**Mathematics Pathway 1**

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| Year 7 sets: 7 |
| Year 8 sets:  |
| Year 9 sets:  |
| **Subject** | Mathematics  |
| **Autumn 1 Unit 1 - Number**  | Recognise concrete representation and place value models of numbers in numerals and words…up to 10 million |
| Revisit the place value of each digit in a number .. up to 10 million |
| Read and write numbers in numerals and words up to…10 million |
| Measure time |
| Measure time in seconds |
| Solve time and word problems with the 24hour clock |
| Use the 24 hour clock |
| Calculate with time and solve word problems |
| Compare two numbers by comparing the values of the highest digit (integers only) |
| Arrange a set of numbers in ascending and descending order (integers only) |
| Addition and subtraction using metal methods and formal algorithms (column method) |
| Multiply and divide 4 and 2 digit numbers without using a calculator, formally long multiplication and division where remainders are presented as decimals and fractions |
| Concept of multiplication and division with mental and formal methods of calculation including large numbers |
| Solve word problems with 3 steps involving the 4 operations |
| Understand factors and multiples of numbers up to 100, and prime numbers |
| Recognise the relationship between a factor and a multiple |
| Check reasonableness of answers |
| Use estimates sum, product, quotient and difference of a calculation |
| Round off whole numbers to a defined degree of accuracy |
| Find a percentage of a quantity |
| Understanding decimals |
| **Autumn 2 Unit 2 - Algebra** | Plot and read coordinates in 1 quadrant |
| Represent and unknown number using a letter |
| Understand simple algebraic expressions such as x + 2, y + y or 3y |
| Simplify algebraic expressions (collecting like terms) |
| Write algebraic expressions from words |
| Evaluate simple algebraic expressions through substitution |
| Understand and plot coordinates in the first quadrant |
| Understand and plot coordinates in all 4 quadrants |
| Understand (x,y) |
| Recognise a simple number pattern (arithmetic sequence) |
| Recognise a simple number pattern (arithmetic and geometric sequences) |
| Determine the term to term rule for sequences |

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| **Spring 1 Unit 3 - Geometry** | Identify perpendicular and parallel lines |
| Draw perpendicular and parallel lines using a ruler |
| Identify types of angles |
| Recognise and use geometric notation (right angles, equal length lines, parallel lines etc) |
| Use angle notation such as angle ABC to label angles |
| Estimate and measure angles in degrees |
| Draw angles using a protractor |
| Use angle properties to find the unknown angles (straight line, point and vertically opposite) |
| Calculate unknown angles in triangles |
| Identify and name quadrilaterals and triangles |
| Identify 3D shapes from solids and given nets |
| Understand amounts of turn and points of the compass |
| Draw circles using a compass |
| Identify all parts of a circle |
| Find area of shapes through counting squares |
| Calculate area and perimeter of rectangles |
| Build solids and measure with unit cubes (KS3 only) |
| **Spring 2 Unit 4 - Number and Algebra** | Compare and order fractions with different denominators |
| Add and subtract fractions with the same denominator |
| Add and subtract fractions with different denominators (denominator should not exceed 12) |
| Solve up to two step word problems involving fraction decimals and percentages |
| Carry out combined operations involving 4 operations and use of brackets (BIDMAS) |
| Express a fraction in its simplest form |
| Write equivalent fractions given the numerator or denominator |
| Convert between fractions and decimals |
| Express and understand the concept of mixed numbers and improper fractions |
| Write fractions and decimals as percentages and vice versa |
| Associate fractions with division |
| Interpret a fraction as part of a whole and writing fractions |
| Find a unit fraction of a quantity |
| Interpret a:b and a:b:c |
| Express a part of a whole as a percentage |
| Know the meaning of percentage |
| Compare two quantities as of percentage |
| Convert percentages to decimals |

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| **Summer 1 Unit 5 - Geometry 2** | Interpreting scales  |
| Recognise line symmetry and completing shapes given a line of symmetry |
| Recognise rotational symmetry, describe using the order and complete a shape given the order of rotational symmetry |
| Reflect simple shapes given a mirror line (not diagonals) including on a set of axes |
| Rotate a simple shape (not a square) on a grid given the point of rotation drawn on the edge of the shape, amount of turn quarter/half and direction |
| Enlarge simple shapes with integer positive scale factors (no centre) |
| Translate simple shapes given wordy instructions, in only positive directions (just right and up) |
| Describe simple one step transformations using words |
| Convert between simple metric units of measurement of length and mass |
| Choose appropriate measures to describe length, mass, capacity of everyday objects |
| Estimate length, mass, capacity of everyday objects |
| **Summer 2 Unit 6 - Statistics**  | Collect, classify and tabulate data including measured primary data |
| Complete a tally table from given data |
| Complete two way tables |
| Draw and interpret pictograms |
| Reading and interpreting two way tables |
| Construct bar charts from tally tables and interpret bar graphs (comparative and compound) |
| calculate the mean average of a given quantity (from a list) |
| Calculate the mode and median average (from a list) |
| Solve problems involving the mean and know that it is an average which is a total divided by the number of items |

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| **Mathematics Pathway 2** |
| Year 7 sets: 3, 4, 5, 6 |
| Year 8 sets: 4, 5, 6, 7 |
| Year 9 sets: 7, 8  |
| **Subject** | **Mathematics**  |
| **Autumn 1 Unit 1 - Number**  | Revise Place value (Possibly extending to base numbers for the most able) |
| Read and write numbers in numerals and words up to…10 million |
| Time including converting to a 24hour clock |
| Calculate with time and solve word problems |
| Order positive and negative numbers |
| Compare two numbers by comparing the values of the highest digit in decimals from left to right |
| Arrange a set of decimals in ascending and descending order |
| Addition and subtraction using mental methods and formal algorithms (column methods) |
| Multiply and divide by tens, hundreds & thousands without a calculator |
| Formal methods of multiplication and division (column method and bus stop) |
| Solve word problems with 4 steps involving the 4 operations |
| Show addition and subtraction of integers on a numberline (negative numbers) |
| Multiplying and dividing simple negatives |
| Understand factors and multiples |
| Recognise the relationship between factor and multiple |
| Use rounding off to estimate sum, product, quotient and difference of a calculation |
| Rounding 10, 100, 1000 and decimal places |
| Use rounding to check reasonableness of answers |
| Find the whole given a part or percentage |
| Identify the pattern in a number sequence |
| Multiplying Decimals |
| **Autumn 2 Unit 2 - Algebra** | Plot and read coordinates in 4 quadrants |
| Understand simple algebraic expressions such as y^2 and y^3 |
| Simplify algebraic expressions including those with powers |
| Write algebraic expressions from words |
| Evaluate simple algebraic expressions through substitution (include negative numbers) |
| Understand the words ‘equation’, ‘formula’, ‘identity’ and ‘expression’ |
| Recognise simple geometric progressions, r^n where n is positive |
| Recognise types of sequences such as Fibonacci and quadratics |

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| **Spring 1 Unit 3 - Geometry** | Convert the metric units of measurement of length, mass and capacity |
| Measure, draw and identify angles using correct angle notation |
| Define triangles (equilateral, isosceles and scalene) |
| Construct all triangles (accurate to 1 degree /mm) |
| Understand properties of perpendicular and angle bisector constructions |
| Classify special quadrilaterals on the basis of their properties (including areas and perimeters) |
| Given minimal information draw a square, rectangle, rhombus, parallelogram and trapezium |
| Know properties of regular polygons |
| Understand and use all angle properties including interior and exterior angles (triangles only) |
| Find the missing angles and interior sum of angles in regular polygons |
| Identify the different type of angles formed by parallel lines and their transversal |
| Area and perimeter of triangles and parallelograms |
| Area and perimeter of compound rectangular shapes (given all the lengths of sides) |
| Area of trapezia |
| Area and perimeter of compound shapes |
| Find the total surface area of cubes and cuboids |
| Understand and recall Pythagoras theorem in 2D |
| Use isometric grids to draw 2D representations of 3D objects (KS3 only) |
| **Spring 2 Unit 4 - Number and Algebra** | Carry out and understand the order of operations |
| Relate ratio to fractions |
| Express one quantity as a fraction of another |
| compare two or more quantities |
| Write equivalent ratios and find missing terms |
| Divide a quantity in a given ratio |
| Solve a 2 step word problems involving simple ratio |
| Divide a quantity in a given ratio |
| relate ratio to fractions |
| Use percentages greater then 100 |
| Increase and decrease a quantity by a given percentage |
| Solve problems involving percentages |
| Convert percentages to fractions in their simplest form |
| Express a fraction or decimals as a percentage |
| Simple story graphs (e.g. filling the bath with water, distance time) |

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| **Summer 1 Unit 5 - Geometry 2** | Recognise and describe line symmetry |
| Recognise and describe rotational symmetry using the order of rotational symmetry |
| Reflect simple shapes in a given mirror line (including diagonals) on a set of axes |
| Rotate a simple shape given an angle, centre and direction on axes |
| Enlarge simple shapes with integer positive scale factors on a set of axes, centre of enlargement the origin |
| Translate a simple shape given wordy instructions, both left/right/up and down |
| Describe a simple one step transformation using words and correct mathematical language (centre of rotation and size of angle etc.) |
| Convert between metric units of length, mass and capacity |
| Know the metric units of measurement of length, mass and capacity |
| Use simple scales and make an accurate scale drawing from a diagram |
| Using litres/ml and cm^3 in volume problems |
| Understand volume to find missing dimensions (cuboids only) |
| **Summer 2 Unit 6 - Statistics**  | Find the probability of a single event including lists of all possible outcomes |
| Know the probability of a certain event is one |
| Know the probability of an impossible event is zero |
| Write probability in words, fractions, decimals and percentages |
| List all outcomes of dual events, including presenting in sample space diagrams |
| Collect, classify and tabulate data using all data collection method |
| Revise constructing and interpreting tally, bar charts and pictograms |
| Construct and interpret vertical line graphs |
| Construct and interpret pie charts |
| Construct and interpret frequency polygons |
| Draw simple inferences from statistical information ie mode, mean, and range |
| Design an experiment or survey |

**Mathematics Pathway 3**

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| Year 7 sets: 1, 2 |
| Year 8 sets: 1, 2  |
| Year 9 sets: 3, 4, 6, 7 |
| **Subject** | **Mathematics**  |
| **Autumn 1 Unit 1 - Number**  | Use the symbols =, ≠, <, >, ≤, ≥ with real numbers |
| Order rational numbers |
| Apply the 4 basic operations on positive and negative integers |
| BIDMAS |
| Add, subtract, multiple and divide fractions (including negative fractions and mixed number) |
| Four operations including negative decimals |
| Find factors of any number |
| Find multiples of any number |
| Find the prime numbers between 1 and 100 |
| Find the prime factors of a number |
| Find the product of primes |
| Determine the LCM and HCF by prime factorisation , using a venn diagram |
| Find the squares, square roots, cube and cube roots using prime number factorisation |
| Use a calculator to find the square roots and cube roots |
| Identify a rational number |
| Estimate and answer by rounding each number to 1 significant figure ) This could include dividing by decimal values |
| Round off an answer to a required number of decimal places (using recurring notation where required) |
| Rounding to both decimal places and significant figures |
| Identify rounding and truncation errors |
| Multiplying and Dividing Decimals |
| **Autumn 2 Unit 2 - Algebra** | Distinguish between like and unlike terms in algebraic expressions |
| Distinguish between terms and coefficients in algebraic expressions |
| Evaluate algebraic expressions and formulae (substitution) |
| Write algebraic expressions |
| Use letters to represent numbers |
| Translate simple real world situations into algebraic expressions |
| Add and subtract linear algebraic expressions |
| Expand simple linear expressions |
| Expand and subtract algebraic expressions with fractional coefficients |
| Manipulate algebraic expressions when solving problems |
| Use identities to show that two algebraic expressions are identical |
| Solve linear equations with one unknown, including fractional coefficients |
| Solve simple fractional equations that can be reduced to a linear equation |
| Formulate a linear equation to solve problems |
| Recognise and represent number patterns (including finding an algebraic expression for the nth term of a linear sequence) |
| Use index laws for multiplication and division of integer powers |

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| **Spring 1 Unit 3 - Geometry** | Construct and understand angle bisectors |
| Construct and understand perpendicular bisectors |
| Construct simple geometric figures |
| Construct triangles and quadrilaterals |
| Identify properties of 3D shapes (vertices, edges etc) and plan/side views etc |
| construct and interpret plans and elevations of 3D shapes  |
| Identify and name common solids |
| Interpret and draw scale drawing |
| Classify triangles and special quadrilaterals according to their properties |
| Apply properties of triangles and special quadrilaterals to calculate unknown angles |
| Find the angle sum of interior and exterior of any convex polygon |
| Match the sides and angles of two congruent polygons |
| Know and recognise that congruent figures are identical in shape and size |
| Recognise and understand similarity (corresponding angles are equal in size, corresponding sides are in proportion) |
| Enlarge a plane figure given a positive integer scale factor |
| Solve simple problems involving similarity and congruence |
| Use the formulae to calculate area and circumference of circles, including half and quarter circles |
| Solve word problems involving area and perimeter of circles |
| find the area and perimeter of composite shapes (including parts of circles) |
| When calculate area and circumference introduce writing numbers in terms of pi |
| Write Pythagoras answers in both decimal and surd form |
| Perimeter of shapes where Pythagoras is required for the sides |
| Introduce trigonometry in right angled triangles to find side lengths (and angles if appropriate) |

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| **Spring 2 Unit 4 - Number and Algebra** | Revise ratio |
| Find the whole when a whole is divided into parts in a given ratio |
| Express a percentage change as a multiplier |
| Understand how to compare quantities using percentages |
| Reverse percentages; find the original quantity given the value after a percentage increase and decrease |
| Calculate average rate e.g. conversions graphs, distance / time |
| Identify linear relationships between two variables |
| Calculate speed, distance and time given two of the three measures |
| Find the gradient of a linear graph as a ratio of vertical change over horizontal change |
| Interpret the name of a linear graph as a function machine |
| Calculate the outputs (y) for a linear graph, given inputs (x) |
| Plot a linear graph |
| Determine whether a given point lies on a graph |
| Recognise that equations of the form y=mx+c correspond to straight line graphs |
| Find the gradient of a linear graph as a ratio of vertical change over horizontal change |
| Draw and describe distance time graphs |
| Recognise and use inequalities symbols and present these on a number line |
| Solve problems involving percentages and reverse percentages |
| **Summer 1 Unit 5 - Geometry 2** | Know metric units of measurement of length, mass and capacity and convert measures from one unit to another |
| Use conversion graphs |
| Reflect 2D objects on a given axes given the name of a line (horizontal or vertical) |
| Find the centre of rotation of a given object and image |
| Enlarge simple shapes with integer positive scale factors on a set of axes given the centre of enlargement |
| Describe simple one step transformation using words and correct mathematical language (e.g. centre of rotation, size of angle etc) |
| Reflect and describe reflections of 2D objects on axes, given the name of a line (including y = x) |
| Revision of metric conversions |
| Revision of volume in 3D shapes made up of cubes and cuboids |
| Solve problems with up to 3 steps involving volume of cube and cuboids |
| Translate simple shapes given wordy instructions or vectors |
| Column representation of vectors |

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| **Summer 2 Unit 6 - Statistics**  | List all outcomes of dual events, including presenting in sample space diagrams |
| List all outcomes using frequency trees and sample space diagrams |
| List all outcomes of dual events, including presenting in sample space diagrams |
| List all outcomes using frequency trees and sample space diagrams |
| Understand and use the probability of P(A')=1 - P(A) |
| Understand mutually exclusive events |
| Identify different mutually exclusive outcomes and know that the sum of the outcome is one |
| Draw venn diagrams |
| Understand the AND/OR rule for mutually exclusive and independent events for sample space diagrams |
| Design and use two way tables for discrete and grouped data |
| Time series |
| Find the mean, median and mode of ungrouped discrete data |
| Understand the purposes and use of mode, median and mean, choosing the appropriate average |
| Finding the mean of grouped data |
| Interpret and analyse stem and leaf diagrams using mode, median, mean and range |
| Interpret and draw scatter graphs |
| Draw and interpret time series graphs including interpreting the trend. |

**Mathematics Pathway 4**

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| Year 9 sets: 1, 2  |
| Year 10 sets: 2, 3 |
| **Subject** |  |
| **Autumn 1 Unit 1 - Number**  | Problem solve and find missing digits in formal calculations |
| Understand and use formal operations and relationships, including inverse operation and hierarchy of operations such as long multiplication and long division |
| Use index notation and powers of 10, including the understanding of a reciprocal e.g. the reciprocal of 2 is 0.5 and that this can be represented as a negative power |
| Use the notation for positive and negative square root and cube root |
| Estimate powers and roots of any given number |
| Use index laws for multiplication and division of integer powers |
| Use index laws for multiplication and division of positive and negative integers |
| Use indices and roots when problem solving |
| Understand and use numbers that are written as surds |
| Order, interpret and calculate with standard index form |
| Simplify surds |
| Multiply and divide surds |
| Add and subtract surds |
| Use and apply standard index form |
| Use decimal notation for recurrence and recognise that each terminating and recurring decimal is an exact fraction (convert decimals into fractions to confirm this |
| Approximate to specified or appropriate degrees of accuracy including significant figures |
| Solve problems involving map scales |
| Use multipliers and indices to calculate repeated percentage change including compound interest |
| Know the difference between simple interest and compound interest in the financial world |
| Solve simple real-life problems involving direct proportion |
| Use the tabular approach to solving direct proportion |
| Solve simple real-life problems involving inverse proportion |
| Use the tabular approach to solving inverse proportion |
| Growth and decay and compound percentages |

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| **Autumn 2 Unit 2 - Algebra** | Expand and Simplify double brackets (Extend to triple brackets but not tested) |
| Expand a linear square expression |
| Factorise a linear expression |
| Factorise a quadratic expression including the difference of 2 squares |
| Multiply and divide algebraic fractions |
| Change the subject of a formula |
| Find the value of the unknown quantity in a given formula |
| Use a table to calculate and plot quadratic functions |
| Use function notation when drawing graphs f() instead of y |
| Interpret and use a quadratic graph to solve an equation where x^2 is the coefficient is equal to 1 |
| Interpret quadratic graphs for lines of symmetry and turning points |
| Know the roots of an equation through factorisation |
| Recognise general shapes of quadratic, cubic and reciprocal graphs and sketch them |
| Use factorising to solve simple quadratic equations |
| Solve linear simultaneous equations in two variables by elimination |
| Derive two equations and solve them simultaneously |
| **Spring 1 Unit 3 - Geometry** | Loci, understanding and using |
| Recognise and use circle theorems |
| Understand, use and solve problems with bearings |
| Revision of finding area and perimeter of circles and compound shapes involving circles including leaving your answer as a multiple of pi |
| Find the total surface area of prisms |
| calculate areas of sectors and arc lengths |
| Understand, recall and use trigonometric relationships in right angled triangles for both missing sides and angles |
| know the exact values of sin θ and cos θ for θ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan θ for θ = 0°, 30°, 45° and 60° |
| Addition and subtraction of vectors  |
| Multiplication of vectors by a scalar |
| Understand and use vector notation |

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| **Spring 2 Unit 4 - Number and Algebra** | Apply and interpret limits of accuracy e.g. (answer not being more accurate than the numbers used in the calculation) |
| Reading a rate of change graph to tell a story; ability to distinguish between a horizontal line on a distance/time vs speed/time graph |
| Reading a rate of change graph to tell a story; distinguishing the difference between a distance travelled/time vs distance from home/time graph |
| Understand that the rate of change is represented by the gradient |
| calculate the rate of change from a graph giving appropriate units of measurement |
| Plot linear graphs given the equation only, where y is explicitly in terms of x e.g. y=3x-4 and 2y=x+5 |
| Plot linear graphs given the equation only, where y is implicitly in terms of x e.g. 2x + 3y =12 |
| Understand the concept of parallel lines |
| Recognise and name lines that are parallel given equations in the form y=mx+c |
| Use and interpret y=mx+c for all straight line graphs |
| Use a table to calculate coordinates for quadratic functions, positive x^2 coefficient |
| Use a table to calculate coordinates for quadratic functions with an x^2 coefficient greater than 1 |
| Draw graphs representing rates of change e.g. distance/time, speed time, capacity/time |
| Solve linear inequalities algebraically, presenting solutions on a numberline |
| Represent inequalities in one variable graphically (horizontal and vertical) |
| **Summer 1 Unit 5 - Geometry 2** | Use the relationship and calculate speed, distance or time, given two of the three |
| Use the relationship and calculate different compound measures including density, pressure, rates of pay etc... given two of the three |
| Understand the concept of speed, average speed and uniform speed |
| Describe simple one step transformation using words and correct mathematical language (e.g. centre of rotation, size of angle etc) |
| Revise translations, reflections and rotations |
| Enlarge simple shapes with integer and fractional positive scale factors on a set of axes given the centre of enlargement |
| Describe enlargement giving the scale factor and centre of enlargement |
| Perform and describe combinations of reflections, rotations and translations |
| Describe an enlargement giving the scale factor and centre |
| Describe a combination of transformations as a single transformation |
| Calculate the volume of prisms including cylinders |
| Calculating missing lengths given volume in prisms |
| Enlarge shapes with positive and negative scale factors, including fractions on a set axes given the centre of enlargement |
| Use and apply the formulae for volume and surface area of spheres and cones |

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| **Summer 2 Unit 6 - Statistics**  | Use and understand theoretical probability and relative frequency and their comparisons |
| Use and understand theoretical probability and relative frequency and their comparisons |
| Understand that results from experiments may not be identical, but that by increasing samples size, better estimate will be produced |
| Use and understand theoretical probability and relative frequency and their comparisons |
| Use tree diagrams to represent outcomes of compound events |
| Understand the AND/OR rule for mutually exclusive and independent events for tree diagrams |
| Use a calculator efficiently using a statistical function |
| Identify possible sources of bias |
| Understand and use statistical problem solving of the data handling cycle |
| Draw and interpret frequency polygon for grouped data |
| Interpret and draw conclusions and predictions from a wide range of graphs and data  |
| Draw and interpret cumulative frequency tables and graphs |
| Calculate mean, median and mode of grouped data |
| Draw and interpret box plots from raw data when given quartiles and medians |
| calculate the mean, median, range, quartiles and interquartile range, mode and modal class |
| Draw box plots from raw data, calculate median and quartiles |
| Interpret and compare box plots (including from cumulative frequency graphs) |
| Compare distributions and make inferences from box plots |