

Year 10E (Higher): Curriculum Implementation Plan

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.	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • 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 	<p>Whole-class assessments towards the end of each term, based on work completed during the year to date.</p> <p>Full GCSE mock examination in the summer term, in preparation for Year 11.</p>	Please see individual units below.

Mathematics – Unit 1 – Powers & Roots	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> Understand and evaluate negative powers with numerical bases Understand the equivalence between e.g. x^{-7} and $1/x^7$ Review: Understand and use the index laws for multiplication, division, and power of power (brackets), including where negative powers are involved Understand and use the index law for power 0 Simplify more complex expressions involving powers using a combination of index laws Use index laws to multiply and divide algebraic terms involving higher powers and multiple variables Understand and evaluate fractional powers with numerical bases Understand the equivalence between e.g. $x^{\frac{3}{2}}$, $(\sqrt{x})^3$ and $\sqrt{x^3}$ Review: Add, subtract and multiply surds Review: Simplify surds Divide with surds in simple cases e.g. $\frac{\sqrt{10}}{\sqrt{2}}$ Simplify a surd expression with a 1-term denominator, by rationalising Simplify a surd expression with a 2-term denominator, by rationalising 	<p>Calculate with roots, and with integer indices</p> <p>Calculate with fractional indices</p> <p>Calculate exactly with surds</p> <p>Simplify surd expressions involving squares</p> <p>Simplify and manipulate algebraic expressions involving surds</p> <p>Rationalise denominators</p> <p>N6 use positive integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5</p> <p>N7 calculate with roots, and with integer indices</p> <p>N7 calculate with fractional indices</p> <p>N8 calculate exactly with surds; simplify surd expressions involving squares</p> <p>A4 simplify and manipulate algebraic expressions (including those involving surds) by collecting like terms</p> <p>N8 rationalise denominators</p>
Mathematics – Unit 2 – Ratio & Scale	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> Review: Divide a quantity into a 2-part or 3-part ratio, including where one part, or the difference, is given Solve simple problems involving a combination of two ratios, including where dividing in a quantity is also involved Solve more complex problems which combine ratios, fractions, decimals and/or percentages Draw/interpret accurate scale diagrams, including using map scale factors (given as ratios or e.g. 1cm represents 4km) Plot/interpret a bearing in a scale diagram 	<p>Identify and work with fractions in ratio problems</p> <p>R4 use ratio notation, including reduction to simplest form</p> <p>R5 divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio</p> <p>R8 relate ratios to fractions and to linear functions</p> <p>R5 apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)</p> <p>N11 identify and work with fractions in ratio problems</p> <p>R8 relate ratios to fractions and to linear functions</p> <p>R12 compare lengths, areas and volumes using ratio notation; make links to similarity (including trigonometric ratios) and scale factors</p>

Mathematics – Unit 3 – Brackets	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> Review: Create a mathematical argument to show that two expressions are equivalent (prove an identity) Expand and simplify the product of three binomials Simplify an algebraic fraction that involves factorising into a single bracket Factorise a quadratic expression ($a=1$), relating this to a graph Factorise a quadratic expression ($a>1$), relating this to a graph Factorise a difference of two squares 	<p>Use algebra to support and construct arguments and proofs</p> <p>Factorise quadratic expressions, including a difference of two squares</p> <p>Factorise quadratic expressions of the form $ax^2 + bx + c$</p> <p>A1 use and interpret algebraic manipulation, including brackets</p> <p>A4 simplify and manipulate algebraic expressions by taking out common factors</p> <p>A3 understand and use the concepts and vocabulary of terms and factors</p> <p>A4 simplify and manipulate algebraic fractions</p> <p>A4 expand the product of more than two binomials</p> <p>A4 simplify and manipulate algebraic expressions by factorising quadratic expressions, including the difference of two squares</p>
Mathematics – Unit 4 – Area & Perimeter	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> Solve area or perimeter problems involving more than one shape (e.g. the area of the triangle is 5 times the area of the rectangle) Review: Form and solve a linear equation in the context of area or perimeter Use brackets in the context of area or perimeter (e.g. area of a rectangle) Identify/draw further parts of a circle (tangent, chord, sector, segment, arc) Calculate the area, arc length or perimeter of a sector Form and solve an equation to calculate the angle or radius of a sector, using its area or arc length Use the area of a sector to calculate the perimeter (or arc length) and vice versa 	<p>Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>Calculate exactly with multiples of π</p> <p>Calculate arc lengths, angles and areas of sectors of circles</p> <p>G17 know the formulae for circumference and area of a circle; calculate: perimeters of 2D shapes including circles, areas of circles and composite shapes</p> <p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>N8 calculate exactly with multiples of π</p> <p>G13 calculate arc lengths, angles and areas of sectors of circles</p> <p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>N8 calculate exactly with fractions and multiples of π</p>

Mathematics – Unit 5 – Equations	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Solve a quadratic equation by factorising ($a=1$), including interpreting the solutions as roots and linking to a graphical representation • Rearrange, expand or simplify a quadratic equation before factorising and solving ($a=1$) • Reduce a quadratic equation to $a=1$ by dividing by a common factor, before factorising and solving • Know and apply the Quadratic Formula to solve a quadratic equation ($a=1$, $a>1$) • Find approximate solutions to linear simultaneous equations using a graph • Solve two linear simultaneous equations by elimination, including where rearrangement is needed • Solve a problem by deriving and solving two linear simultaneous equations 	<p>Deduce roots of quadratic functions algebraically</p> <p>Solve quadratic equations algebraically by factorising</p> <p>Solve quadratic equations that require rearrangement by factorising</p> <p>Find approximate solutions to a quadratic equation using a graph</p> <p>Solve quadratic equations by using the quadratic formula</p> <p>A18 solve quadratic equations algebraically by factorising</p> <p>A11 deduce roots algebraically</p> <p>A18 solve quadratic equations that require rearrangement by factorising</p> <p>A18 find approximate solutions to quadratic equations using a graph</p> <p>A18 solve quadratic equations (including those that require rearrangement) by using the quadratic formula</p>
Mathematics – Unit 6 – Solids	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Review: Calculate the volume of cuboids, prisms and cylinders • Calculate the volume of spheres, cones and pyramids • Solve context problems involving the volume of solids, including composite solids • Form and solve equations to solve problems involving volume (e.g. to find a missing length) • Use algebra in context problems involving volume (e.g. where lengths are specified algebraically) • Review: Calculate the surface area of cuboids, prisms and cylinders • Calculate the surface area of spheres, cones and pyramids • Solve context problems involving the surface area of solids, including composite solids 	<p>Construct and interpret plans and elevations of 3D shapes</p> <p>Calculate surface areas and volumes of spheres, pyramids, cones and composite solids</p> <p>G12 identify properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres</p> <p>G13 construct and interpret plans and elevations of 3D shapes</p> <p>G16 know and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)</p> <p>N13 use standard units of length, using decimal quantities where appropriate</p> <p>G14 use standard units of measure and related concepts (length, area, volume/capacity, etc.)</p> <p>G17 calculate surface area and volume of spheres, pyramids, cones and composite solids</p>

Mathematics – Unit 7 – Fractions	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Convert a fraction to a recurring decimal • Convert a recurring decimal to a fraction • Compare and order fractions with different denominators • Order a combination of fractions, decimals and percentages • Review: Use the four operations with simple algebraic fractions • Multiply/divide more complex algebraic fractions • Increase or decrease a quantity by a fraction • Find the result of a repeated fractional change 	<p>Change recurring decimals into their corresponding fractions and vice versa</p> <p>Calculate exactly with fractions</p> <p>Simplify and manipulate algebraic fractions</p> <p>N10 change fractions into recurring decimals and recurring decimals into their corresponding fractions</p> <p>N2 apply the four operations, including formal written methods, to simple fractions (proper and improper), and mixed numbers – all both positive and negative</p> <p>N8 calculate exactly with fractions</p> <p>N12 Interpret fractions as operators</p>
Mathematics – Unit 8 – Angles	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Review: Solve problems involving angles on parallel lines • Review: Solve problems involving interior and exterior angles in polygons • Know/use the fact that the angle at the centre is twice the angle at the circumference • Know/use the fact that angles in the same segment are equal • Know/use the fact that the angle in a semicircle is a right angle • Know/use the fact that two tangents intersect at the same distance from a circle • Know/use the fact that a tangent and radius are perpendicular • Know/use the fact that a radius is the perpendicular bisector of a chord • Know/use the fact that opposite angles in a cyclic quadrilateral add up to 180° • Know/use the alternate segment theorem • Create a chain of reasoning to show that a given geometric statement involving angles is true, where angles are numerical or algebraic • Form and solve a linear equation in the context of angles 	<p>Apply the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results</p> <p>G3 apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles; understand and use alternate and corresponding angles on parallel lines; 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)</p> <p>G6 apply angle facts and properties of quadrilaterals to conjecture and derive results about angles and sides, including the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs</p> <p>G9 identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <p>G10 apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results</p>

Mathematics – Unit 9 – Linear Graphs	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • <i>Review: Plot a line graph of the form $y=mx+c$, including using a table of values</i> • Decide whether a point would lie on a line with given equation • Plot a line graph which is defined implicitly e.g. $3x+4y=12$ • Find an approximate solution to a linear equation using a graph • Find the equation of the line through a given point with given gradient • Find the equation of the line through a given point, which is parallel to another line, specified by its equation • Understand and use the gradients of perpendicular lines • Find the equation of the line through a given point, which is perpendicular to another line, specified by its equation 	<p>Recognise, sketch and interpret graphs of linear functions</p> <p>Use the form $y = mx + c$ to identify parallel lines</p> <p>Find the equation of the line through two given points, or through one point with a given gradient</p> <p>Use the form $y = mx + c$ to identify perpendicular lines</p> <p>A8 work with co-ordinates in all four quadrants</p> <p>A9 plot graphs of equations that correspond to straight-line graphs</p> <p>A9 use the form $y = mx + c$ to identify parallel lines</p> <p>A10 identify gradients and intercepts of linear functions algebraically</p> <p>A9 find the equation of the line through two given points or through one point with a given gradient</p> <p>A9 use the form $y = mx + c$ to identify perpendicular lines</p>
Mathematics – Unit 10 – Inequalities	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • <i>Identify an inequality represented on a number line</i> • <i>Draw a number line to represent a given inequality</i> • Solve a linear inequality with a negative term in the unknown on one side • Solve a linear inequality with the unknown on both sides, including where one of both terms in the unknown are negative • Identify possible integer solutions • Solve a simple 3-part inequality • Identify the set of integer solutions • Review: Represent the solution of a single inequality using a shaded region on a graph • Identify a single inequality represented on a graph • Represent the solution of a set of inequalities using a shaded region on a graph • Identify the set of inequalities satisfied by a given shaded region on a graph 	<p>Solve linear inequalities in one variable; represent the solution set on a number line</p> <p>Solve linear inequalities in two variables, represent the solution set on a graph</p> <p>N1 use the symbols $=, \neq, <, >, \leq, \geq$</p> <p>A3 understand and use the concepts and vocabulary of inequalities</p> <p>A22 solve linear inequalities in one variable; represent the solution set on a number line</p> <p>A22 solve linear inequalities in two variables; represent the solution set on a number line, using set notation and on a graph</p>

Mathematics – Unit 11 – Statistics 1	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Criticise a data collection method • Find a small set of data values that produce a combination of given statistics (mean, median, mode, range) • Review: Understand why the median is often a more reliable measure of average than the mean • Review: Calculate the mean and total from an ungrouped frequency table • Review: Estimate the mean and total from a grouped frequency table, appreciating why this is only an estimate • Identify the mode from an ungrouped frequency table • Identify the modal class from a grouped frequency table • Identify the range from an ungrouped frequency table • Estimate the range from a grouped frequency table • Construct/interpret frequency polygons • Identify misleading diagrams • Construct stem and leaf diagrams • Interpret stem and leaf diagrams, including identifying the mode, median and range 	<p>Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (including modal class) and spread (the range), and appropriate graphical representation involving discrete, continuous and grouped data</p> <p>Interpret and construct tables and line graphs for time series data</p> <p>Apply statistics to describe a population</p> <p>Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling</p> <p>S4 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)</p> <p>S5 apply statistics to describe a population</p> <p>S2 interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical</p> <p>line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use</p> <p>S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data</p>

Mathematics – Unit 12 – Formulae & Functions	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Review: find numerical and algebraic outputs using function notation • Find/use the inverse of a given function • Find inputs, outputs and inverses for composite functions • Create a formula to describe a given situation • Change the subject of formulas involving 3+ steps, small powers, and small roots • Change the subject of a formula when the subject appears twice 	<p>Interpret simple expressions as functions with inputs and outputs</p> <p>Interpret the reverse process of a function as the 'inverse function' and the succession of two functions as a 'composite function'</p> <p>A2 substitute numerical values into formulae, including scientific formulae</p> <p>A3 understand and use the concepts and vocabulary of formulae and terms</p> <p>A5 rearrange formulae to change the subject</p> <p>A7 interpret simple expressions as functions with inputs and outputs</p> <p>A7 interpret the reverse process [of a function] as the 'inverse function' and the succession of two functions as a 'composite function' (the use of formal notation is expected)</p>
Mathematics – Unit 13 – Basic Trigonometry	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Review: Use Pythagoras' theorem to calculate missing sides in a right-angled triangle, including in context • Review: Use Pythagoras' theorem to determine whether a given triangle is right-angled • Use Pythagoras' theorem in 3D problems involving cuboids and other solids • Use sin, cos, tan to find a missing side in a right-angled triangle <ul style="list-style-type: none"> - Label the sides of a right-angled triangle 'hypotenuse', 'adjacent' and 'opposite' - Understand sin, cos & tan as functions of angles that give ratios of pairs of sides - Use a calculator to find the sine/cosine/tangent of angles - Choose an appropriate trig. ratio for a given situation - Set up and solve a trig. equation to find a missing side - Set up and solve when the unknown is in a denominator • Use sin, cos, tan to find a missing angle in right-angled triangle • Solve a variety of problems involving right-angled triangles, including in context 	<p>Apply Pythagoras' Theorem to find lengths in right-angled triangles in 2D and 3D</p> <p>Apply trigonometric ratios to find angles and lengths in right-angled triangles in 2D</p> <p>Link trigonometric ratios to similar triangles</p> <p>G6 apply angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' theorem, and use known results to obtain simple proofs</p> <p>G20 know the formula for Pythagoras' theorem and apply it to find lengths in right-angled triangles in two-dimensional figures</p> <p>R12 compare lengths using ratio notation; make links to similarity (including trigonometric ratios)</p> <p>G20 know the formulae for the trigonometric ratios; apply them to find angles and lengths in right-angled triangles in two-dimensional figures</p>

Mathematics – Unit 14 – Number	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Use a calculator to evaluate complex calculations involving integers, decimals and trigonometric functions • Review: Use prime factor form to identify the LCM and HCF of larger numbers • Solve context problems involving HCF and LCM • Review: Divide by a decimal by transforming to division by an integer • Review: Estimate when dividing by a decimal • Estimate with powers and roots, including in context • Decide whether an estimate is an over-estimate or under-estimate in situations where the values were all rounded up, or all rounded down • Review: Identify the upper bound and lower bound for a rounded number • Review: Write an error interval for a rounded number • Solve problems involving bounds, where up to two numbers have been rounded • Truncate a decimal number to a given number of decimal places • Write an error interval for a truncated number 	<p>Estimate powers and roots of any given positive number</p> <p>Apply and interpret limits of accuracy when rounding or truncating (including upper and lower bounds)</p> <p>N2 apply the four operations, including formal written methods, to integers, decimals, simple fractions (proper and improper), and mixed numbers – all both positive and negative</p> <p>N10 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 or $\frac{3}{8}$)</p> <p>N14 estimate answers; check calculations using approximation and estimation, including answers obtained using technology</p> <p>N6 estimate powers and roots of any given positive number</p> <p>N15 use inequality notation to specify simple error intervals due to truncation or rounding</p> <p>N16 apply and interpret limits of accuracy</p> <p>N16 apply and interpret upper and lower bounds</p>
Mathematics – Unit 15 – Non-linear Graphs	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Plot the graph of a more complex quadratic function, using a table of values • Appreciate the general shape of a quadratic graph • Review: Identify/estimate the roots and turning point of a quadratic function from its graph • Find approximate solutions to a quadratic equation using a graph • Plot the graph of a simple cubic function, using a table of values • Appreciate the general shape of a cubic graph, and know the specific graphs of $y = x^3$ and $y = -x^3$ • Plot the graph of a simple reciprocal function using a table of values ($y = k/x$, where k is a positive integer) • Plot/interpret the graph of a non-standard function 	<p>Recognise, sketch and interpret graphs of quadratic functions, simple cubic functions and the reciprocal function $y = 1/x$</p> <p>Identify and interpret roots, intercepts and turning points of quadratic functions graphically</p> <p>Find approximate solutions to a quadratic equation using a graph</p> <p>Plot and interpret graphs of non-standard functions in real contexts</p> <p>A12 recognise, sketch and interpret graphs of quadratic functions, simple cubic functions, and the reciprocal function $y = 1/x$</p> <p>A11 identify and interpret roots, intercepts, turning points of quadratic functions graphically</p> <p>A18 find approximate solutions to quadratic equations using a graph</p> <p>A14 plot and interpret graphs of non-standard functions in real contexts</p>

Mathematics – Unit 16 – Compound Units	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • <i>(Applied to the compound units below)</i> Analyse the effect of a change in a value • Review: Solve simple problems involving speed, distance and time • Solve simple problems involving speed where the units of distance or time need to be changed beforehand • Review: Plot/complete a distance-time graph, including interpreting the gradient as speed • Review: Solve simple problems involving density • Solve problems involving density where the units of mass need to be changed beforehand • Solve problems involving density where the volume needs to be calculated 	<p>Plot and interpret graphs in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration</p> <p>Interpret the gradient of a straight line graph as a rate of change</p> <p>Interpret the gradient of a graph, or area under a graph, in cases such as distance-time graphs</p> <p>A10 identify and interpret gradients and intercepts of linear functions graphically</p> <p>A14 plot and interpret graphs in real contexts to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration</p> <p>R14 interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion</p> <p>N13 use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate</p>
Mathematics – Unit 17 – Proportion	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Solve simple problems in context involving direct proportion • Review: Solve problems involving rates of pay • Solve problems involving population density • Solve problems involving other rates and rates of change • Review: Identify graphs and tables that represent a direct proportion relationship • Know the features of expressions and formulas that represent a direct proportion relationship • Construct and use simple formulas involving direct proportion • Construct and use more complex formulae involving direct proportion • Solve simple problems in context involving inverse proportion • Construct and use simple formulas involving inverse proportion • Construct and use more complex formulas involving inverse proportion • Know the features of graphs, tables, expressions and formulas that represent an inverse proportion relationship 	<p>Recognise graphs that illustrate direct and inverse proportion</p> <p>Construct and interpret equations and graphs that describe direct and inverse proportion</p> <p>Understand that X is inversely proportional to Y is equivalent to X is proportional to $1/Y$</p> <p>R6 express a multiplicative relationship between quantities as a ratio or a fraction</p> <p>R10 solve problems involving direct and inverse proportion, including graphical and algebraic representations</p> <p>R14 recognise and interpret graphs that illustrate direct and inverse proportion</p> <p>R13 understand that X is inversely proportional to Y is equivalent to X is proportional to $1/Y$; interpret equations that describe direct and inverse proportion</p> <p>R13 construct equations that describe direct and inverse proportion</p>

Mathematics – Unit 18 – Percentage	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Compare two quantities using percentages • Review: Identify the percentage of a change, profit or loss • Review: Find the result of a repeated percentage change, using a calculator and multiplier • Review: Solve problems involving simple and compound interest • Solve original value problems involving repeated percentage change 	<p>Set up, solve and interpret the answers in growth and decay problems, including compound interest</p> <p>R9 define percentage as ‘number of parts per hundred’</p> <p>R9 interpret percentages as a fraction or a decimal and interpret these multiplicatively</p> <p>R9 compare two quantities using percentages</p> <p>R9 express one quantity as a percentage of another</p> <p>R9 interpret percentage changes as a fraction or a decimal, and interpret these multiplicatively; work with percentages greater than 100%; solve problems involving percentage change, including percentage increase/decrease</p> <p>N12 Interpret percentages as operators</p> <p>R9 solve problems involving percentage change, including original value problems, and simple interest including in financial mathematics</p> <p>R16 set up, solve and interpret the answers in growth and decay problems, including compound interest</p>
Mathematics – Unit 19 – Advanced Trigonometry	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Use the Sine Rule to find missing sides in non-right-angled triangles • Use the Sine Rule to find missing angles in non-right-angled triangles • Use the Cosine Rule to find missing sides in non-right-angled triangles • Use the Cosine Rule to find missing angles in non-right-angled triangles • Solve a variety of problems involving non-right-angled triangles 	<p>Know and apply the sine rule and cosine rule to find unknown lengths and angles</p> <p>G22 know and apply the sine rule and cosine rule to find unknown lengths and angles</p>

Mathematics – Unit 20 – Statistics 2	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Use a sample to infer properties of a population, using proportional reasoning • Identify the quartiles and IQR for a set of simple data • Understand why the IQR is generally a more reliable measure of spread than the range • Construct box plots for sets of simple data • Interpret box plots and use them to compare two sets of data • Complete a cumulative frequency table • Construct cumulative frequency graphs • Use a cumulative frequency graph to identify a missing interval or frequency in a table • Interpret cumulative frequency graphs • Construct box plots using cumulative frequency graphs 	<p>Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling</p> <p>Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (including modal class) and spread (the range)</p> <p>Apply statistics to describe a population</p> <p>Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling</p> <p>Interpret and analyse the distributions of data sets from univariate empirical distributions using box plots, quartiles and inter-quartile range</p> <p>Construct and interpret diagrams for grouped discrete data and continuous data, including cumulative frequency graphs, and know their appropriate use</p> <p>S4 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)</p> <p>S5 apply statistics to describe a population</p> <p>S1 infer properties of populations or distributions from a sample, while knowing the limitations of sampling</p> <p>S3 construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use</p> <p>S4 interpret, analyse and compare the distributions of data sets from univariate empirical distributions using quartiles and the inter-quartile range, and box plots</p>

Mathematics – Unit 21 – Sequences & Proof	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Use algebra in proofs involving odd and even numbers • Use algebra in sequences, including Fibonacci-type sequences • Explore Fibonacci-type sequences involving surds • Review: identify the nth term of an increasing linear sequence • Identify the nth term of a decreasing linear sequence • Identify the nth term of a quadratic sequence • Decide whether a given sequence is arithmetic, geometric, Fibonacci-type or quadratic 	<p>Recognise and use simple arithmetic progressions, quadratic sequences and Fibonacci-type sequences</p> <p>Deduce expressions to calculate the nth term of linear sequences and quadratic sequences</p> <p>Use algebra to support and construct arguments and proofs</p> <p>A24 recognise and use simple arithmetic progressions, Fibonacci-type sequences and quadratic sequences</p> <p>A25 deduce expressions to calculate the nth term of linear sequences and quadratic sequences</p> <p>A6 use algebra to support and construct arguments and proofs</p>
Mathematics – Unit 22 – Vectors	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Understand vector and scalar quantities • Identify/represent column vectors on a grid • Add column vectors, understanding this as a resultant of two vectors, including represented on a grid • Subtract column vectors • Multiply a column vector by a scalar • Identify vectors in a diagram (e.g. in terms of a and b), including where a midpoint is involved 	<p>Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors</p> <p>G25 apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors</p>

Mathematics – Unit 23 – Probability	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue)
<ul style="list-style-type: none"> • Use a theoretical probability to identify a total • Find a missing probability in a table of numerical probabilities • Solve algebraic problems involving tables of probabilities • Review: Construct/complete a probability tree diagram for two events • Review: Use a probability tree diagram to calculate probabilities • Use a probability tree diagram in non-standard situations • Know and apply the addition law of probability ('OR') • Know and apply the multiplication law of probability ('AND') 	<p>Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one</p> <p>Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions</p> <p>P4 apply the property that the probabilities of an exhaustive set of outcomes or mutually exclusive events sum to one</p> <p>P8 calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions</p>