exam 2** **Final Exam 3**