

Year 10 Foundation: Curriculum Implementation Plan

Mathematics – Year 10 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.	<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 	Whole-class assessments towards the end of each term, based on work completed during the year to date.	Please see individual units below.

Mathematics – Unit 1 – Brackets	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> Expand and simplify a ‘double’ bracket e.g. $(x + 5)(x - 4)$ or $(2k + 1)(4k + 5)$ Expand a ‘perfect square’ such as the expression e.g. $(2x + 3)^2$ or $(x - 2y)^2$ Expand when more than two terms appear in a bracket e.g. $(x + 3)(x^2 + 3x - 5)$ Continue to use brackets in simple contexts e.g. expression for the area of a rectangle Factorise a quadratic expression of the form $x^2 + bx + c$ Factorise a difference of two squares of the form $x^2 - c$ 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Expand product of two binomials Factorise quadratic expressions of the form x^2+bx+c Simplify and manipulate algebraic expressions by factorising quadratic expressions of the form x^2+bx+c, including a difference of two squares
Mathematics – Unit 2 – Number	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> Evaluate more complex expressions and solve problems using positive and negative integer powers, and roots e.g. evaluate $5^{-2} + 4^2 + \sqrt[3]{8}$ Use a calculator to evaluate numerical expressions involving powers and roots Work with numbers in standard form, applying this in context in GCSE-standard questions: converting to/from standard form, multiply/divide without a calculator (REVISION) Solve problems where numbers are given in prime factor form Use the FACT function on a scientific calculator (REVISION) 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Calculate with negative integer powers Use negative integer indices to represent reciprocals Calculate with roots Calculate with square roots, and with integer indices Calculate with roots Calculate with numbers in standard form
Mathematics – Unit 3 – Loci	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> Use ruler and compasses to bisect an angle (REVISION) Construct the perpendicular bisector of a line segment (REVISION) Construct a perpendicular at a point on a line Construct a perpendicular to a line from a point not on the line Use construction to identify the shortest distance from a point to a line Construct the locus of points a fixed distance from a point, and from a line Construct the locus of points equidistant from two lines, and from two points Use ruler and compasses to construct a triangle with three given sides (SSS) (REVISION) Use ruler and compasses to construct an angle of 60° or 30° Choose techniques to construct 2D shapes; e.g. a rhombus 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Construct the perpendicular bisector and midpoint of a line segment Construct the bisector of an angle formed from two lines 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’

Mathematics – Unit 4 – Equations 1	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Solve linear equations with the unknown on both sides, including with brackets, and where the unknown term is negative (REVISION) • Form and solve linear equations of all types to solve increasingly complex problems • Use a graph to find the approximate solution of a linear equation • Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation • Find the solution to a complex equation, to a required degree of accuracy, using ‘trial and improvement’ 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Solve linear equations in one unknown algebraically Set up and solve linear equations in mathematical and non-mathematical contexts, including those with the unknown on both sides of the equation Interpret solutions to equations in context Use a graph to find the approximate solution of a linear equation
Mathematics – Unit 5 – Proportion	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Understand a relationship between two quantities which are in direct proportion • Know the features of graphs, tables and formulae that represent a direct proportion • Construct and use simple formulae describing direct proportion e.g. $a = kb$ • Understand the relationship between two quantities that are inversely proportional • Know that ‘y is inversely proportional to x’ is equivalent to $y \propto 1/x$ • Know the features of graphs, tables and expressions that represent an inverse proportion • Construct and use simple formulae describing inverse proportion e.g. $a = \frac{k}{b}$ • Divide in a ratio and solve problems where one part is given or the difference is given (REVISION) • Solve more complex ratio problems e.g. comparison, mixing, concentrations • Solve problems combining understanding of fractions and ratio 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Recognise and interpret graphs that illustrate direct and inverse proportion 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 Interpret and use fractional scale factors for enlargements Recognise and interpret graphs that illustrate direct and inverse proportion Solve more formal problems involving quantities in inverse proportion Recognise that if $y=k/x$ then y is inversely proportional to x

Mathematics – Unit 6 – Formulae & Functions	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Distinguish situations that can be modelled by an expression or a formula • Create an expression or a formula to describe a situation • Change the subject of a formula involving 2 or more steps, including reciprocals • Find numerical and algebraic outputs from functions defined using a function machine, expression or equation • Identify missing operation(s) in a 1 or 2-step function machine 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Formulate simple formulae and expressions from real-world contexts Rearrange formulae to change the subject, where the subject appears once only Interpret simple expressions as functions with inputs and outputs Interpret, where appropriate, simple expressions as functions with inputs and outputs
Mathematics – Unit 7 – Approximation	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Estimate the answer to calculation involving dividing by a decimal between 0 and 1 (e.g. 0.43) • Understand the equivalence of $0.\dot{9}$ and 1 • Understand that this extends to other recurring decimals e.g. $0.24\dot{9}$ and 0.25 • Identify the minimum and maximum possible values of an integer quantity that has been rounded (e.g. number of people, number of items) • Identify the upper and lower bounds (minimum and maximum values) of a continuous quantity that has been rounded to the nearest integer, 10, 100, 5, 20 etc. • Identify the upper and lower bounds of a continuous quantity that has been rounded to a specific number of decimal places or significant figures. • Write an error interval for a discrete/continuous rounded quantity, using an inequality • Solve simple problems involving one rounded quantity • Truncate a decimal number to a given number of decimal places • Understand the difference between truncating and rounding • Write an error interval for a value that has been truncated 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Round numbers to a given number of decimal places or significant figures Round answers to an appropriate level of accuracy Estimate or check, without a calculator, the result of more complex calculations including roots Use the symbol \approx appropriately Use inequality notation to write down an error interval for a number or measurement rounded or truncated to a given degree of accuracy Apply and interpret limits of accuracy Apply and interpret limits of accuracy when rounding or truncating

Mathematics – Unit 8 – Graphs 1	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
<ul style="list-style-type: none"> • Extend identifying gradients, parallel lines, and y-intercepts algebraically to equations which have to be rearranged first into the form $y=mx+c$ • Use a line equation to decide whether a given point would lie on the line (REVISION) • Identify the gradient, y-intercept and equation of a straight line from its graph (REVISION) • Find the equation of a line through one point with given gradient, or parallel to another line • Find the gradient of the line segment joining two given points • Find the equation of a line through two given points • Interpret the gradient of a straight line graph as a rate of change in context • Interpret the y-axis intercept of a straight line graph in context • Plot graphs of more complex quadratic functions e.g. $y=x^2 - 5x+2$ • Sketch quadratic functions of the form $y=x^2\pm c$ 	<p>Find and interpret the gradient and intercept of straight lines, graphically and using $y = mx + c$</p> <p>Construct and interpret graphs in real-world contexts e.g. distance-time, money conversion, temperature conversion</p> <p>Recognise and sketch the graphs of simple linear and quadratic functions e.g. $x = 1$, $y = 2x$</p> <p>Use the form $y=mx+c$ to find and sketch equations of straight lines e.g. $y = -2x + 5$</p> <p>Interpret straight line gradients as rates of change e.g. gradient of a distance-time graph as a velocity</p> <p>Use the form $y = mx + c$ to identify parallel lines</p> <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>Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, and the reciprocal function $y = 1/x$</p> <p>Find the equation of the line through two given points, or through one point with a given gradient</p> <p>Interpret the gradient of a straight line graph as a rate of change</p> <p>Plot and interpret graphs to find approximate solutions to problems</p> <p>Find the equation of a line through two given points, or through one point with a given gradient</p> <p>Identify and find equations of parallel lines</p> <p>Recognise and sketch the graphs of simple quadratic functions e.g. $y = x^2 - 9$</p>

Mathematics – Unit 9 – Geometry 1	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
<ul style="list-style-type: none"> • Solve problems involving the area and circumference of circles, including in terms of π (REVISION) • Know circle definitions, including: tangent, arc, sector, segment, chord (REVISION) • Solve problems involving the arc length or perimeter of a sector, including in terms of π • Solve problems involving the area of a sector, including in terms of π • Calculate the angle/radius of a sector using the arc length or area • Know/use Pythagoras' theorem to calculate any side or an angle in a right-angled triangle • Know the meaning of a Pythagorean triple • Use Pythagoras' theorem to determine whether a given triangle is right-angled • Solve a range of 2D problems using Pythagoras' theorem 	<p>Know and apply the formula $A=\pi r^2$ to calculate the area of a circle</p> <p>Apply area formulae in calculations involving the area of composite 2D shapes</p> <p>Calculate exactly with multiples of π</p> <p>Recall and use formulae for the circumference and area of a circle</p> <p>Calculate arc lengths, angles and areas of sectors of circles</p> <p>Use multiples of π in exact calculations without a calculator</p> <p>Calculate the area of a sector of a circle given its angle and radius</p> <p>Calculate the arc length of a sector of a circle given its angle and radius</p> <p>Identify and apply circle definitions and properties, including: chord, tangent, arc, sector, segment</p> <p>Apply Pythagoras' Theorem in right-angled triangles in 2D</p> <p>Recall and use Pythagoras' theorem</p> <p>Know, derive and apply Pythagoras' theorem to find lengths in right-angled triangles in 2D figures</p>
Mathematics – Unit 10 – Inequalities	
Knowledge and Skills – Students will be taught to...	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
<ul style="list-style-type: none"> • Solve a 1-step/2-step linear inequality with positive x term and brackets, including with non-integer solutions, and representing solutions on number lines (REVISION) • Solve a simple three-part inequality with positive x term (REVISION) • Understand the situations in which an inequality is reversed • Solve linear inequalities with negative terms of the unknown e.g. $20-3x<8$ • Solve a linear inequality with the unknown on both sides • Solve problems by constructing and solving linear inequalities in one variable 	<p>Solve linear inequalities in one variable, representing the solution set on a number line</p> <p>Understand and use the symbols $<$, \leq, $>$ and \geq</p> <p>Solve linear inequalities in one variable, expressing solutions on a number line using the conventional notation</p>

Mathematics – Unit 11 – Probability	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Know and use the addition law of probability ('OR') • Understand that the addition law only applies to mutually exclusive events • Know and use the multiplication law of probability ('AND') • Understand that the multiplication law only applies to independent events • Draw a tree diagram to show the outcomes of two or three combined events • Label tree diagrams with probabilities for independent/dependent events • Use a probability tree diagram to solve a range of problems involving dependent and independent combined events 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <p>Use tables and grids to list the outcomes of single events and simple combinations of events, and to calculate theoretical probabilities e.g. Flipping two coins, finding the number of orders in which the letters E, F and G can be written</p> <p>Calculate probabilities, expressed as fractions or decimals, in simple experiments with equally likely outcomes e.g. flipping coins, rolling dice</p> <p>Use frequency tree diagrams and other representations to calculate the probability of independent and dependent combined events</p> <p>Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions</p>
Mathematics – Unit 12 – Equations 2	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Understand that there are an infinite number of solutions to the equation $ax + by = c$ ($a \neq 0$, $b \neq 0$), including by considering its graphical representation • Find approximate solutions to simultaneous equations using a graph • Solve two linear simultaneous equations in two variables by:- <ul style="list-style-type: none"> - adding/subtracting (no multiplication needed) - multiplying one equation before adding or subtracting - multiplying both equations before adding or subtracting • Solve problems by deriving two simultaneous equations, and interpret the solution 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <p>Solve two linear simultaneous equations</p> <p>Set up and solve two linear simultaneous equations in two variables algebraically</p>
Mathematics – Unit 13 – Compound Units	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Analyse the effect of a change in a value in a situation involving compound units • Solve more complex problems involving speed • Convert between units of speed • Solve simple problems involving density, including where the mass needs changing first to obtain specific units in the answer • Know and understand units for density e.g. kg/m^3 • Solve simple problems involving pressure • Know and understand units for pressure e.g. N/m^2 or Pascals (Pa) • Solve problems involving rates of pay, population density and unit pricing • Solve problems involving other rates of change 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <p>Use and convert simple compound units (e.g. for speed, rates of pay, unit pricing)</p> <p>Know and apply in simple cases: $\text{speed} = \text{dist} \div \text{time}$</p> <p>Use and convert compound units in algebraic contexts</p> <p>Use and convert standard units in algebraic contexts</p> <p>Know and apply: $\text{density} = \text{mass} \div \text{volume}$</p> <p>Use and convert other compound units (e.g. density, pressure)</p> <p>Convert between related compound units (speed, rates of pay, prices, density, pressure) in numerical contexts</p> <p>Convert between related compound units in numerical algebraic contexts</p>

Mathematics – Unit 14 – Growth	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Find the result of a percentage change using a multiplier and calculator (REVISION) • Find the percentage of a given increase, decrease, profit or loss (REVISION) • Find the original amount before a percentage change (REVISION) • Calculate the result of a repeated percentage change • Calculate the final value of an investment involving compound interest • Calculate the final value of an investment involving simple interest • Solve a range of problems involving repeated percentage change, including comparing investments earning simple interest with those earning compound interest • Solve problems involving finding the result of a single fractional increase or decrease (REVISION) • Solve problems involving repeated fractional increase or decrease • Calculate the original quantity, given the result of a fractional increase or decrease 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Calculate simple interest, including in financial contexts Solve problems step-by-step involving multipliers over a given interval, for example compound interest, depreciation, etc. Set up, solve and interpret the answers in growth and decay problems, including compound interest Calculate exactly with fractions Calculate with fractions greater than 1 Use fractions in exact calculations without a calculator Carry out more complex calculations, including the use of improper fractions
Mathematics – Unit 15 – Graphs 2	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Recognise that the gradient of a curve is not constant • Estimate the gradient of a quadratic or other curve at a particular point, using a tangent • Recognise, plot and sketch graphs of simple cubic functions • Interpret the graphs of simple cubic functions • Use a cubic graph to estimate y for given x, and vice versa • Recognise, plot and sketch graphs of $y=1/x$ and other simple reciprocal functions • Interpret the graphs of simple reciprocal functions • Use a reciprocal graph to estimate y for given x, and vice versa • Plot and interpret graphs of non-standard functions in real contexts 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, and the reciprocal function $y = \frac{1}{x}$ Interpret the gradient of a straight line graph as a rate of change Plot and interpret graphs, including reciprocal graphs and graphs to non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration Recognise and sketch graphs of $y = x^3$ and $y = 1/x$

Mathematics – Unit 16 – Geometry 2	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Solve more complex geometrical problems involving using similarity to calculate missing lengths • Finding missing lengths in similar shapes when the scale factor is given as a ratio • Enlarge a 2D shape using a fractional scale factor and a centre of enlargement • Identify the scale factor and centre of an enlargement with a fractional scale factor • Understand the implications of enlargement on area and volume • Move freely between scale factors for length, area and volume • Solve practical problems involving length, area and volume in similar figures • Calculate the volume of a cylinder, including in terms of π • Calculate the surface area of a cylinder, including in terms of π • Solve practical problems involving the volume and surface area of solids 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Compare lengths using ratio notation and/or scale factors; make links to similarity Apply the concepts of congruence and similarity, including the relationship between lengths in similar figures Make links between similarity and scale factors or ratios Identify similar triangles Compare lengths using ratio notation and scale factors Apply similarity to calculate unknown lengths in similar figures Identify the centre and scale factor (including fractional scale factors) of an enlargement of a simple shape, and perform such an enlargement on a simple shape
Mathematics – Unit 17 – Sequences	
Knowledge and Skills – Students will be taught to... <ul style="list-style-type: none"> • Find the nth term of an ascending or descending linear sequence (REVISION) • Solve problems involving Fibonacci-type sequences, including finding next terms and missing terms within the sequence (REVISION) • Use a Fibonacci-type sequence with algebraic terms e.g. a, b, \dots • Generate terms of a quadratic sequence from a more complex position to term rule e.g. $3n^2 - 2n$ • Find the <u>next terms</u> of a quadratic sequence using first and second differences • Recognise/describe a simple geometric sequence, finding missing terms at the start, middle or end of the sequence (REVISION) 	Links to KS4 National Curriculum (red) & Exam board specification (blue/black) <ul style="list-style-type: none"> Generate a sequence from a formula for the nth term Find a position-to-term rule for simple arithmetic sequences, algebraically or in words e.g. $2n, n + 5$ Find a formula for the nth term of an arithmetic sequence Deduce expressions to calculate the nth term of linear sequences Recognise and use Fibonacci type sequences and quadratic sequences Recognise Fibonacci and quadratic sequences

Mathematics – Unit 18 – Data	
Knowledge and Skills – Students will be taught to..	Links to KS4 National Curriculum (red) & Exam board specification (blue/black)
<ul style="list-style-type: none"> • Continue to use charts to identify probabilities, analyse and compare data including data given in more than one form • Plot points on a scatter diagram, identifying correlation, and interpreting the relationship shown (REVISION) • Construct a line of best fit and using it to make estimates (REVISION) • Identify outliers, and distinguish these from anomalies (REVISION) • Understand the lack of reliability of making predictions outside the range of the original data (extrapolating) • Understand that correlation does not necessarily indicate causation • Find the mean, median, modal class and range from a grouped table (REVISION) • Appreciate the limitations of different statistics: mean, median, mode, range, including statistics estimated from grouped data 	<p>Plot and interpret scatter diagrams for bivariate data; recognise correlation</p> <p>Identify an outlier in simple cases e.g. from a list of data</p> <p>Interpret correlation within the context of the variables</p> <p>Draw a line of best fit by eye, and use it to make predictions</p> <p>Interpolate and extrapolate from data, and be aware of the limitations of these techniques</p> <p>Appreciate there may be errors in data from values (outliers) that do not 'fit'</p> <p>Recognise outliers on a scatter graph</p> <p>Use and interpret scatter graphs of bivariate data</p> <p>Recognise correlation and know that it does not indicate causation</p> <p>Draw estimated lines of best fit on a scatter graph and use them to make predictions</p>