SUBJECT: MATHEMATICS – Higher Pathway - Upper

Year Group	**Year 8**					
Rationale	Develop confidence and fluency with numerical and algebraic techniques and problem solving. To use a scientific calculator effectively. To develop further geometrical skills and techniques that support problem solving.					
Topic/Unit	**Autumn Term 1**	**Autumn Term 2**	**Spring Term 1**	**Spring Term 2**	**Summer Term 1**	**Summer Term 2**
Knowledge	▪ Reverse Percentages & Multipliers ▪ Index Laws & Further Factorising ▪ Quadratic Sequences	▪ Probability ▪ Polygons, Angles & Parallel Lines ▪ Indices, Roots & Order of Operations	▪ Circles ▪ Representing & Solving Inequalities ▪ Pythagoras' Theorem	▪ Ratio & Proportion ▪ Plotting & Naming Linear Graphs ▪ Quadratic & Cubic Graphs	▪ Scatter Graphs ▪ 3D Shapes	▪ Reciprocal & Circle Graphs ▪ Similarity in 2D
Skills	<u>Reverse Percentages & Multipliers</u> Use a multiplier to find a percentage of an amount and to increase or decrease by a percentage (including decimal percentages and those greater than 100%) Find the original amount after a percentage increase or decrease. <u>Index Laws & Further Factorising</u> Use the laws of indices when multiplying or dividing with algebraic terms. Use index laws involving brackets (raising a power to a power) and the power 0. Use index laws including fractional and negative powers. Factorise a quadratic expression by grouping in pairs. Factorise a quadratic where the 'a' term is 1 or is prime. Factorise a quadratic using	<u>Probability</u> Write probabilities using fractions, percentages or decimals. Know and use the fact that the sum of all mutually exclusive events is 1, to solve a range of problems. Estimate the number of times an event will happen from given information and relative frequency. Find the probability of successive events. List all outcomes from single and combined events. Draw and use sample space diagrams. Draw and use two-way tables to calculate conditional and unconditional probability. <u>Polygons, Angles & Parallel Lines</u> Classify triangles and quadrilaterals from a range of geometric properties. Find missing angles in	<u>Circles</u> Identify, define and draw parts of a circle. Use the formulae for circumference and area of a circle, giving decimal answers. Find the area and/or perimeter of partial circles and composite shapes. Find the radius or diameter when given the area of circumference. <u>Representing & Solving Inequalities</u> Show inequalities on number lines using open and closed circles. Write down all integers that satisfy a given inequality. Solve linear inequalities in one variable, in a range of situations including 'double inequalities' such as $10 > 2x > 20$.	<u>Ratio & Proportion</u> Write ratios from a range of given information. Simplify ratios including the use of unitary form. Divide a quantity in a given ratio. Use a ratio to find one quantity when the other is known. Interchange between fractions and ratios. Write a ratio as a linear function. Compare scale models to real life measure-ments, including to make estimates. Convert between currencies in a range of contexts. Manipulate recipes in a range of contexts. Solve proportion problems using the unitary method. Work out and justify which product offers the best value for money.	<u>Scatter Graphs</u> Set up axes and plot a scatter graph. Identify outliers and consider what they show. Distinguish between positive, negative and zero correlation. Interpret a scatter graph in terms of the relationship of the two variables, using correlation and a real-life context. Draw a line of best fit, by eye, in order to support correlation. Find the equation of the line of best fit. Understand that correlation does not imply causality. Use a line of best fit to make predictions, understanding the difference in reliability in interpolation and extrapolation.	<u>Reciprocal & Circle Graphs</u> Recognise a linear, quadratic, cubic, reciprocal or circle graph from its shape. Draw circles with a centre at the origin, in the form $x^2 + y^2 = r^2$ Draw graphs of the reciprocal function $y = {}^{1}/_{x}$ with $x \neq 0$, using a table of values. For reciprocal graphs be able to state the value of x for which the equation is not defined. <u>Similarity in 2D</u> Write the lengths of two shapes as a ratio in its simplest form. Understand the conditions that make shapes similar, for both lengths and angles. Prove that two shapes are similar using angle properties and/or enlarge-ment. Identify the scale factor that links similar shapes and use it to find missing lengths in a range of simple

	the difference of two squares. Simplify algebraic fractions by first factorising. <u>Quadratic Sequences</u> Find the nth term of a quadratic sequence. Continue a quadratic sequence or find a specific term, including by using the nth term. Use the nth term to generate a sequence and to deduce whether a specific number appears in a given sequence.	different triangles and quadrilaterals as well as more complex composite shapes/ diagrams. Use the angle properties of parallel lines to find missing angles (alternate, corresponding, co-interior) giving clear reasoning. Identify and use vertically opposite angles. <u>Indices, Roots & Order of Operations</u> Use index notation including negative powers. Recognise powers of 2, 3, 4, 5 and 10. Estimate square or cube roots using knowledge of square and cube numbers. Recognise and use the equivalence in base numbers in order to solve problems. Use BIDMAS correctly, including appreciating the use of negatives. Use a calculator correctly to evaluate with indices and roots.	<u>Pythagoras' Theorem</u> Understand and use Pythagoras' theorem to find missing lengths in given right angle triangles – for a hypotenuse and other shorter side. Justify whether a triangle is right-angled using Pythagoras' theorem. Calculate the length of line segments, given their end coordinates. Manipulate other shapes in order to use Pythagoras' theorem.	<u>Plotting & Naming Linear Graphs</u> Plot and draw graphs of the form ax + by = c. Identify and interpret gradient and intercept from graphs of the form ax + by = c. Find the equation of a line through one point with a given gradient. Know and use the fact that parallel graphs have the same gradient. <u>Quadratic & Cubic Graphs</u> Use tables of values to generate sets of coordinates to represent quadratic and cubic graphs. Plot and construct quadratic and cubic graphs accurately. Read from graphs to find approximate solutions to quadratic and cubic equations. Estimate the gradient at a point, on a quadratic or cubic graph. Estimate the area under a quadratic graph by dividing it into trapezia.	<u>3D Shapes</u> Sketch and identify 3D shapes. Sketch and identify places of symmetry on a range of 3D shapes. Draw plans, front elevations and side elevations of different 3D shapes. Given the front elevation, side elevation and plan be able to draw the 3D shape.	and more complex situations (including the use of fractional scale factors)
Assess-ments	Assessment 4	Assessment 5	Assessment 6		Assessment 7	EOY Assessment
Homework	Mathswatch: Assessment 4 Higher upper revision assignment	Mathswatch: Assessment 5 Higher upper revision assignment Core skills homework booklets	Mathswatch: Assessment 6 Higher upper revision assignment	Retrieval grid	Mathswatch: Assessment 7 higher upper revision assignment Core skills homework booklet	Mathswatch: EOY assessment revision HU

SUBJECT: MATHEMATICS – Higher Pathway - Lower

Year Group	**Year 8**					
Rationale	Develop further confidence and fluency with numerical and algebraic techniques and problem solving. To use a scientific calculator effectively. To develop further geometrical skills and techniques that support problem solving.					
Topic/Unit	**Autumn Term 1**	**Autumn Term 2**	**Spring Term 1**	**Spring Term 2**	**Summer Term 1**	**Summer Term 2**
Knowledge	▪ Percentages & Multipliers ▪ Index Laws & Further Factorising ▪ Quadratic Sequences	▪ Probability ▪ Polygons& Angles ▪ Indices, Roots & Order of Operations	▪ Circles ▪ Representing & Solving Inequalities ▪ Pythagoras' Theorem	▪ Ratio & Proportion ▪ Sketching, Naming & Using Linear Graphs ▪ Quadratic & Cubic Graphs	▪ Scatter Graphs ▪ 3D Shapes	▪ Similarity in 2D ▪ Working with Grouped Data
Skills	<u>Percentages & Multipliers</u> Use a multiplier to find a percentage of an amount and to increase or decrease by a percentage (including decimal percentages and those greater than 100%) <u>Index Laws & Further Factorising</u> Use the laws of indices when multiplying or dividing with algebraic terms. Use index laws involving brackets (raising a power to a power) and the power 0. Use index laws including simple fractional and negative powers. Factorise a quadratic expression of the form $x^2 + bx + c$ where b and c are positive and negative. Factorise a quadratic expression by grouping in pairs. Factorise a quadratic where the 'a' term is 1 or is prime. Factorise a quadratic using the difference of two squares.	<u>Probability</u> Write probabilities using fractions, percentages or decimals. Know and use the fact that the sum of all mutually exclusive events is 1, to solve a range of problems. Find the probability of successive events. List all outcomes from single and combined events. Draw and use sample space diagrams. Draw and use two-way tables to calculate conditional and unconditional probability. <u>Polygons & Angles</u> Classify triangles and quadrilaterals from a range of geometric properties. Find missing angles in different triangles and quadrilaterals as well as more complex compo-site shapes/ diagrams.	<u>Circles</u> Identify, define and draw parts of a circle. Use the formulae for circumference and area of a circle, giving decimal or 'in terms of pi' answers. Find the radius or diameter when given the area of circumference. <u>Representing & Solving Inequalities</u> Show inequalities on number lines using open and closed circles. Write down all integers that satisfy a given inequality. Solve linear inequalities in one variable, in a range of situations including 'double inequalities' such as $10 > 2x > 20$. <u>Pythagoras' Theorem</u> Understand and use Pythagoras' theorem to find missing lengths in given right angle triangles – for a hypotenuse	<u>Ratio & Proportion</u> Write ratios from a range of given information. Simplify ratios including the use of unitary form. Divide a quantity in a given ratio. Use a ratio to find one quantity when the other is known. Interchange between fractions and ratios. Compare scale models to real life measure-ments, including to make estimates. Convert between currencies in a range of contexts. Manipulate recipes in a range of contexts. Solve proportion problems using the unitary method. Work out and justify which product offers the best value for money. <u>Sketching, Naming & Using Linear Graphs</u> Know and use the fact that parallel graphs have the same gradient. Find the equation of a	<u>Scatter Graphs</u> Set up axes and plot a scatter graph. Identify outliers and consider what they show. Distinguish between positive, negative and zero correlation. Interpret a scatter graph in terms of the relationship of the two variables, using correlation and a real-life context. Draw a line of best fit, by eye, in order to support correlation. Find the equation of the line of best fit. Understand that correlation does not imply causality. Use a line of best fit to make predictions, understanding the difference in reliability in interpolation and extrapolation. <u>3D Shapes</u> Sketch and identify 3D shapes. Sketch and identify places of symmetry on a range of 3D shapes. Draw plans, front elevations and side elevations of	<u>Similarity in 2D</u> Write the lengths of two shapes as a ratio in its simplest form. Understand the conditions that make shapes similar, for both lengths and angles. Prove that two shapes are similar using angle properties and/or enlargement. Identify the scale factor that links similar shapes and use it to find missing lengths in a range of simple and more complex situations (including the use of fractional scale factors) <u>Working with Grouped Data</u> Find the modal class interval from a grouped frequency data containing continuous data. Find the class interval that contains the median, from a grouped frequency data containing continuous data. Find an estimate for the mean from a grouped frequency data containing continuous data.

	Simplify algebraic fractions by first factorising (simple quadratics of the form $x^2 + bx + c$ or $ax^2 + bx + c$ where 'a' is prime). Quadratic Sequences Find the nth term of a quadratic sequence of the form an^2 or $n^2 + c$. Continue a quadratic sequence or find a specific term, including by using the nth term. Use the nth term to generate a sequence and to deduce whether a specific number appears in a given sequence.	Indices, Roots & Order of Operations Use index notation including negative powers. Recognise powers of 2, 3, 4, 5 and 10. Estimate square or cube roots using knowledge of square and cube numbers. Recognise and use the equivalence in base numbers in order to solve simple problems. Use BIDMAS correctly, including. appreciating the use of negatives. Use a calculator correctly to evaluate with indices and roots.	and other shorter side. Justify whether a triangle is right-angled using Pythagoras' theorem. Calculate the length of line segments, given their end coordinates. Manipulate other shapes in order to use Pythagoras' theorem.	straight line from a graph given in the form y = mx + c. Sketch a linear graph using the gradient and y-intercept. Find approximate solutions to a linear equation from its graph. Quadratic & Cubic Graphs Use tables of values to generate sets of coordinates to represent quadratic and cubic graphs. Plot and construct quadratic and cubic graphs accurately. Read from graphs to find approximate solutions to quadratic and cubic equations. Estimate the area under a quadratic graph by dividing it into trapezia.	different 3D shapes. Given the front elevation, side elevation and plan be able to draw the 3D shape.	Understand why the mean is only an estimate.
Assess-ments	Assessment 4	Assessment 5	Assessment 6		Assessment 7	EOY Assessment
Homework	Mathswatch: Assessment 4 Higher lower revision assignment ,	Mathswatch: Assessment 5 Higher lower revision assignment Core skills homework booklets ,	Mathswatch: Assessment 6 Higher lower revision assignment	Retrieval grid	Mathswatch: Assessment 7 higher lower revision assignment Core skills homework booklet	Mathswatch: EOY assessment revision HL

SUBJECT: MATHEMATICS: Foundation Pathway - Upper

Year Group	**Year 8**					
Rationale	Develop further confidence with algebraic and geometrical techniques to support problem solving. To use a scientific calculator more effectively. To increase fluency with the manipulation of proportional reasoning and number skills.					
Topic/Unit	**Autumn Term 1**	**Autumn Term 2**	**Spring Term 1**	**Spring Term 2**	**Summer Term 1**	**Summer Term 2**
Knowledge	▪ Working with Percentages ▪ Working with Indices, Powers & Roots	▪ Theoretical Probability ▪ Lines, Shapes & Angles	▪ Circles ▪ Representing & Solving Inequalities ▪ Application of Fractions	▪ Ratio & Proportion ▪ Drawing Linear Graphs	▪ Relative Frequency & Listing Outcomes ▪ Scatter Graphs	▪ 2D & 3D Shapes ▪ Time
Skills	<u>Working with Percentages</u> Find a percentage of a quantity using a decimal multiplier Use percentages in real-life contexts including price after VAT, value of profit and loss, simple interest and income tax calculations. <u>Working with Indices, Powers & Roots</u> Use index notation including negative powers. Recognise powers of 2, 3, 4, 5 and 10. Recall the squares of 1 to 20 and cubes of 1, 2, 3, 4, 5 and 10. Use the laws of indices to multiply and divide numbers written in index notation. Evaluate expressions involving squares, cubes and roots using the four rules of arithmetic and index laws. Use BIDMAS correctly, including appreciating the use of negatives. Use a calculator correctly to	<u>Theoretical Probability</u> Distinguish events as impossible, unlikely, evens, likely and certain. Mark events on a probability scale. Write probabilities in words, fractions, decimals and percentages. Find the probability of an event occurring. List outcomes for single events. Work out probabilities from frequency tables. Use knowledge of mutually exclusive events to calculate missing probabilities or the probability of an event not happening. <u>Lines, Shapes & Angles</u> Use correct 3 or 2 letter notation for lines, angles and shapes. Identify and mark parallel and perpendicular lines. Describe measures of turn using angles, including clockwise and anti-clockwise. Estimate angle sizes.	<u>Circles</u> Identify, define and draw parts of a circle. Use the formulae for circumference and area of a circle, giving decimal or 'in terms of pi' answers. <u>Representing & Solving Inequalities</u> Show inequalities on number lines using open and closed circles. Write down all integers that satisfy a given inequality. Solve simple linear inequalities in one variable, and represent the solution on a number line. <u>Application of Fractions</u> Add, subtract, multiply and divide fractions and mixed numbers in a range of different contexts. Find the reciprocal of an integer, decimal or fraction.	<u>Ratio & Proportion</u> Express the division of a quantity in a ratio. Simplify ratios including writing ratios in unitary form. Share a quantity in a given ratio including 3 part ratios. Use a ratio to find one quantity when the other is known. Interchange between fractions and ratios. Compare scale models to real life measurements, including to make estimates. Convert between currencies in a range of contexts. Manipulate recipes in a range of contexts. Solve proportion problems using the unitary method. Work out and justify which product offers the best value for money. <u>Drawing Linear Graphs</u> Draw and identify graphs parallel to the axes as well as y = x and y = -x. Plot and draw graphs in the	<u>Relative Frequency & Listing Outcomes</u> Find the probability of an event using relative frequency. Estimate the number of times an event will occur given the probability and the number of trials. Compare experimental and theoretical probabilities. List outcomes systematically for combined events. Draw and use sample space diagrams. <u>Scatter Graphs</u> Set up axes and plot a scatter graph. Identify outliers and consider what they show. Distinguish between positive, negative and zero correlation. Interpret a scatter graph in terms of the relationship of the two variables, using correlation and a real-life context. Draw a line of best fit by eye, in order to support correlation. Understand that correlation does	<u>2D & 3D Shapes</u> Draw circles and arcs to a given radius or diameter. Measure and draw line to the nearest mm. Know and use compass directions. Make accurate drawing of 2D shapes using a ruler and protractor. Sketch and identify 3D shapes. Find the number of faces, edges and vertices on a 3D shape. Sketch and identify places of symmetry on a range of 3D shapes. Draw plans, front elevations and side elevations of different 3D shapes. Given the front elevation, side elevation and plan be able to draw the 3D shape. <u>Time</u> Use correct notation for 12 and 24-hour clock and convert between the two. Work out the time taken for a journey. Calculate time intervals in hours, minutes or a mixture of both.

	evaluate with indices and roots.	Measure angles accurately using a protractor. Identify, draw and describe angle types, different triangles and different quadrilaterals. Understand and use the angle properties of triangles, straight lines, quadrilaterals and vertically opposite angles.		form y = mx + c with and without a given table of values. Identify and interpret the gradient of a graph given in the form y = mx + c. Sketch a graph using the gradient and intercept.	not imply causality. Use a line of best fit to make predictions, understanding the difference in reliability in interpolation and extrapolation.	Use a calculator correctly with time calculations.
Assess-ments	Assessment 4	Assessment 5	Assessment 6		Assessment 7	EOY Assessment
Homework	Mathswatch: Assessment 4 Foundation upper revision assignment	Mathswatch: Assessment 5 Foundation upper revision assignment Core skills homework booklets	Mathswatch: Assessment 6 Foundation upper revision assignment ,	Retrieval grid ,	Mathswatch: Assessment 7 Foundation upper revision assignment Core skills homework booklet ,	Mathswatch: EOY revision FU

SUBJECT: MATHEMATICS: Foundation Pathway - Lower

Year Group	**Year 8**					
Rationale	Develop confidence with geometrical techniques to support problem solving. To use a scientific calculator more effectively. To increase confidence with the manipulation of proportional reasoning and number skills.					
Topic/Unit	**Autumn Term 1**	**Autumn Term 2**	**Spring Term 1**	**Spring Term 2**	**Summer Term 1**	**Summer Term 2**
Knowledge	▪ Working with Percentages ▪ Working with Indices, Powers & Roots	▪ Theoretical Probability ▪ Lines, Shapes & Angles ▪ Perimeter & Area Revisit	▪ Representing & Solving Inequalities ▪ Ratio & Proportion	▪ Fractions Revisit ▪ Drawing Linear Graphs	▪ Relative Frequency & Listing Outcomes ▪ Scatter Graphs	▪ 2D & 3D Shapes ▪ Time
Skills	<u>Working with Percentages</u> Convert between simple fractions, decimals and percentages. Compare and order simple fractions, decimals and percentages. Express a number as a percentage of another number. Find a percentage of a quantity without a calculator: 50%, 25% and multiples of 10% and 5%. Find a percentage of a quantity with a calculator. Calculate the amount of percentage increase and decrease. Use percentages in simple real-life contexts including price after VAT. <u>Working with Indices, Powers & Roots</u> Recall the squares of 1 to 10 and cubes of 1, 2, 3, 4, 5 and 10. Recognise powers of 2, 3, 4, 5 and 10. Evaluate expressions involving squares, cubes and roots using the four rules of	<u>Theoretical Probability</u> Distinguish events as impossible, unlikely, evens, likely and certain. Mark events on a probability scale. Write probabilities in words, fractions, decimals and percentages. Find the probability of an event occurring. List outcomes for single events. Work out probabilities from frequency tables. Work out probabilities from given two-way tables. Use knowledge of mutually exclusive events to calculate missing probabilities or the probability of an event not happening in simple examples. <u>Lines, Shapes & Angles</u> Use correct 3 or 2 letter notation for lines, angles and shapes. Identify and mark parallel and perpendicular lines. Describe measures of turn using	<u>Representing & Solving Inequalities</u> Show inequalities on number lines using open and closed circles. Write down all integers that satisfy a given inequality. Solve simple linear inequalities in one variable, and represent the solution on a number line. <u>Ratio & Proportion</u> Write a ratio to describe a situation or to represent a division of parts. Simplify ratios including writing ratios in simple unitary form. Share a quantity in a given ratio including 3 part ratios. Interchange between fractions and ratios. Convert between currencies in a range of contexts. Manipulate recipes in a range of contexts. Solve proportion problems using the	<u>Fractions Revisit</u> Write fractions to describe shaded parts of a diagram and use diagrams to compare or order fractions. Simplify and find equivalent fractions including to compare or order fractions. Express one value as a fraction of another. Convert between mixed numbers and improper fractions. Add and subtract fractions including with mixed numbers. Multiply and divide fractions with fractions and with integers. Find a fraction of an amount. <u>Drawing Linear Graphs</u> Draw and identify graphs parallel to the axes as well as $y = x$ and $y = -x$. Plot and draw graphs in the form $y = mx + c$ with and without a given table of values. Recognise that graphs of the form $y = mx + c$ correspond to straight lines.	<u>Relative Frequency & Listing Outcomes</u> Find the probability of an event using relative frequency. Estimate the number of times an event will occur given the probability and the number of trials. List outcomes systematically for combined events. Draw and use simple sample space diagrams. <u>Scatter Graphs</u> Plot or complete a scatter graph on given axes. Identify outliers and consider what they show. Distinguish between positive, negative and zero correlation. Interpret a scatter graph in terms of the relationship of the two variables, using correlation and a real-life context, in more simple cases. Draw a line of best fit by eye, in order to support correlation. Use a line of best fit to make predictions, understanding the difference in	<u>2D & 3D Shapes</u> Draw circles and arcs to a given radius or diameter. Measure and draw line to the nearest mm. Know and use compass directions. Make accurate drawings of triangles using a ruler and protractor. Sketch and identify 3D shapes. Find the number of faces, edges and vertices on a 3D shape. Sketch and identify places of symmetry on simple 3D shapes. Draw plans, front elevations and side elevations of simple 3D shapes. Given the front elevation, side elevation and plan be able to draw the 3D shape, in very simple cases. <u>Time</u> Use correct notation for 12 and 24-hour clock and convert between the two. Work out the time taken for a journey. Calculate time intervals in hours, minutes or a mixture of both.

	arithmetic and index laws. Use index notation for powers of 10, including negative powers. Use the laws of indices to multiply and divide numbers written in index notation. Use BIDMAS correctly, including appreciating the use of negatives. Use a calculator correctly to evaluate with indices and roots.	angles, including clockwise and anti-clockwise. Estimate angle sizes. Measure angles accurately using a protractor. Identify, draw and describe angle types, different triangles and different quadrilaterals. Understand and use the angle properties of triangles, straight lines, quadrilaterals and vertically opposite angles. <u>Perimeter & Area Revisit</u> Find the perimeter of rectangles, triangles, parallelograms and trapezia. Find the perimeter of composite shapes made up from rectangles, triangles, parallelograms and trapezia. Find the area of rectangles and triangles using formulae. Find the area of composite shapes made from rectangles and triangles.	unitary method. Work out and justify which product offers the best value for money, in simple cases.		reliability in interpolation and extrapolation (using more simple language).	Use a calculator correctly with time calculations.
Assess-ments	Assessment 4	Assessment 5	Assessment 6		Assessment 7	EOY Assessment
Homework	Mathswatch: Assessment 4 Foundation lower revision assignment	Mathswatch: Assessment 5 Foundation lower revision assignment Core skills homework booklets	Mathswatch: Assessment 6 Foundation lower revision assignment	Retrieval grid	Mathswatch: Assessment 7 Foundation lower revision assignment Core skills homework booklet	Mathswatch: EOY revision FL