Year 11 Foundation: Curriculum Implementation Plan

Mathematics – Year 11 Foundation – Overview				
Knowledge and Skills – Students will be taught to…	Reading, Oracy, Literacy	Formative Assessment	Summative Assessment	Link to GCSE Content
Please see individual units below. Note: The overview for Year 11 is *approximate* – teachers will use the results of all forms of assessment to identify the most appropriate learning for each individual group, in order to best use the available time in Year 11 to prepare them for GCSE exams.	• Reading worded questions to understand the context and decide how to approach a problem • Paired discussion of problems • Writing responses to worded questions such as "Explain why…" • Expanding vocabulary of key mathematical terms • Giving verbal responses in class question-and-answer	• Questioning in class • Self-assessment • Peer-assessment • Starter and homework questions • Mini-tests • Show of hands and other forms of whole-class feedback • Review of student work during lessons • Mini-whiteboards • Practice GCSE papers • Knowledge tests	Full GCSE mock examinations in the Autumn and Spring terms.	Please see individual units below.

Mathematics – Unit 1 – Trigonometry 1	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
- Label the sides of a right-angled triangle 'hypotenuse', 'adjacent', 'opposite' - Appreciate that the ratio of corresponding sides in similar triangles is constant - Know the trigonometric ratios, $\sin\theta = opp/hyp$, $\cos\theta = adj/hyp$, $\tan\theta = opp/adj$ - Understand that sine, cosine and tangent are functions of an angle - Use a calculator to find the sine, cosine and tangent of an angle - Choose an appropriate trigonometric ratio that can be used in a given situation - Set up and solve a trig. equation to find a missing side in a right-angled triangle - Set up and solve a trig. equation when the unknown is in the denominator of a fraction - Set up and solve a trig. equation to find a missing angle in a right-angled triangle - BRIEFLY REVISE: using Pythagoras' theorem - Solve GCSE-style problems that involving more than one triangle	Link trigonometric ratios to similar triangles Apply trigonometric ratios to find angles and lengths in right-angled triangles in 2D Recall and use the trigonometric identities for right-angled triangles Know and apply the trigonometric ratios, sin θ, cos θ and tan θ and apply them to find angles and lengths in right-angled triangles in 2D figures
Mathematics – Unit 2 – Growth	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
- REVISE: calculating the result of a repeated percentage change - Determine the number of increases or decreases by a percentage needed to obtain or exceed a given value, showing sufficient calculations to justify the result - Compare investments earning simple interest with those earning compound interest - Set up and solve a simple growth or decay problem	Set up, solve and interpret the answers in growth and decay problems, including compound interest Solve problems step-by-step involving multipliers over a given interval, for example compound interest, depreciation, etc. Calculate simple interest, including in financial contexts

Mathematics – Unit 3 – Algebra	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
• REVISE BRIEFLY: solving linear equations, including with the unknown on both sides • REVISE BRIEFLY: solving linear inequalities, representing the solution on a number line • Change the subject of a formula that involves powers or roots • Change the subject of a formula where the subject appears twice	Solve linear equations in one unknown algebraically Solve linear inequalities in one variable, expressing solutions on a number line using the conventional notation Solve linear inequalities in one variable, representing the solution set on a number line Rearrange formulae to change the subject, where the subject appears once only Rearrange formulae to change the subject, including cases where a reciprocal of the subject appears Rearrange formulae to change the subject in cases where a power of the subject appears or where the subject appears twice
Mathematics – Unit 4 – Transformation and Loci	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
• Identify and describe a single transformation, given two congruent 2D shapes (i.e. rotation, reflection, or translation) • Know that rotation, reflection and translation produce a congruent image, whereas enlargement produces a similar image • Practise a variety of GCSE transformation questions • REVISE BRIEFLY: constructing an angle bisector, perpendicular bisector, perpendicular from/at a point • Combine techniques to solve more complex loci problems, including shading regions satisfied by multiple 'rules'	Identify a mirror line $x=a$, $y=b$, $y=x$ or $y=-x$ from a simple shape and its image under reflection Identify the centre, angle and direction of a rotation from a simple shape and its image under rotation Identify the mirror line of a reflection from a shape and its image Use a column vector to describe a translation Describe translations as 2D vectors Apply ruler and compass constructions to construct figures and identify the loci of points, to include real-world problems Construct the perpendicular from a point to a line Construct the perpendicular to a line at a point Know that the perpendicular distance from a point to a line is the shortest distance to the line Understand the term 'equidistant' Construct the perpendicular bisector and midpoint of a line segment Construct the bisector of an angle formed from two lines

Mathematics – Unit 5 – Proof	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
• Know the difference between an equation and an identity • Create a mathematical argument to show that two expressions are equivalent • Prove that two triangles are similar by consideration of angles • Know and use the conditions for triangles to be congruent (SSS, SAS, RHS, ASA) • Prove that two given triangles are congruent • Apply angle facts to derive results about angles and sides • Create a geometrical proof	Know the difference between an equation and an identity Recognise the difference between an equation and an identity Apply similarity to calculate unknown lengths in similar figures Prove that two triangles are congruent using the cases SSS, ASA, SAS, RHS Prove that two triangles are similar Recall and use the trigonometric identities for right-angled triangles Apply angle facts to find angles in rectilinear figures, and to justify results in simple proofs. e.g. 'The sum of the interior angles of a triangle is 180°' Use the basic properties of isosceles, equilateral and right-angled triangles to find lengths and angles in rectilinear figures and in simple proofs Use the properties of special triangles and quadrilaterals to find lengths and angles in rectilinear figures and in simple proofs Apply congruent triangles in calculations and simple proofs. e.g. The base angles of an isosceles triangle are equal
Mathematics – Unit 6 – Solids	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
• REVISE BRIEFLY: finding the volume and surface area of a cuboid or prism • Find the volume of spheres, cones, frustums and pyramids • Find the surface area of spheres, cones, frustums and pyramids • Use Pythagoras' theorem, when needed, to find a length in a pyramid or cone • Use this context to practise arithmetic with large integers, decimals, fractions & negatives • Find the volume or surface area of a composite solid, including in the context of density • Continue to solve practical problems involving the volume and surface area of solids	Calculate the surface area and volume of spheres, cones and simple composite solids (formulae will be given) Calculate the surface area and volume of a pyramid (the formula will be given) Calculate surface areas and volumes of spheres, pyramids, cones and composite solids

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Mathematics – Unit 7 – Quadratics	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
- Identify and interpret roots of quadratic functions graphically - Identify and interpret intercepts of quadratic functions graphically - Identify and interpret the turning point (vertex) of a quadratic function graphically - REVISE: plotting graphs of quadratic functions, simple cubic functions, $y = 1/x$ and other simple reciprocal functions - REVISE: factorising quadratic expressions of the forms x² + bx + c and x² – c - Solve a quadratic equation given in factorised form e.g. (x + 3)(x – 2) = 0 - Solve a quadratic equation of the form x² + bx + c by factorising - Deduce roots of quadratic functions algebraically - Use a graph to estimate solutions to quadratic equations of the form ax² + bx + c = 0 - Use a graph to estimate solutions to quadratic equations of the form ax² + bx + c = k - Solve problems that involve solving a quadratic equation in context	Identify and interpret roots, intercepts and turning points of quadratic functions graphically Identify intercepts and, using symmetry, the turning point of graphs of quadratic functions Recognise and sketch the graphs of simple quadratic functions e.g. $y = x^2 - 9$ Find approximate solutions to a quadratic equation using a graph Use graphs to find approximate roots of quadratic equations
Mathematics – Unit 8 – Vectors	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
- Understand that a vector quantity represents both magnitude (size) and direction, whereas a scalar quantity has only magnitude - Draw a column vector as an 'arrow' on a grid, or write a column vector for a given 'arrow' - Add and subtract column vectors, understanding this as a resultant of two vectors - Multiply a column vector by a scalar (constant) - Work with combinations of 'letter' vectors shown as arrows on a grid - Solve simple geometrical problems involving vectors	Describe translations as 2D vectors Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors Understand addition, subtraction and scalar multiplication of vectors Represent a 2-dimensional vector as a column vector, and draw column vectors on a square or coordinate grid

Mathematics – Unit 9 – Statistics and Probability	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
• Use a sample to infer properties of a population • Understand the limitations of sampling • Know what is meant by simple random sampling • REVISE BRIEFLY: estimating the mean and identifying the modal class from a table of grouped data • Construct a Venn diagram to solve a problem, including calculating probabilities • Solve more complex problems using probability tree diagrams, including constructing diagrams on a blank page	Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling Describe a population using statistics Infer properties of populations or distributions from a sample Find the modal class, and calculate estimates of the range, mean and median for grouped data, and understand why they are estimates Construct a Venn diagram to classify outcomes and calculate probabilities Use tree diagrams and other representations to calculate the probability of independent and dependent combined events
Mathematics – Unit 10 – Trigonometry 2	
Knowledge and Skills – Students will be taught to…	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
• Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90° • Know the exact values of tan θ for θ = 0°, 30°, 45° and 60° • Use trigonometry to solve problems in context	Know the exact values of sin θ and cos θ for θ=0, 30, 45, 60, 90°; know the exact value of tan θ for θ=0, 30, 45, 60° Know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60° Recall and use the trigonometric identities for right-angled triangles Apply trigonometric ratios to find angles and lengths in right-angled triangles in 2D