

Subject : Maths Higher

Year Group:

Scheme title	Half term 1 - June	Half term 2 - September	Half term 3 - November
Purpose of scheme	To develop fluency, problem solving and reasoning skills across the 6 key areas of number, algebra, geometry and measures, statistics, probability and ratio and proportion	To develop fluency, problem solving and reasoning skills across the 6 key areas of number, algebra, geometry and measures, statistics, probability and ratio and proportion	To develop fluency, problem solving and reasoning skills across the 6 key areas of number, algebra, geometry and measures, statistics, probability and ratio and proportion
Skills	<p>Statistics – Statistical Measures</p> <ul style="list-style-type: none"> Find the mean for grouped data Find the median class for grouped data Find the upper and lower quartiles and calculate inter-quartile range for a frequency distribution <p>Number - Indices and Standard Form</p> <ul style="list-style-type: none"> Use index notation and index laws for negative powers Use index notation and index laws for fractional powers such as $16^{1/2}$ and 160.5 Use index notation and index laws for fractional powers such as $8^{2/3}$ and $8^{-2/3}$ Estimate powers and roots of any given positive number. Convert between ordinary and standard index form numbers Use standard index form for calculations involving multiplication and/or division The product rule for counting <p>Geometry and Measure - Trigonometry 1</p> <ul style="list-style-type: none"> Use sine, cosine and tangent to calculate a side in a right angled triangle Use sine, cosine and tangent to calculate an angle in a right angled triangle Use trigonometry to solve problems, including those involving bearings Know exact values of sin/cos/tan at the key angles <p>Geometry and Measure - Angles and Area</p> <ul style="list-style-type: none"> Recognise corresponding, alternate and interior angles on parallel lines Understand and use three-figure bearings Find the area of a triangle, trapezium and parallelogram Calculate exterior and interior angles. <hr/> <ul style="list-style-type: none"> Find the area and perimeter of shapes made from triangles and rectangles Calculate the circumference and area of a circle Work out the perimeter and area of compound shapes made from parts of a circle Geometric proof – understand and construct geometric proof using formal arguments (Further Maths Level 2 ONLY) 	<p>Algebra - Iteration</p> <ul style="list-style-type: none"> Set up, solve and interpret answers in growth and decay problems, including compound interest. Find approximate solutions to equations numerically using iteration <p>Number - Surds</p> <ul style="list-style-type: none"> Rationalise the denominator of a surd Simplify surds, such as write $(3 - \sqrt{5})^2$ in the form $a + b\sqrt{c}$ <p>Geometric sequences where the common ratio is a surd</p> <p>Number - Percentages</p> <ul style="list-style-type: none"> Work out percentage increase or decrease Use multipliers to solve repeated percentage changes and exponential growth Work out the values and draw graphs in situations involving exponential growth. <p>Ratio, proportion and rates of change - Ratio</p> <ul style="list-style-type: none"> Solve direct and indirect proportion problems Interpret graphs showing direct and indirect proportion problems Explain the relationship between two quantities as a fraction and a ratio(*) Write a ratio as a linear fraction <p>Set up, solve and interpret growth and decay problems</p> <p>Geometry and Measure - Area and Volume</p> <ul style="list-style-type: none"> Convert between square units such as changing 2.6 m^2 to cm^2 Convert between cube units such as changing 3.7 m^3 to cm^3 Find the volume of prisms including cylinders Find the surface area of simple prisms Solve problems involving surface areas and volumes of pyramids, cones and spheres Solve problems involving complex shapes and solids, including segments of circles and frustums of cones <p>Algebra - Linear Graphs</p> <ul style="list-style-type: none"> Draw the graph of a line, such as $y = 3x - 5$, without being given a table of values Solve problems such as finding where the line $y = 3x - 5$ crosses the line $y = 4$ Find the gradients of straight-line graphs Find the midpoint of a line segment such as the line from A (1,5) to B(3,7) Find the gradient and equation of a line through two points such as (0,3) and (5,13) Find the equation of parallel lines, such as $y = 3x - 5$, passing through a given point Find the equation of a line through 2 points or through 1 point with a given gradient Use $y = mx + c$ to identify perpendicular lines <p>Calculus (Further Maths Level 2 ONLY)</p> <ul style="list-style-type: none"> Know that the gradient function dy/dx gives the gradient of the curve and measures the rate of change of y with respect to x Know that the gradient of a function is the gradient of the tangent at that point. Differentiation of kx^n where n is an integer and the sum of such functions The equation of a tangent and normal at any point on a curve Increasing and decreasing functions Understand the second differential Use of differentiation to find maxima and minima points on a curve Using calculus to find maxima and minima in simple problems Sketch/interpret a curve with known maximum and minimum points <p>Statistics - Data</p> <ul style="list-style-type: none"> Construct a frequency polygon Construct and interpret a cumulative frequency diagram for continuous or grouped data Construct a scatter graph and use the line of best fit to predict values Use sampling methods including random and stratified sampling Use a cumulative frequency diagram to estimate median and inter-quartile range Construct and interpret a box plot Construct a histogram with unequal class intervals Interpret a histogram with unequal class intervals Consider outliers when calculating the range of a distribution 	<p>Geometry and Measure - Properties of Circles</p> <ul style="list-style-type: none"> Calculate the lengths of arcs of circles Calculate the areas of sectors of circles Know the angle and tangent properties of a circle Understand the alternate segment theorem Prove the circle theorems Equation of circle centred at origin Find the equation of a tangent at a point on a circle (Further Maths Level 2 ONLY) <p>Geometry and Measure - Transformations</p> <ul style="list-style-type: none"> Reflect shapes in lines such as $y = x$ and $y = -x$ Rotate shapes about any point Translate a shape by a vector such as $(4, -3)$ Enlarge a shape by a fractional scale factor/ negative scale factor <p>Matrix Transformations (Further Maths Level 2 ONLY)</p> <ul style="list-style-type: none"> Multiplication of matrices The identity matrix I Transformations of the unit square in the xy plane <p>Combination of transformations</p> <p>Geometry and Measure - Pythagoras</p> <ul style="list-style-type: none"> Use Pythagoras' theorem to find the third side of a right-angled triangle Use Pythagoras' theorem to prove that a triangle is right-angled Find the distance between two points from their coordinates Use Pythagoras' theorem in 3-D problems Use trigonometry to find sides and angles in three dimensions Recognise Pythagorean triples (Further Maths Level 2 ONLY) <p>Probability</p> <ul style="list-style-type: none"> Use probability to estimate outcomes for a population Understand and use relative frequency Understand independent and non-independent events Find the probabilities of successive independent events The product rule for possible outcomes eg. 5! Draw tree diagrams extending to conditional probability Find probabilities of successive dependent events The and/or rules of probability. <p>Algebra - Inequalities</p> <ul style="list-style-type: none"> Represent and interpret inequalities on a number line, using set notation and on a graph Solve an inequality such as $2x - 7 < 9$ and $3x + 2 \leq 4 - x$ Find the integer solutions of an inequality such as $-8 < 2x \leq 5$ Represent linear inequalities in two variables, such as $x + y < 7$, as a region on a graph/Solve quadratic inequalities <p>Number - Fractions and Decimals</p> <ul style="list-style-type: none"> Add and subtract fractions including mixed numbers Multiply and Divide fractions including mixed numbers Change between recurring decimals and fractions Find the reciprocal of a number Round numbers to different degrees of accuracy, decimal places and significant figures Simplify fractions such as $x/3 + x/5$ and $2(x-1)/(x-1)$ Use upper and lower bounds in calculations <p>Algebra - Equations and Formulae</p> <ul style="list-style-type: none"> Solve equations such as $3x - 4 = 5 + x$ or $2(5x + 1) = 28$ Substitute numbers into formulae such as $C = (A+1)D/9$ Solve equations such as $3x - 12 = 2(2x - 5)$, $2x/3 - x/4 = 5$ or $((7-x))/3 = 2$ Solve equations such as $((2x-1))/6 + ((x+3))/3 = 5/2$ <p>Definition of a Function</p> <ul style="list-style-type: none"> Find inverse and composite functions Domain and Range of a function (Further Maths Level 2 ONLY) Binomial expansion
Key Words	<p>Multiple</p> <p>Factor</p> <p>Difference</p> <p>Venn</p> <p>Quadratic</p> <p>Fibonacci</p> <p>Geometric</p> <p>Parallelogram</p> <p>Interior</p> <p>Exterior</p> <p>Circumference</p> <p>Expand</p> <p>Simplify</p>	<p>Iteration</p> <p>Bounds</p> <p>FDP</p> <p>Denominator</p> <p>Numerator</p> <p>Surds</p> <p>Ratio</p> <p>Decay</p> <p>Growth</p> <p>Ratio</p> <p>Exponential</p> <p>Represent</p> <p>Inequality</p>	<p>Frequency Polygon</p> <p>range</p> <p>Interquartile range</p> <p>Histogram</p> <p>Outliers</p> <p>Distribution</p> <p>Sampling</p> <p>Stratified</p> <p>Circle theorem</p> <p>Alternate segment theorem</p> <p>Average</p> <p>Indices</p> <p>Standard Form</p> <p>Scale factor</p> <p>Pythagoras</p>
End Point	Students are able to understand and apply the skills identified above.	Students are able to understand and apply the skills identified above.	Students are able to understand and apply the skills identified above.
Assessment method	After each topic in bold (listed opposite), students complete a reflection grid which is marked in class then later teacher marked. This will be stuck in books to record progress and support revision. Students complete one GCSE style assessment once per term. Results are recorded centrally by teachers on a central spreadsheet. Students complete RAG analysis to identify their strengths and areas for development. Assessments are cumulative and grade boundaries reflect GCSE Maths.	After each topic in bold (listed opposite), students complete a reflection grid which is marked in class then later teacher marked. This will be stuck in books to record progress and support revision. Students complete one GCSE style assessment once per term. Results are recorded centrally by teachers on a central spreadsheet. Students complete RAG analysis to identify their strengths and areas for development. Assessments are cumulative and grade boundaries reflect GCSE Maths.	After each topic in bold (listed opposite), students complete a reflection grid which is marked in class then later teacher marked. This will be stuck in books to record progress and support revision. Students complete one GCSE style assessment once per term. Results are recorded centrally by teachers on a central spreadsheet. Students complete RAG analysis to identify their strengths and areas for development. Assessments are cumulative and grade boundaries reflect GCSE Maths.

Half term 4 - January	Half term 5 - February
To develop fluency, problem solving and reasoning skills across the 6 key areas of number, algebra, geometry and measures, statistics, probability and ratio and proportion	To develop fluency, problem solving and reasoning skills across the 6 key areas of number, algebra, geometry and measures, statistics, probability and ratio and proportion
<p>Ratio, Proportion and Rates of Change - Real Life Graphs</p> <ul style="list-style-type: none"> •Recognise from a distance-time graph when the fastest average speed takes place •Use compound measures, such as density and pressure – students need to learn the formulae, for example find density given the cross-sectional area, length and mass •Interpret areas under graphs and gradients of graphs in real-life contexts eg. Recognise that the area under a velocity-time graph represents displacement. <p>Algebra - Simultaneous Equations</p> <ul style="list-style-type: none"> •Solve a pair of simultaneous equations such as $x + 3y = 9$ and $3x - 2y = 5$ •Solve a pair of simultaneous equations such as $y = 4x + 5$ and $y = x^2$ or $xy = 8, x + y = 6$ •Algebraic solution of equations with 3 unknowns (Further Maths Level 2 ONLY) <p>Algebra - Quadratic Equations</p> <ul style="list-style-type: none"> •Use a graph to estimate x – and y – values, giving answers to an appropriate degree of accuracy •Draw graphs of harder quadratics such as $y = 2x^2 - 7x + 5$ •Factorise and expression such as $x^2 - 5x + 14$ or $x^2 - 9$ •Solve an equation such as $x^2 - 5x + 14 = 0$ •Solve problems using equations that factorise such as $3x^2 + 7x + 2 = 0$ •Solve problems using equations such as $2x^2 - 6x + 1 = 0$ by using the quadratic formula •Solve problems using equations such as $x^2 + 3x + 2 = 5$ by graphical methods •Solve problems using equations such as $3/(x-2) + 4/(x-1) = 2$ •Draw a tangent or chord to a curve and find its gradient. Link this to rates of change. (*) •Locate turning points of quadratic functions by completing the square •Find equation of a tangent to a circle at a given point, using the fact that it is perpendicular to its radius. •The factor Theorem (Further Maths Level 2 ONLY) <p>Geometry and Measure - Construction</p> <ul style="list-style-type: none"> •Construct perpendicular bisectors and angle bisectors •Match sides and angles of similar triangles •Prove two triangles are congruent •Prove construction theorems <p>Algebra - Formulae</p> <ul style="list-style-type: none"> •Rearrange formulae involving brackets, indices, fractions and square roots •Rearrange formulae where the variable appears twice •Rearrange formulae such as $v = at^2$ to make v the subject (Further Maths Level 2 ONLY) <p>Number - Prime Factors</p> <ul style="list-style-type: none"> •Find the least common multiple (LCM) of two simple numbers •Find the highest common factor (HCF) of two simple numbers •Write a number as a product of prime factors •Find the least common multiple (LCM) of two or more numbers •Find the highest common factor (HCF) of two or more numbers •Unique factorisation theorem states every integer greater than 1 is prime or can be written as the product of prime numbers. •Use Venn Diagrams <p>Algebra - Sequences</p> <ul style="list-style-type: none"> •Write the terms of a sequence or a series of diagrams given the nth term •Write the nth term of a sequence or a series of numbers •Recognise and use sequences of triangular, square and cube numbers, Fibonacci type sequences, quadratic sequences and geometric sequences.⊞ •Find quadratic nth term •Find the limiting values of sequences as n tend to infinity (Further Maths Level 2 ONLY) •Algebraic proof such as Prove $(n + 5)^2 - (n + 3)^2$ is divisible by 4 for any integer value of n (Further Maths Level 2 ONLY) 	<p>Geometry and Measure - Vectors</p> <ul style="list-style-type: none"> •Add, subtract and multiply vectors •Use addition, subtraction and multiplication of vectors to solve simple geometric problems •Understand the relationship between parallel vectors •Solve more difficult geometric problems using vectors •Use vectors to construct geometric arguments and proofs <p>Algebra - Cubic, circular and exponential functions</p> <ul style="list-style-type: none"> •Sketch and draw circular graphs such as $\sin x$ and $\cos x$ •Draw graphs of $\sin x, \cos x, \tan x$ for any angle (Further Maths Level 2 ONLY) •Use graphs to solve equations •Sketch and draw graphs of exponential functions and use them to solve equations •Understand the graphs of circular functions for angles of any size •Recognise the shapes of graphs of functions including cubic functions, reciprocal functions, circular functions and exponential functions •Sketch functions with 3 domains eg $y = \frac{1}{x}$: (Further Maths Level 2 ONLY) <p>Algebra - Transforming Functions</p> <ul style="list-style-type: none"> •Understand that $(y/a)=f(x)$ and $y=f(x/a)$ represent a one-way stretch with a scale factor a parallel to the y- and x- axis respectively of $y = f(x)$ •Understand that $y = f(x) + a$ and $y = f(x-a)$ represent translations of $y = f(x)$ <p>Geometry and Measure - Trigonometry 2</p> <ul style="list-style-type: none"> •Use the sine and cosine rules to solve 2-D problems •Calculate the area of a triangle using $\frac{1}{2}ab\sin C$ •Use the sine and cosine rules to solve 3-D problems •Know and use the identities: $\sin^2 x + \cos^2 x = 1$: (Further Maths Level 2 ONLY) •Solution of simple trig equations in given intervals, solutions are restricted to single angles: (Further Maths Level 2 ONLY) <p>Algebra - Working with Symbols</p> <ul style="list-style-type: none"> •Expand brackets in context such as $x(x + 2)$ •Factorise an expression such as $x^2 + 4x$ •Expand and simplify an expression such as $x(2x + 1) - x(2x - 3)$ •Expand and simplify two brackets in context such as $(x + 4)(x - 8)$ •Expand and simplify two brackets in context such as $(3x + 4)(2x - 8)$ •Expand and simplify triple brackets •Expand $(a+b)^n$ for positive integer n (Further Maths Level 2 ONLY) •Use the factor theorem for rational values of the variable for polynomials (Further Maths Level 2 ONLY)
<p>Velocity Displacement Speed Density Simultaneous Equations Independent Probability Relative frequency Dependent Independent Probability Quadratic Solve Radius Construction</p>	<p>Linear Parallel Perpendicular Midpoint Vector Construct Exponential Reciprocal Functions Transform Sine cosine</p>
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