Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

The Mathematics curriculum from Years 7-11 is based on developing students' knowledge from primary school to secure maximum progress. With this in mind not all students have the same starting points and progress at the same rates. Our curriculum is organised according to steps with a guideline of steps to be completed as follows:

	Working towards age related	Working at age related	Working above age related
Year 7	Step 1 - 3	Step 4/5	Step 6+
Year 8	Step 1- 4	Step 5/6	Step 7+
Year 9	Step 1- 5	Step 6/7	Step 8+
Year 10	Step 1 -6	Step 7/8	Step 9+
Year 11	Step 1 -7	Step 8/9	Step 10+

Developing Cultural Capital: As we study each unit in Mathematics we aim to link to "real life" situations answering "when will I ever need this?" and will explore areas which students may be less familiar with to broaden their horizons. When appropriate we will explain the History of the Mathematics and how it has developed, showcasing areas of the world and famous mathematicians.

HALF TERM 1	**Unit: Sequences**		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Find the next term in a simple positive integer sequence • Find the next term in a sequence made by doubling or halving	**Term** **Integer**	Counting in a sequence in MFL
Step 2	• Describe a simple term to term rule based on + - ÷ x	**Term to term rule** Term Integer	
Step 3	• Find the next term in a simple sequence that could include negative integers • Recognise the sequences of square, triangular numbers both numerically and as pictures • Generate terms of a simple sequence given the start number and term to term rule		
Step 4	• Find a term given its position in a sequence like tenth number in 4 × table is 40 (one operation on n) • Find a term of a practical sequence given its position in the sequence eg the 5th fence panel • Know that an arithmetic sequence is generated by a starting number , then adding a constant number	**Arithmetic** Term to term rule Term Integer	
Step 5	• Begin to use linear expressions to describe the nth term in a one-step arithmetic sequence (e.g. nth term is 3n or n + 5) • Begin to use linear expressions to describe the nth term in a two-step arithmetic sequence (e.g. nth term is 3n + 1 or n/2 – 5) • Explain the rule for the sequence of triangle numbers given the terms in the sequence • Generate terms of a linear sequence using position to term (nth term rules) with positive integers. • Predict how the sequence should continue and test for several more terms • Recognise arithmetic sequences from diagrams and draw the next term in a pattern sequence	**Linear sequence** **Nth term** Arithmetic Term to term rule Term Integer	
Step 6	• Begin to use formal algebra to describe the nth term in an arithmetic sequence. • Find a specific term in a sequence using position-to-term rules	**Position to term rules** Linear sequence Nth term Arithmetic Term to term rule Term Integer	
Step 7	• Find and use the nth term of an arithmetic sequence including from real life practical contexts	**Arithmetic sequence** Position to term rules Linear sequence Nth term	

		Arithmetic Term to term rule Term Integer	
Step 8	• Identify which terms are/are not in a sequence given the nth term rule	**Nth term rule** Arithmetic sequence Position to term rules Linear sequence Nth term Arithmetic Term to term rule Term Integer	
Step 9	• By looking at the spatial patterns of triangular numbers, deduce that the nth term is 1/2n(n + 1) • Continue geometric progression and find term to term rule, including negative, fraction and decimal terms • Distinguish between arithmetic and geometric sequences • Recognise and use simple geometric progressions (rn where n is an integer and r is a rational number > 0 or a surd)	**Geometric sequences** **Quadratic sequences** **Nth term rule** Arithmetic sequence Position to term rules Linear sequence Nth term Arithmetic Term to term rule Term Integer	
Step 10	• Continue a quadratic sequence and use the nth term to generate terms		
	• Find the nth term of a quadratic sequence of the form n^2 ,an^2, $an^2 \pm b$, $an^2 \pm bn \pm c$		
Step 12	• Use iteration with simple converging sequences	**Iteration** Geometric sequences Quadratic sequences Nth term rule Arithmetic sequence Position to term rules Linear sequence Nth term Arithmetic Term to term rule Term Integer	

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 1	Unit: Analysing Data		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Find the mean, median, mode and range for a list of numbers	**Mean, median, mode, range**	Geography will analyse data about climate and populations
Step 2	• Compare 2 data sets using one of the averages and the range eg which dinner lady would you use?	**Compare** Mean, median, mode, range	
Step 3	• Find the mode and range of a data set presented in other ways eg in a bar chart		
Step 4	• Recognise the advantages/disadvantages of the different averages • Identify the modal class from a grouped/non grouped frequency table	**Advantage** **Disadvantage** Compare Mean, median, mode, range	
Step 5	• Write a list of numbers with a mean or median or mode of ? • Use a non grouped frequency table to find the median	**Frequency** Advantage Disadvantage Compare Mean, median, mode, range	
Step 6	• Calculate the mean for a non-grouped frequency table • Understand the effects of outliers in a data set	**Outlier** Frequency Advantage Disadvantage Compare Mean, median, mode, range	
Step 7	• Estimate the mean of grouped data in a frequency table • Estimate the median of grouped data in a frequency table	**Estimated mean** Outlier Frequency Advantage Disadvantage Compare Mean, median, mode, range	
Step 8	• Use the reverse mean to solve problems • Compare and contrast data sets using an average and the range		
Step 9	• Interpret boxplots to find median, range and interquartile range • Draw boxplots given required information • Compare 2 boxplots	**Boxplot** **Interquartile range** Estimated mean Outlier Frequency Advantage Disadvantage Compare Mean, median, mode, range	

Step 10	• Plot a cumulative frequency graph and use it to find the median • Solve problems that combine the mean of 2 data sets/adding in an extra person etc	**Cumulative** Boxplot Interquartile range Estimated mean Outlier Frequency Advantage Disadvantage Compare Mean, median, mode, range	
Step 11	• Use cumulative frequency graphs to find median and interquartile range		
Step 12	• Compare 2 distributions represented as boxplots or cumulative frequency graphs		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 1	Unit: Place value		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Order positive and negative integers • Round positive whole numbers to the nearest 10, 100 or 1000	Integer Round	Recognising the accuracy of measurements in Technology and Science
Step 2	• Be able to put positive decimals into ascending or descending order. Decimals should be to 4 or 5 significant figures • Be able to use > or < correctly between two positive decimals. Decimals should be to 4 or 5 significant figures • Know what each digit represents in numbers with up to two decimal places • Put digits in the correct place in a calculation	**Ascending** **Descending** Integer Round	
Step 3	• Compare decimals in different contexts • Round numbers to decimal places • Approximate before carrying out an addition or subtraction	**Approximate** Ascending Descending Integer Round	
Step 4	• Add and subtract decimals - positive and negative • Be able to put positive and negative decimals into ascending or descending order. Decimals should be to 4 or 5 significant figures • Be able to use > or < correctly between two negative decimals. Decimals should be to 2 or 3 significant figures • Check a result by considering if it is of the right order of magnitude • Make estimates and approximations of calculations - use a range of ways to find an approximate answer • Round integers to a given number of significant figures • Use rounding to the nearest 10 or a nice number, e.g. 62 to 63 when dividing by 9 etc. • Work with numbers rounded to whole numbers or to 1 or 2 decimal places to estimate solutions	**Significant figures** Approximate Ascending Descending Integer Round	
Step 5	• Multiply and divide decimals - positive and negative • Use one calculation to find the answer to another • Round integers and decimals to a given number of significant figures	Significant figures Approximate Ascending Descending Integer Round	
Step 6	• Understand the effect of multiplying or dividing any number between 0 and 1 • Use one calculation to find the answer to another • Identify upper and lower bounds for rounding of discrete and continuous data • Know there are different ways of finding an approximate answer • Use numbers of any size rounded to 1 significant figure to make standardised estimates for calculations with one step	**Bounds (upper and lower)** Significant figures Approximate Ascending Descending Integer Round	
Step 7	• Round numbers and measures to an appropriate degree of accuracy (dp or sig fig) • Check reasonableness of answers • Estimate answers to calculations by rounding numbers to 1 sig. fig • Estimate answers to one- or two-step calculations	**Degree of accuracy** Bounds (upper and lower) Significant figures Approximate Ascending Descending	

		Integer Round	
Step 8	• Identify the upper and lower bounds of a measurement • Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half in either direction. Use error intervals.	**Error intervals** Degree of accuracy Bounds (upper and lower) Significant figures Approximate Ascending Descending Integer Round	
Step 9	• Calculate the upper and lower bounds of 2-D measurements involving addition e.g. perimeter • Use inequality notation to specify simple error intervals due to truncation or rounding	**Inequality notation** Error intervals Degree of accuracy Bounds (upper and lower) Significant figures Approximate Ascending Descending Integer Round	
Step 10	• Calculate the upper and lower bounds of 2-D measurements e.g. area • Calculate the upper and lower bounds of 2-D measurements involving subtraction e.g. difference in length • Find upper and lower bounds of calculations that involve division	Inequality notation Error intervals Degree of accuracy Bounds (upper and lower) Significant figures Approximate Ascending Descending Integer Round	
Step 11	• Calculate the upper and lower bounds of other compound measurements e.g. density	Inequality notation Error intervals Degree of accuracy Bounds (upper and lower) Significant figures Approximate Ascending Descending Integer Round	

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 1	Unit: Area and Perimeter		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Find the perimeter of a square/rectangle by counting • estimate the area of a irregular shape by counting squares	**Perimeter** **Area**	Designing product packaging from nets in Technology.
Step 2	• Find the perimeter of a square/rectangle knowing the formula	**Formula** Perimeter Area	
Step 3	• Calculate perimeter and area of compound shapes made from triangles, rectangles and other shapes • Calculate the surface area of cubes with a net • Use nets to calculate the surface area of simple cuboids • Use the formula for the area of a rectangle/square	**Compound shape** **Surface area** **Net** Formula Perimeter Area	
Step 4	• Calculate the perimeter and area of shapes made from rectangles • Calculate the surface area of cubes, without a net • Calculate the surface area of simple cuboids (without use of nets) • Find the area of triangles by counting i.e. adding full and partial squares	**Cube** **Cuboid** Compound shape Surface area Net Formula Perimeter Area	
Step 5	• Calculate areas of compound shapes made from rectangles and triangles • Deduce and use formulae for the area of a triangle • Use a formula to calculate the area of parallelograms	**Parallelogram** Cube Cuboid Compound shape Surface area Net Formula Perimeter Area	
Step 6	• Calculate surface areas of shapes made from cuboids, for lengths given as whole numbers • Deduce and use formula for the area of a trapezium • Deduce and use the formula for the area of a parallelogram • Know the formulae for the circumference and area of a circle given the radius or diameter	**Trapezium** **Circumference** **Radius** **Diameter** Parallelogram Cube Cuboid Compound shape Surface area Net Formula Perimeter	

		Area	
Step 7	• Find the perimeters and areas of semicircles and quarter circles • Use the formulae for the circumference and area of a circle, given the circumference or area, to calculate the radius or diameter • Calculate the surface area of right prisms	**Semicircle** **Right prism** Trapezium Circumference Radius Diameter Parallelogram Cube Cuboid Compound shape Surface area Net Formula Perimeter Area	
Step 8	• Find the surface area of simple shapes (prisms) using the formulae for triangles and rectangles, and other shapes • Recognise the formulae for area of sectors in a circle. • Recognise the formulae for length of arcs in a circle.	**Sector** **Arc** Right prism Trapezium Circumference Radius Diameter Parallelogram Cube Cuboid Compound shape Surface area Net Formula Perimeter Area	
Step 9	• Calculate the surface area of pyramids, cones and spheres • Use the formulae to find the length of an arc and the area of a sector	**Cone** **Pyramid** **Sphere** Sector Arc Right prism Trapezium Circumference Radius Diameter Parallelogram Cube Cuboid	

		Compound shape Surface area Net Formula Perimeter Area	
Step 10	• Find the surface area of compound solids constructed from cubes, cuboids, cones, pyramids, spheres, hemispheres, cylinders • Solve problems including examples of solids in everyday use	**Hemisphere** Cone Pyramid Sphere Sector Arc Right prism Trapezium Circumference Radius Diameter Parallelogram Cube Cuboid Compound shape Surface area Net Formula Perimeter Area	
Step 11	• Use the formulae for length of arcs and area of sectors of circles to solve problems.	Hemisphere Cone Pyramid Sphere Sector Arc Right prism Trapezium Circumference Radius Diameter Parallelogram Cube Cuboid Compound shape Surface area Net Formula Perimeter	

		Area	
Step 12	• Find the area of a segment of a circle given the radius and length of the chord • Solve problems involving more complex shapes and solids, including segments of circles and frustums of cones	**Chord** **Segment** Hemisphere Cone Pyramid Sphere Sector Arc Right prism Trapezium Circumference Radius Diameter Parallelogram Cube Cuboid Compound shape Surface area Net Formula Perimeter Area	

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 1	Unit: Basic Algebra		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 3	• Substitute positive integers into simple formulae expressed in words • Use function machines to create expressions • Simplify expressions involving multiplication and division (e.g. 3 x e x f x 5 = 15ef) • Simplify simple linear algebraic expressions by collecting like terms (e.g. a + a + a, 3b + 2b) • Use distributive law with brackets, with numbers • Use notation and symbols correctly	Formula Expression Like terms	Using letters to represent variables in Science
Step 4	• Create basic expressions from worded examples (e.g. 6 more than x = x + 6) • Explain the distinction between equations, formulae and functions • Identify variables and use letter symbols (e.g. in 'the cost of hiring a van...' let c = cost, v = van) • Simplify algebraic expressions by collecting like terms • Substitute integers into more complex formulae expressed in letter symbols, e.g. a/b, ax +/- b • Know that expressions can be written in more than one way, e.g. 2 × 3 + 2 × 7 = 2(3 + 7) • Multiply together two simple algebraic expressions, e.g. 2a × 3b • Use arithmetic operations with algebra • Begin to multiply a single positive term over a bracket containing linear terms e.g. 4(x+3)	Equation Function	
Step 5	• Substitute positive and negative integers into simple formulae • Substitute positive integers into more complex formulae (involving brackets and more than one operation) expressed in letter symbols (e.g. D = n(n − 3)/2 where D is the number of diagonals in a polygon of n sides) • Understand the difference between an expression and an equation and the meaning of the key vocabulary 'term' • Understand the different role of letter symbols in formulae and functions • Write expressions to solve problems representing a situation	T erm	
Step 6	• Substitute a positive or negative value into the expression x^2 • Substitute positive and negative integers into expressions involving small powers (up to 3) • Factorise to one bracket by taking out the highest common factors when the highest common factor is one term e.g. 4x + 8 = 4(x + 2) or $4x^2 + 5x = x(4x + 5)$ • Recognise when an expression is not factorised completely. • Use the distributive law to take out numerical common factors, e.g. 6a + 8b = 2(3a + 4b) • Know that expressions involving repeated multiplication can be written as n, n^2, n^3 • Understand the difference between 2n and n^2 • Multiply a single term over a bracket eg ax(bx + c)	Common factor	
Step 7	• Know and understand the meaning of an identity and use the≠ sign • Select an expression/ equation/ formula/identity from a list • Simplify simple expressions involving index notation • Multiply out brackets involving positive or negative terms (a ± b)(c ± d) and collect like terms	Identity Factorise	
Step 8	• Factorise quadratic expressions of the form $ax^2 + bx + c$ where a = 1, including the difference of two squares • Factorise to one bracket by taking out the highest common factors for all terms e.g. $2x^2y + 6xy^2 = 2xy(x + 3y)$ • Simplify expressions involving brackets and powers e.g. $x(x^2+x+4)$, 3(a + 2b) − 2(a + b) • Simplify more complex expressions involving index notation. E.g. $3a^4b^2 \times 5a^3b^{-1}$, $(3a^4)^2$	Quadratic	
Step 9	• Factorise quadratic expressions of the form $ax^2 + bx + c$ where a = 1, including the difference of two squares • Factorise to one bracket by taking out the highest common factors for all terms e.g. $2x^2y + 6xy^2 = 2xy(x + 3y)$	Difference of two squares	

	• Simplify expressions involving brackets and powers e.g. $x(x^2+x+4)$, $3(a + 2b) - 2(a + b)$ • Simplify more complex expressions involving index notation. E.g. $3a^4b^2 \times 5a^3b^{-1}$, $(3a^4)^2$ • Multiply out brackets involving positive or negative terms $(a \pm b)(c \pm d)$		
Step 10	• Simplify algebraic fractions involving factorising quadratic expressions of the form $x^2 \pm bx \pm c$ either in the numerator or denominator. • Add, subtract and simplify algebraic fractions where the denominators are both algebraic expressions • Factorise more complex expressions with the difference of two squares e.g. $(p^2 - 4) - (p - 2)^2$ • Expand two or more brackets		
Step 11	• Simplify algebraic fractions involving factorising quadratic expressions of the form $ax^2 \pm bx \pm c$ where $a \neq 1$ either in the numerator or denominator • Factorise quadratic expressions of the form $ax^2 + bx + c$ where $a \neq 1$		
Step 12	• Simplify and manipulate algebraic expressions involving surds and algebraic fractions		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 1	Unit: Fractions		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Identify the fraction of a shaded shape • Shade in a given fraction • Find 1/2 of a number	Fraction	Fraction calculations in a range of subjects
Step 2	• Add/subtract fractions with the same denominator • Find 1/2, 1/4, 1/10 of a number • Recognise when fractions are equivalent to 1/2 or 1/4, maybe using diagrams to help	Denominator Numerator	
Step 3	• Use fraction notation to describe parts of shapes • Know how many unit fractions in a whole • Find unit fractions of an amount eg 1/7 of 21	Unit fraction	
Step 4	• Simplify fractions by cancelling all common factors • Convert improper fractions to mixed numbers; convert mixed numbers to improper fractions. Example: $^{9}/_{2} = 4\ ^{1}/_{2}$, $^{6}/_{4} = 1\ ^{2}/_{4} = 1\ ^{1}/_{2}$, $^{29}/_{12} = 2\ ^{5}/_{12}$ • Find non-unit fractions of amounts. Example: $^{2}/_{7}$ of 42, $^{2}/_{5}$ of 60, $^{5}/_{9}$ of 54 • Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. Example: $^{14}/_{4} = 3\ ^{1}/_{2}$, $^{16}/_{6} = 2\ ^{2}/_{3}$ $^{2}/_{4}$, $^{8}/_{16}$, $^{4}/_{8} = ^{1}/_{2}$ • Use knowledge of equivalence to compare and order fractions. Example: $^{2}/_{3} < ^{5}/_{6}$ $^{7}/_{10} < ^{4}/_{5}$ $^{3}/_{4}$, $^{9}/_{12}$, $^{30}/_{40} = ^{3}/_{4}$ • Identify equivalent fractions	Common factor Simplify Equivalent	
Step 5	• Use fraction notation to express a smaller whole number as a fraction of a larger one • Multiply fractions less than 1 by whole numbers. Example: $2 \times ^{2}/_{3}$, $2 \times ^{5}/_{6}$, $4 \times ^{2}/_{5}$ • Multiply pairs of unit fractions by reading the × sign as 'of'. Example: $^{1}/_{2} \times ^{1}/_{5}$, $^{1}/_{4} \times ^{1}/_{3}$, $^{1}/_{3} \times ^{1}/_{7}$ • Add/subtract fractions where you only need to change one fraction		
Step 6	• Add and subtract fractions, with different denominators and mixed numbers, using the concept of equivalent fractions. Example: $^{1}/_{6} + ^{1}/_{9}$ $^{5}/_{6} - ^{3}/_{8}$ $^{2}/_{3} + ^{3}/_{5}$ • Associate a fraction with division to find an unknown number using inverse operations. Example: $^{88}/_{m} = 4$. What is *m*? $^{w}/_{3} = 12$. What is *w*? • Multiply and divide simple fractions – proper and improper, positive and negative • Multiply simple pairs of proper fractions writing the answer in its simplest form; understand that if two numbers less than 1 are multiplied, the answer is smaller than either. Example: $^{3}/_{4} \times ^{1}/_{2}$, $^{2}/_{3} \times ^{1}/_{2}$, $^{2}/_{3} \times ^{1}/_{4}$ • Multiply unit fractions by non-unit fractions, writing the answer in its simplest form. Example: $^{1}/_{2} \times ^{2}/_{3}$, $^{1}/_{4} \times ^{2}/_{3}$, $^{1}/_{3} \times ^{3}/_{10}$ • Use equivalence to add and subtract proper fractions and mixed numbers with related or unrelated denominators, and spot and test a rule. Example: $^{1}/_{2} + ^{1}/_{3}$, $^{1}/_{6} + ^{1}/_{5}$, $^{1}/_{2} - ^{1}/_{4}$	Proper fraction Improper fraction Mixed number	
Step 7	• Add and subtract fractions (mixed) - positive and negative • Divide a fraction by an integer • Divide proper fractions by whole numbers. Example: $^{3}/_{4} \div 2$, $^{1}/_{4} \div 4$, $^{1}/_{6} \div 3$		
Step 8	• Multiply and divide simple fractions (mixed) - positive and negative • Given a fraction and the result, find the original amount e.g. 4/5 of a number is 20, find the number • Multiply and divide mixed numbers		
Step 9	• Add, subtract and simplify algebraic fractions where the denominator is a whole number		
Step 10	• Add, subtract and simplify algebraic fractions where the denominators are both algebraic expressions		
Step 11	• Simplify algebraic fractions involving factorising quadratic expressions of the form $ax^2 \pm bx \pm c$ where $a \neq 1$ either in the numerator or denominator		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 2	Unit: Coordinates		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1/2	• Read *x* and *y* coordinates in the first quadrant	Coordinate Quadrant	Map skills in Geography
Step 3	• Draw, label and scale axes • Use conventions and notation for 2D coordinates in all four quadrants	Scale Axis.axes	
Step 4	• Describe positions on the full coordinate grid (all four quadrants). Example: Draw and join these points: *A* (1, –1), *B* (5, –1), *C* (1, –5). Reflect this triangle in the *y*-axis and write the new coordinates. What do you notice? • Identify points with given coordinates and coordinates of a given point in all four quadrants • Plot and draw graphs of y = a, x = a, y = x and y = -x • Read *x* and *y* coordinates in all four quadrants	Reflect	
Step 5	• Find the coordinates of points identified by geometrical information in 2D (all four quadrants) for simple shapes (e.g. squares and rectangles) • Draw and recognise lines parallel to axes, and also $y = x$ and $y = -x$ • Plot a graph of a simple linear function in the first quadrant. • Plot and draw graphs of straight lines using a table of values given in the form $y = mx + c$	Parallel Linear function	
Step 6	• Find the coordinates of the midpoint of a line from a given graph • Given the coordinates of points A and B, calculate the midpoint of AB • Plot the graphs of simple linear functions in the form y = mx + c in four quadrants	Midpoint	
Step 7	• Construct a table of values, including negative values of x for a function such as $y = ax^2$ • Plot and draw graphs of straight lines using a table of values given in the form ax + by = c • Generate points and plot graphs of simple quadratic functions, then more general functions	Table of values	
Step 8	• Generate points and plot graphs of simple cubic functions, then more general functions • Given the coordinates of points A and B, calculate the length of AB	Cubic	
Step 9	• Find the coordinates of the midpoint of a line from coordinates using a formula • Generate points and plot graphs of more complex cubic functions		
Step 10	• Plot graphs of exponential functions in the form $y = a^x$ for integer values of *x* and simple positive values of *a*	Exponential	
Step 11	• Construct the graphs of simple loci including the circle $x^2 + y^2 = r^2$ for a circle of radius r centred at the origin of the coordinate plane • Plot graphs of the exponential function $y = k^x$ for integer values of x and simple positive values of k	Loci	
Step 12	• Plot graphs of exponential functions in the form $y = ab^x$ for integer values of *x* and simple positive values of *a* and *b*		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 2	Unit: Use of Maths equipment		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1/2	• Measure lines to the nearest millimetre • Use a protractor to measure acute angles to the nearest degree • Construct diagrams of everyday 2D situations involving rectangles, triangles, and perpendicular and parallel lines	Acute Protractor	Accurate drawing in Technology, reading scales of measuring equipment in Science and in Geography field work
Step 3	• Begin to estimate the size of angles • Measure shapes to find perimeters and areas • Use a protractor to draw acute angles to the nearest degree • Use a protractor to measure obtuse angles to the nearest degree • Use a protractor to measure reflex angles to the nearest degree • Construct diagrams of everyday 2D situations involving rectangles, triangles, and perpendicular and parallel lines • Draw 2D shapes using given dimensions and angles. Example: Use a ruler and a protractor to draw a square with 7 cm sides. • Draw a right-angled triangle with base 8 cm and height 6 cm and work out what the two missing angles are	Obtuse Reflex	
Step 4	• Use a protractor to draw obtuse angles to the nearest degree • Use a protractor to draw reflex angles to the nearest degree • Use ruler and protractor to construct simple nets of 3D shapes, using squares, rectangles and triangles (e.g. regular tetrahedron, square-based pyramid, triangular prism)	Net	
Step 5	• Use straight edge and compasses to construct the midpoint and perpendicular bisector of a line segment • Measure a bearing between the points on a map or scale plan • Understand and use the language associated with bearings	Midpoint Perpendicular bisector	
Step 6	• Construct a regular hexagon inside a circle • Construct an equilateral triangle • Use straight edge and compasses to construct a triangle given three sides (SSS) • Use straight edge and compasses to construct the bisector of an angle	SSS triangle Angle bisector	
Step 7	• Mark on a diagram the position of point B given its bearing from the point A • Use accurate drawing to solve bearings problems • Construct angles of 60°, 90°, 30°, 45° • Draw the locus equidistant between 2 points or from a point • Use construction to find the locus of a point that moves according to a rule • Use straight edge and compass to construct the perpendicular from or to a point on a line segment	Bearing Locus/loci Equidistant	
Step 8	• Understand how standard constructions using straight edge and compasses relate to the properties of two intersecting circles with equal radii • Understand that a locus in 3D can be a plane or curved surface and extend understanding of loci to include 3D problems, e.g. know that all the points equidistant from a single point in space form the surface of a sphere • Use straight edge and compasses to construct a triangle, given right angle, hypotenuse and side (RHS)		
Step 9	• Shade regions given two or more loci rules		
Step 10	• Know that the perpendicular from the centre to the chord bisects the chord • Know that the perpendicular distance from a point to a line is the shortest distance to the line		
Step 11	• Understand and use the fact that tangents to a circle from an external point are equal in length		
Step 12	• Use geometric facts involving circles to solve complex loci problems		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 2	Unit: Linear Equations		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Fill empty boxes in calculations using inverse operations • Use function machines to solve two step problems including working backwards	Inverse	Solving equations in context in Science
Step 2	• Use function machines to solve multi step problems including working backwards		
Step 3	• Begin to use letters to represent unknowns to be found		
Step 4	• Enumerate possibilities of combinations of two variables. Example: $a + b + 19 = 28$ and $a \times b = 14$. Work out the possible pairs of numbers that a and b could be. • Express missing number problems algebraically • Solve simple linear one step equations	Variable	
Step 5	• Construct equations from worded contexts and solve them		
Step 6	• Construct and solve two step equations, (only integer coefficients, no brackets)		
Step 7	• Solve linear equations with the unknown on both sides, including from geometrical contexts • Construct and solve equations involving brackets		
Step 8	• Solve two linear simultaneous equations algebraically, where neither or one equation needs multiplying	Simultaneous	
Step 9	• Solve a pair of linear equations by either substitution or multiplying one or both equations		
Step 10	• Construct and solve a pair of linear simultaneous equations in the most efficient way		
Step 11	• Appreciate the solution of a pair of simultaneous equations is the intersection point of the two lines on a graph	Intersection	
Step 12	• Solve linear simultaneous equations graphically		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 2	Unit: Ratio		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Convert between metric units of length and mass given the conversion factor	Metre Centimetre Millimetre Gram Kilogram	Scaling recipes in Food Technology Using map scales in Geography
Step 2	• Convert between metric units of weight and capacity given the conversion factors	Volume Litre Centilitre Millilitre	
Step 3	• Estimate length using a scale diagram • Draw lines and shapes to scale • Use and interpret scale drawings • Use approximate imperial and metric equivalents to convert	Scale Metric imperial	
Step 4	• Use ratio notation • Reduce a ratio to simplest form • Express the division of a quantity into a number of parts as a ratio • Solve best buy problems by comparing equivalent quantities or costs	Ratio Best buy/best value	
Step 5	• Use the unitary method to solve simple word problems involving ratio and direct proportion • Use a ratio to find one quantity when the other is known • Use proportional reasoning to solve a problem, eg if 10 matches weigh 40 grams what would 15 weigh? • Reduce ratios to their simplest form, including three-part ratios • Use ratio to scale recipes etc	Unitary	
Step 6	• Divide a given quantity into two parts in a given part : part or part : whole ratio • Divide a quantity into two parts in a given ratio, where ratio given in ratio notation • Understand the relationship between fractions and ratios, write fractions as ratios and ratios as fractions • Solve problems involving simple ratios, i.e. unequal sharing and grouping using knowledge of fractions and multiples. Eg the ratio of blue tiles to orange tiles is 3:5. There are 16 tiles altogether. How many are orange? • Simplify a ratio expressed in fractions or decimals • Use and interpret maps, using proper map scales (1 : 25 000)	Map scale	
Step 7	• Compare ratios by changing them to the form 1 : m or m : 1 • Divide a quantity into more than two parts in a given ratio • Use and interpret scale drawings, where scales use mixed units, and drawings aren't done on squared paper, but have measurements marked on them • Simplify a ratio expressed in different units • Use measures in ratio and proportion problems (currency conversion, rates of pay, best value)	Proportion currency	
Step 8	• Interpret and write ratios to describe a situation including links to fractions and percentages • Solve a ratio problem in context		
Step 9	• Write a ratio as a linear function and a linear function as a ratio. Eg 3x=4y what is ratio x:y?	linear	
Step 10	• Solve problems involving ratios given as mixed numbers		
Step 11	• Solve complex ratio problems eg ratio of A:B and B:C given, what is ratio of A:C? etc		
Step 12	• Solve algebraic problems involving ratio		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 2	Unit: Expand, factorise and solve		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Use BIDMAS in simple cases to understand we do the brackets first		
Step 2	• Understand that 5(3+4) is the same as 5x7		
Step 3	• Use the distributive law with brackets with numbers		
Step 4	• Multiply a single positive term over a bracket containing linear terms e.g. 4(x+3)	bracket	
Step 5	• Multiply a single positive numerical or algebraic term over a bracket containing linear terms e.g. 4(x+3), x(x+3) and link to area type problems • Multiply a single term over a bracket eg ax(bx + c)	term	
Step 6	• Multiply a single term over a bracket eg ax(bx + c) • Simplify after multiplying a single term over a bracket eg 2(x+3)+5(2x-4) • Use the distributive law to take out numerical common factors, e.g. 6a + 8b = 2(3a + 4b) • Factorise to one bracket by taking out the highest common factors when the highest common factor is one term e.g. 4x + 8 = 4(x + 2) or $4x^2 + 5x = x(4x + 5)$	Factor Common factor factorise	
Step 7	• Solve quadratic equations of the form $ax^2 + bx = 0$ • Factorise to one bracket by taking out the highest common factors for all terms e.g. $2x^2y + 6xy^2 = 2xy(x + 3y)$ • Recognise when an expression is not factorised completely.	Highest common factor	
Step 8	• Multiply out brackets involving positive or negative terms (ax ± b)(cx ± d) • Factorise quadratic expressions of the form $ax^2 + bx + c$ where $a = 1$, including the difference of two squares • Solve quadratic equations in the form form $ax^2 + bx + c = 0$ where $a = 1$, including the difference of two squares by factorising	quadratic	
Step 9	• Construct more complex expressions involving expanding double brackets (ax ± b)(cx ± d) and simplifying • Predict that $(a + b)(a - b) = a^2 - b^2$ • Factorise to one bracket more complex expressions where the factor is an expression e.g. 2q(p + 1) - 3p(p + 1) • Express $ax^2 + bx + c$ where $a = 1$ in completed square format and use this to solve quadratic equations		
Step 10	• Factorise more complex expressions with the difference of two squares e.g. $(p^2 - 4) - (p - 2)^2$ • Use the quadratic formula to solve quadratic equations		
Step 11	• Factorise quadratic expressions of the form $ax^2 + bx + c$ where $a \neq 1$ • Solve quadratic equations in the form $ax^2 + bx + c = 0$ where $a \neq 1$ by factorising • Express $ax^2 + bx + c = 0$ where $a \neq 1$ in completed square format and use to solve quadratic equations		
Step 12	• Use the discriminant to understand why some quadratics have no solution		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 2	Unit: Transformations		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Draw sketches of shapes • Identify all the symmetries of 2D shapes • Recognise properties of rectangles • Recognise properties of squares • Understand and use the language associated with reflections • Recognise where a shape will be after reflection • Understand and use the language associated with translations	Symmetry Translate reflect	Design in Art and Technology
Step 2	• Identify quadrilaterals from everyday usage • Recognise reflection symmetry • Recognise and visualise the reflection in a mirror line of a 2D shape • Recognise where a shape will be after translation • Translate a shape on a square/coordinate grid • Understand and use the language associated with rotations	Rotation Degrees Clockwise Anticloockwise	
Step 3	• Identify angle, side and symmetry properties of simple quadrilaterals • Identify simple angle, side and symmetry properties of triangles • Recognise and visualise the symmetry of a 2D shape: line symmetry • Recognise and visualise rotation about a given point (rotation point must be outside the shape)	Rotation point Centre of rotation	
Step 4	• Draw or complete diagrams with a given number of lines of symmetry • Draw or complete diagrams with a given order of rotational symmetry • Find co-ordinates of points determined by geometric information • Identify and begin to use angle, side and symmetry properties of quadrilaterals • Identify regular and irregular polygons • List the properties of each, or identify (name) a given shape • Name all quadrilaterals that have a specific property • Recognise and visualise the rotational symmetry of a 2D shape • Enlarge a given shape using a whole number scale factor (without a centre of enlargement) • Reflect shapes in the x or y axes	Regular Irregular Enlarge Scale factor Axes	
Step 5	• Draw and translate simple shapes on the coordinate plane, and reflect them in the axes. Example: Plot the points (–6, 5), (–4, 3), (–2, 5), (–2, –1), (–4, –3), (–6, –1), and join them. Add the same number to the *x*-coordinates to slide the hexagon across, or to the *y*-coordinates slide the shape up. • Enlarge a given shape using a fractional scale factor such as 1/2 or 1/3 (without a centre of enlargement) • Know that translations, rotations and reflections preserve length and angle • Recognise that enlargements preserve angle but not length		
Step 6	• Enlarge 2D shapes, given a centre of enlargement and a positive whole number scale factor • Enlarge a given shape using (0, 0) as the centre of enlargement with a positive whole number scale factor	Centre of enlargement	

	• Enlarge shapes with a centre other than (0, 0) with a positive whole number scale factor • Find the centre of enlargement • Find the scale factor of enlargement where the scale factors is a positive whole number • Rotate shapes about a centre of rotation other the (0,0) given an angle of 90^o ,180^o or 270^o and direction of turn • Reflect shapes on a mirror line such as y = x, y = -x		
Step 7	• Colour in missing squares to complete a reflection or rotation • Describe an enlargement using the scale factor and the centre of enlargement where the scale factor is a positive whole number • Describe reflections on a coordinate grid • Enlarge 2D shapes, given a fractional scale factor with a centre of enlargement (0,0) • Enlarge 2D shapes, given a fractional scale factor with a centre of enlargement other than (0,0) • Find the centre of rotation • Find the scale factor of enlargement where the scale factors is a positive fraction • Recognise whether a reflection is correct • Use 2D Vector notation for translation • Translate a shape using a vector	vector	
Step 8	• Describe an enlargement using the scale factor and the centre of enlargement where the scale factor is a positive fraction • Enlarge a 2D shape given a negative scale factor about a centre (0,0) • Know the coordinates of points after they have been reflected in the x axis, y axis and line y = -x without a diagram • Transform 2D shapes by a more complex combinations of reflections and describe the resultant single transformation • Transform 2D shapes by simple combinations of rotations, translations and enlargements		
Step 9	• Describe an enlargement using the scale factor and the centre of enlargement where the scale factor is negative • Enlarge a 2D shape given a negative scale factor about a centre other than (0,0)		
Step 10	• Describe an enlargement using the scale factor and the centre of enlargement where the scale factor is negative and a fraction • Enlarge 2D shapes, given a negative, fractional scale factor and a centre of enlargement • Find the coordinates of an object given the coordinates of its image after combinations of different transformations		
Step 11	• Understand invariance with transformations and identify invariant points in completed transformations	invariant	
Step 12	• Understand the geometry behind invariant points eg rotation around a coordinate (x,y) then (x,y) will always be invariant		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 3	Unit: Indices, surds, factors, multiples and primes		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Apply simple tests of divisibility (2, 9, 10, 5) • Know square numbers up to 100 and their square roots	Divisible square	Accuracy of answers in Science calculations
Step 2	• Recognise the first few triangular numbers • Apply simple tests of divisibility (3, 6, 4, 25)	triangular	
Step 3	• Find all the factor pairs for any whole number without any support • Determine factors and multiples of numbers by listing • Identify numbers with exactly 2 factors (primes) • Recognise and use multiples and factors (divisors) and use simple tests of divisibility • Recognise that every number can be written as a product of two factors • Understand the difference between factors, multiples and prime numbers • Understand the vocabulary of prime numbers, factors (divisors), multiples, common factors, common multiples.	Factor Multiple Product Prime Common factor Common multiple	
Step 4	• Use index notation for squares and cubes and for positive integer powers of 10 (e.g. write 27 as 3^3 and 1000 as 10^3) • Find common factors and primes • Find the HCF or LCM of two numbers • "Identify common factors, common multiples and prime numbers. Example: What are the common factors of 24 and 30? What is the smallest prime number?" • Know the prime factorisation of numbers up to 30, giving answers as powers • Recognise and use common factor, highest common factor and lowest common multiple • Recognise two digit prime numbers	Index notation Indices HCF LCM Prime factorisation	
Step 5	• Be able to estimate square roots of non square numbers less than 100 • Extend mental calculations to cubes and cube roots • Extend mental calculations to squares and square roots • Find and interpret roots of non square numbers using square root key • Give the positive and negative square root of a square number • Know all the squares of numbers less than 16 and know the square root given the square number • Recall the cubes of 2, 3, 4, 5 and 10 • Use index notation for small integer powers, e.g. $24 = 3 \times 2^3$ • Use positive integer powers and associated real roots (square, cube and higher) • Find lowest common multiple by listing • Find the prime factor decomposition of a number less than 100 • Recognise rules relating to odd and even numbers • Understand the vocabulary of highest common factor, lowest common multiple	Square root	
Step 6	• Establish index laws for positive powers where the answer is a positive power • Extend the patterns by using the index law for division established for positive power answers, to show that any number to the power of zero is 1 • Mentally calculate the squares of numbers less than 16 multiplied by a multiple of ten, e.g. 0.2, 300, 0.400 • Use the HCF to solve problems • Use the LCM to solve problems • Use the HCF and LCM to solve problems		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

Step 7	• Use the index laws to include negative power answers and understand that these answers are smaller than 1 • Be able to estimate square roots to 1 decimal place of non square numbers less than 100 • Use the laws of indices to multiply and divide numbers written in index notation • Use the square, cube and power keys on a calculator • Use an extended range of calculator functions, including +, -, x, , x^2, √x, memory, xy, x1/y, brackets • Find HCF and LCM using prime factors • Recognise that prime factor decomposition of a positive integer is unique • Use prime factorisation to represent a number as a product of its primes using index notation	Product of primes	
Step 8	• Calculate with roots (surds - exact values) • Use the laws of indices for a number written in index form raised to a power e.g. $(3^2)4$ • Given a number written as a product of it prime factors, use this to write a multiple of the number as a product of its prime factors	Surds	
Step 9	• Evaluate a number written with a negative power • Estimate powers and roots of any given positive number • Recall that $n^0 = 1$ and n-1 = 1/n for positive integers n as well as $n^{1/2} =$ √n and $n^{1/3} = \sqrt[3]{n}$ for any positive number n		
Step 10	• Understand that the inverse operation of raising a positive number to a power n is raising the result of this operation to the power 1/n • Simplify surd expressions involving squares (e.g. √12 = √ (4 × 3) = 2 √3) • Use fractions, surds and pi in exact calculations, without a calculator		
Step 11	• "Evaluate a number written as a negative or fractional power • e.g. 64 -2/3" • Find the value of calculations using indices including fractional and negative indices • Rationalise a denominator when the denominator is a single surd e.g. 3/ √2 • Solve problems involving simplifying surds and rationalising the denominator • Solve problems involving negative and fractional indices e.g. 1/16 = 2n , 27-1/3 x 93/2 • Write $(3 - \sqrt{3})^2$ in the form a + b√3		
Step 12	• Rationalise a denominator when the denominator is an expression involving surds e.g. (6 + √2) / (8 - √2)		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 3	Unit: Angles and Circle Theorems		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Know the sum of angles on a straight line • Tessellate combinations of polygons practically • Draw sketches of shapes • Identify all the symmetries of 2D shapes	tesselate	Bearings and map skills in Geography
Step 2	• Identify parallel lines • Know the sum of angles around a point • Identify quadrilaterals from everyday usage • Know that the sum of angles in a triangle is 180° • Use correct notation for labelling lines	Parallel	
Step 3	• Consolidate classifying angles as acute, right, obtuse or reflex. Example: 23° = acute • Distinguish between acute, obtuse and reflex angles • Identify perpendicular lines • Use correct notation for labelling angles • Calculate angles in a triangle • Mark perpendicular lines on a diagram • Recognise and visualise the symmetry of a 2D shape: line symmetry • Use correct notation for labelling triangles	Acute Obtuse Reflex Right angles Perpendicular	
Step 4	• Calculate angles around a point • Derive and use the fact that an exterior angle of a triangle is equal to the sum of the two opposite interior angles • Derive and use the sum of angles in a triangle and a quadrilateral • Identify interior and exterior angles in a shape • Know the definition of a set of lines that are perpendicular to each other • Recognise and use vertically opposite angles • Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. Example: Angles on a straight line add up to 180°. The given angles are 70° + 45° = 115°. The missing angle is 180° – 115° = 65°." • Use sum of angles in a triangle to find missing angle values • Use the fact that the sum of the interior angle and the exterior angle is 180° • Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons; find missing angles at a point, vertically opposite, or on a straight line (e.g. Rectangles are quadrilaterals with two sets of equal sides and four right angles) • Identify regular and irregular polygons • Solve geometric problems using side and angle properties of equilateral and isosceles triangles • Solve simple geometric problems using properties of quadrilaterals • Solve simple geometric problems using properties of triangles	Exterior Interior Vertically opposite Polygon Regular Irregular	
Step 5	• Identify alternate, corresponding and co-interior on parallel lines and their values. • Know that the sum of the exterior angles in a polygon is 360° • Solve harder problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons, by looking at several shapes together	Alternate Corresponding Co-interior	
Step 6	• Calculate the interior angles of regular polygons	Radius Diameter	

	• Compare and classify geometric shapes based on their properties and sizes and use mathematical reasoning to find unknown angles in any triangles, quadrilaterals, and regular polygons • Prove the sum of the interior angles in a triangle using parallel lines • Use the sum of angles in a triangle to deduce and use the angle sum in any polygon • Use the fact that the sum of the exterior angles of any polygon is 360° • Use co-interior angles and their values to decide if two lines are parallel. • Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius • Solve geometric problems using side and angle properties of equilateral, isosceles and right-angled triangles		
Step 7	• Calculate the interior angles of any polygons • Find the size of each interior angle or the size of each exterior angle or the number of sides of a regular polygon • Use the sum of the interior angles of an n-sided polygon		
Step 8	• Solve angle problems by constructing and solving equations • Solve two or more step angle problems using angle facts for parallel lines including the use of bearings • Use two or more step angle problems by finding interior or exterior angles in regular polygons • Solve problems involving angles, triangles and circles • Derive the fact that base angles of isosceles triangles are equal		
Step 9	• Prove and use facts about the angle subtended at the centre and at the circumference; • Prove and use the fact that angles in the same segment are equal • Prove and use the fact that opposite angles of a cyclic quadrilateral sum to 180° • Prove and use the fact that the angle in a semicircle is a right angle • Know that the perpendicular from the centre to the chord bisects the chord • Know that the tangent at any point on a circle is perpendicular to the radius at that point	Subtended Segment Cyclic quadrilateral	
Step 10	• Use circle theorems including tangent properties to circles to prove results		
Step 11	• Give reasons for angle and length calculations involving the use of tangent theorems • Give reasons for angle sizes using mathematical language • Use a combination of circle theorems to prove geometrical problems • Understand and use the fact that tangents to a circle from an external point are equal in length		
Step 12	• Prove and use the alternate segment theorem	Alternate segment theorem	

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 3	Unit: Percentages		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Define percentages as number of parts per hundred • Shade in a given percentage of a hundred square	Percentage	Percentages from surveys in life skills
Step 2	• Identify 50% as a half and 25% as a quarter, represent this visually	Quarter Half	
Step 3	• Calculate simple percentages 50%, 25%, 75%, 10% • Extend mental methods of calculation to include percentages		
Step 4	• Express one given number as a percentage of another • Find a percentage of a quantity using a multiplier on a calculator eg 14% x by 0.14 • Interpret percentage and percentage change as a fraction or a decimal • Use percentages to compare simple proportions • Extend the percentage calculation strategies with jottings to find any percentage (e.g. 17.5% by finding 10%, 5% and 2.5%, and adding together)	Multiplier Percentage chance	
Step 5	• Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts, and use mental strategies to solve problems involving simple percentages of amounts Example: 1/4 m = 0.75 m = 75% of a metre, 10% of £12 = 1/10 of £12 = £1.20, 90/250 = 90 ÷ 250 = 0.36" • Find the outcome of a given percentage decrease or decrease • Use percentages greater than 100%		
Step 6	• Compare two quantities using percentages, including a range of calculations and contexts • Solve problems involving percentage change • Use a multiplier to increase or decrease by a percentage • Use a unitary method to find a percentage, e.g. if £40 is 60%, find 1% by dividing by 60 and then 100% by multiplying by 100; give them the scaffolding to answer the question • Use percentages in real-life situations: VAT, value of profit or loss, simple interest, income tax calculations		
Step 7	• Represent repeated percentage change using a multiplier raised to a power • Use calculators to explore exponential growth and decay • Use compound interest and understand the difference to simple interest • Use the unitary method for an inverse operation, e.g. If I know an item was 80% of the original cost in a sale, find the original price		
Step 8	• Calculate repeated percentage change • Find the original amount given the final amount after a percentage change (reverse percentages)		
Step 9	• Use percentages in real-life situations: compound interest, depreciation, percentage profit and loss • Use calculators for reverse percentage calculations by doing an appropriate division	Compound interest depreciation	
Step 10	• Find the original amount after repeated percentage change		
Step 11	• More complicated exam questions based on compound, reverse percentages		
Step 12	• Use calculators to explore exponential growth and decay and plot graphs of the results		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 3	Unit: Straight line graphs		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Read information from simple line graphs		Plotting graphs of science experiments
Step 2	• Draw, label and scale axes and plot coordinates in all 4 quadrants	axes	
Step 3	• Discuss and interpret line graphs and graphs of functions from a range of sources		
Step 4	• Draw and recognise graphs parallel to the axes • Plot coordinates that follow rules in words, eg 2nd number is always 5, the coordinates add up to 5 etc and begin to extend to simple algebraic rules in the form x + y = a		
Step 5	• Draw and recognise lines parallel to axes, and also y = x and y = –x • Plot a graph of a simple linear function in the first quadrant. • Plot and draw graphs of straight lines using a table of values given in the form y = mx + c, interpret what c means		
Step 6	• Recognise that all equations of the form y = mx + c correspond to straight-line graphs in the coordinate plane • Plot and draw graphs of straight lines given in the form y=mx+c and interpret what m means • Identifying parallel lines by plotting and then looking at the equation of the line in the form y=mx+c		
Step 7	• Recognise that linear functions can be rearranged to give y explicitly in terms of x e.g. rearrange y + 3x - 2 = 0 in the form y = 2 - 3x • Without drawing the graphs, compare and contrast features of graphs such as y = 4x, y = 4x + 6, y = x + 6, y = -4x, y= x - 6 • Plot the graphs of linear functions in the form y = mx + c and recognise and compare their features • Plot and draw graphs of straight lines using a table of values given in the form ax + by = c • Know that the gradient of a line is the change in y over change in x	Parallel gradient	
Step 8	• Find the equation of a straight-line from its graph • Plot and draw graphs of straight lines WITHOUT using a table of values (use intercept and gradient) • Recognise that when the linear function such as y = 2x, y = 3x and its inverse are plotted, they are a reflection in the line y = x • Write down the equation of a line parallel to a given line given in any format • Identify and interpret gradient and y-intercept from an equation y = mx + c • Solve problems finding equations of straight lines eg parallel to y-4x+5 and passes through (1,5)		
Step 9	• Solve linear/linear simultaneous equations graphically • Understand how gradients of perpendicular lines works • Solve problems finding equations of straight lines eg perpendicular to y=4x+5 and passes through (1,5)	perpendicular	
Step 10	• Find the equation of the line through two given points		
Step 11	• Find the equation of the tangent to a circle at a given point		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 4	Unit: Probability		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Use vocabulary associated with probability	Likely Unlikely Even chance Certain Impossible	
Step 2	• Use a probability scale with words		
Step 3	• Mark events and/or probabilities on a probability scale of 0 to 1		
Step 4	• Understand and use the probability scale from 0 to 1 • Find and justify probabilities based on equally likely outcomes in simple contexts • Apply the property that the probabilities of an exhaustive set of outcomes sum to 1 • Identify all possible mutually exclusive outcomes of a single event • Apply probabilities from experimental data to a different experiment in simple situations (only looking at one outcome) - how many successes would you expect? • Understand and use experimental and theoretical measures of probability, including relative frequency to include outcomes using dice, spinners, coins etc.	Exhaustive Mutually exclusive Relative frequency	
Step 5	• Apply systematic listing strategies • Find the probability of an event happening using relative frequency • When interpreting the results of an experiment use the vocabulary of probability • Write probabilities in words, fractions, decimals and percentages • Compare experimental and theoretical probabilities • Compare relative frequencies from samples of different sizes • Estimate the number of times an event will occur, given the probability and the number of trials • Find the theoretical probability of an event happening • Identify different mutually exclusive outcomes and know that the sum of probabilities of all outcomes is 1 • Know that if the probability of an event is p, the probability of it not occurring is 1 – p • Identify all mutually exclusive outcomes for two successive events with three outcomes in each event • Identify all mutually exclusive outcomes for two successive events with two outcomes in each event • Record outcomes of events in tables and grids • Apply probabilities from experimental data to a different experiment (a combination of two outcomes) - how many successes would you expect? • Work out probabilities from frequency tables • Work out probabilities from two-way tables		
Step 6	• Calculate the probability of the final event of a set of mutually exclusive events. • Use and draw sample space diagrams • Complete a probability tree diagram for independent events • Draw a probability tree diagram based on given information (no more than 3 branches per event) • Apply probabilities from experimental data to a different experiment in applying to two-step outcomes (e.g. spin a spinner twice and total the two numbers; which total is more likely?) • Identify conditions for a fair game - from a small set of options • Draw a frequency tree based on given information and use this to find probability and expected outcome • Record outcomes of probability experiments in tables	Sample space Tree diagram	

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

Step 7	• Understand and use P(A and B) = P(A) x P(B) for independent events • Understand and use P(A or B) = P(A) + P(B) for mutually exclusive events • Record outcomes of events in a Venn Diagram • Use Venn diagrams to calculate simple probabilities	Independent Venn diagram	
Step 8	• Use tree diagrams to calculate the probability of two independent events • Use Venn diagrams and set notation • Decide whether two events are independent • Complete a probability tree diagram for dependent events understanding replacement and non-replacement • Find a missing probability from a list or two-way table including algebraic terms		
Step 9	• Use tree diagrams to calculate the probability of two dependent events		
Step 10	• Use the product rule for counting (i.e. if there are m ways of doing one task and for each of these, there are n ways of doing another task, then the total number of ways the two tasks can be done is m × n ways) • Apply the rule that for two independent events A and B, P(A) = P(A|B)		
Step 11	• Use a tree diagram to calculate conditional probability • Use a two-way table to calculate conditional probability • Use Venn diagrams to calculate conditional probability	Conditional	
Step 12	• Use the formula for conditional probability		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 4	Unit: Volume		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Read volume of liquids from measuring containers	Volume	
Step 2	• Understand metric units of capacity	Litre Millilitre	
Step 3	• Recognise volume as space inside a shape • Choose appropriate metric units of capacity	capacity	
Step 4	• Find the volume of 3D shapes made from cubes by counting the cubes • Understand that cube numbers relate to the volumes of cubes	Cube Cm^3	
Step 5	• Know the formulae for the volume of cube and a cuboid and where it comes from. • Find volumes of cuboids		
Step 6	• Calculate the volume of shapes made from cuboids • Find a missing length in a cuboid • Find volumes of cuboids where a change in units is needed		
Step 7	• Calculate the lengths and areas given the volumes in right prisms • Calculate the volume of a cylinders • Calculate the volume of right prisms • Calculate volumes of shapes made from cuboids, for lengths given as whole numbers	Right prism Cylinder	
Step 8	• Find a missing length given the volume of a prism (including cylinders)		
Step 9	• Calculate the volume of pyramids, cones and spheres	Pyramid Cone Sphere	
Step 10	• Find the volume of compound solids constructed from cubes, cuboids, cones, pyramids, spheres, hemispheres, cylinders	Hemisphere	
Step 11	• Solve problems involving volumes of the shapes in step 10		
Step 12	• Construct and solve equations based on problems of volumes of cones, spheres, pyramids etc		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 4	Unit: Formulae		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Use function machines that “add 2” etc		Substitution into scientific formula and rearranging in Science
Step 2	• Use simple substitution into expressions eg a+2	substitution	
Step 3	• Substitute positive integers into simple formulae expressed in words	formula	
Step 4	• Substitute integers (including negatives) into simple formula with max 2 steps		
Step 5	• Construct simple formulae • Substitute numbers (including decimals/negative numbers) into simple formulae • "Use simple formulae. Example: V = L × W × H, What does 3n – 1 mean?"		
Step 6	• Change the subject of a formula in one step e.g. y = x + 4 • Write the subject of a formula which doesn’t need re-arranging using square or square root. E.g. x2 = 2a + b, make x the subject or √x = 2a	subject	
Step 7	• Find an unknown where it is not the subject of the formula and where an equation must be solved.		
Step 8	• Find an unknown where it is not the subject of the formula and where an equation must be solved and involves the square root • In simple cases, change the subject of the formula, e.g. make c the subject of the formula from y = mx + c		
Step 9	• Change the subject of a formula including where the subject is the denominator of a fraction • Change the subject of a formula involving multiple steps • Change the subject of a formula which involves rearranging and squaring or square root • In more complex cases, change the subject of the formula, e.g. make t the subject of the formula from p = q + rt		
Step 10	• Change the subject of a formula including where the subject is on both sides		
Step 11	• Change the subject of a complex formula that involves cubing or cube root e.g. make x the subject of the formula y = 3√4x • Change the subject of a more complex formula that involves the square root e.g. make l the subject of the formula T = 2pi √(l/g)		
Step 12	• Change the subject of a complex formula that involves fractions, e.g. make u or v the subject of the formula 1/v + 1/u =1/t		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 4	Unit: Proportion		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Understand that more items cost more money etc		
Step 2	• If one cost £2 how much would 5 cost type problems		
Step 3	• If two rulers cost £1.50, how much would 5 cost etc		
Step 4	• Scaling recipe problems • Converting between currencies		
Step 5	• Solve best buy problems by comparing equivalent quantities or costs		
Step 6	• Identify direct proportion from a graph • Recognise graphs showing constant rates of change, average rates of change and variable rates of change	Direct proportion	
Step 7	• Interpret the gradient of a straight line graph as a rate of change • Use informal algebraic methods to solve problems involving variables in direct proportion, only proportional to x • Write the equation of a straight line graph where the variables are in direct proportion		
Step 8	• In a table of values, recognise the values are in direct proportion if the ratio between the values is constant • Set up equations to show direct proportion		
Step 9	• Use expressions of the form $y \propto 1/x$ • Set up equations to show inverse proportion • Use expressions of the form $y \propto x^2$ • Recognise graphs showing direct or inverse proportion • identify direct proportion (or not) from a table of values	Inverse proportion	
Step 10	• Calculate an unknown quantity from quantities that vary in direct or inverse proportion • Set up and use equations to solve word and other problems involving direct or inverse proportion • Solve problems involving inverse proportion using graphs by plotting and reading values from graphs • Solve problems involving inverse proportionality, including problems where y is inversely proportional to the square of x		
Step 11	• Set up and solve equations where y is inversely proportional to the cube of x etc		
Step 12	• Set up and use equations to solve more complex word problems involving direct and inverse proportion		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 5	Unit: Standard form		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Multiply integers by 10, 100 etc	Integer	Calculations involving atoms in Chemistry or distances in space in Physics
Step 2	• Divide integers by 10, 100 etc		
Step 3	• Multiply and divide decimals by 10, 100, 1000, and explain the effect		
Step 4	• Know the positive integer powers of 10		
Step 5	• Understand the effect of multiplying and dividing integers and decimals by any integer power of 10		
Step 6	• Perform calculations such as 5.2 x 10 squared		
Step 7	• Interpret a calculator display using standard form • Recognise numbers written in standard form • Use standard form display and know how to enter numbers in standard form into a calculator	Standard form	
Step 8	• Convert between large and small numbers into standard form and vice-versa • Order numbers written in standard index form • Write numbers greater than 10 in standard index form • Write numbers less than 10 in standard index form • Write numbers written in standard form as ordinary numbers		
Step 9	• Multiply and divide numbers in standard form • Estimate the answer to calculations of numbers written in standard form.		
Step 10	• Add and subtract in standard form		
Step 11	• Solve more complex problems with numbers given in standard form		
Step 12	• Solve problems in standard form from a range of contexts for example in area of shapes		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 5	Unit: Real life graphs and functions		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Read graphs from real life eg temperature graphs in holiday brochures		Science also have speed distance time graphs in their curriculum
Step 2	• Draw simple real life graphs to represent for example filling baths etc and begin to understand what the gradient means		
Step 3	• Read information from a conversion graph	Conversion	
Step 4	• Use real life contexts to draw and use conversion graphs		
Step 5	• Draw and interpret distance/time graphs • Interpret information from a real life graph (fixed charge/unit cost), read values and discuss trends		
Step 6	• Draw and read from distance–time graphs, find the speed etc		
Step 7	• Interpret a range of real life graphs, eg container filling etc • Use graphs to calculate measures including unit price, average speed, distance, time, acceleration		
Step 8	• Interpret velocity–time graphs • Know that the gradient of a velocity time graph represents acceleration • Calculate the acceleration by working out the gradient of a line on a velocity time graph • Estimate the acceleration of a point on a velocity time graph (non-linear), by drawing the tangent at a point in time, and calculating the gradient. • Estimate the average acceleration by calculating the gradient of the chord between two points on a velocity time graph which is curved • Know that the area under a velocity time graph is the distance travelled	Speed Velocity	
Step 9	• Estimate the gradient of a non-linear function by drawing the tangent at that point and finding its gradient • Estimate area under a quadratic graph by dividing it into trapezia		
Step 10	• Given f(x) where f(x) is a linear function, find a when f(a) = whole number		
Step 11	• Find the inverse of a linear function	Inverse function	
Step 12	• Find f(x) + g(x), 2f(x), f(3x) etc. algebraically • Interpret the succession of two functions as a 'composite function' e.g. for f(x) and g(x) find gf(x)	Composite function	

HALF TERM 5	Unit: Fractions, Decimals and Percentages		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

Step 1	• Recognise the equivalence of percentages, fractions and decimals (0.5, 0.1, 0.25)	Equivalence	A range of calculations across subjects
Step 2	• Convert a simple percentage to a number of hundredths or tenths		
Step 3	• Convert terminating decimals to fractions, e.g. 0.23 = 23/100		
Step 4	• Recall equivalent fractions, decimals and percentages, including for fractions that are greater than 1; match across all three types, using simple fractions (1/2, 1/4, 1/5, 1/10) • Associate a fraction with division and calculate decimal fraction equivalents for a simple fraction. Example: 1 ÷ 4 = 1/4 = 0.25, 7 ÷ 10 = 7/10 = 0.7, 3 ÷ 8 = 3/8 = 0.375" • Convert decimals (up to 3 places) to fractions and vice versa using thousandths, hundredths and tenths. Example: 1.87 = 1 87/100, 0.078 = 78/1000, 54/100 = 0.54"		
Step 5	• Use strategies for finding equivalent fractions, decimals and percentages (non standard facts) • Convert a terminating decimal to a fraction and simplify the fraction • Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. Example: 360 cats are tested. 90 of the cats prefer wet cat food to dry cat food. 90 out of 360 = 90/360 = 1/4 = 25% of cats"	terminating	
Step 6	• Convert between any fdp to make calculations easier • Use division to convert a fraction to a decimal • Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 or 3/8)		
Step 7	• Use halving and doubling strategies on fractions to find decimal equivalents of other fractions (e.g. 1/4 = 0.25 so 1/8 is half of 0.25, etc.); original fact is given		
Step 8	• Know the denominators of simple fractions that produce recurring decimals and of those that do not • Learn fractional equivalents to key recurring decimals (e.g. 0.333333..., 0.66666666..., 0.11111... and by extension 0.222222…) • Understand recurring decimal notation	recurring	
Step 9	• Convert a recurring decimal to a fraction in simple cases		
Step 10	• Understand and complete a recurring decimal to fraction proof for cases where the repeat is the whole decimal		
Step 11	• Understand and complete a recurring decimal to fraction proof for cases such as 0.456565656565656		
Step 12	• Understand and complete a recurring decimal to fraction proof where the answer would be a mixed number		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 5	Unit: Pythagoras and Trigonometry		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Know the sum of angles on a straight line		Modelling waves etc in science
Step 2	• Tessellate combinations of polygons practically	tesselate	
Step 3	• Explain why some shapes tessellate and why other shapes do not		
Step 4	• Identify parallel lines • Know the sum of angles around a point		
Step 5	• "Consolidate classifying angles as acute, right, obtuse or reflex. Example: 23° = acute • Distinguish between acute, obtuse and reflex angles • Identify perpendicular lines • Use correct notation for labelling angles	Acute, obtuse, reflex	
Step 6	• Know the formula for Pythagoras' theorem and use to find the hypotenuse • Know the formula for Pythagoras' theorem and use to find a shorter side	Hypotenuse	
Step 7	• Use Pythagoras' theorem to prove if a triangle is a right-angled triangle • Use and apply Pythagoras' theorem to solve problems in 2D		
Step 8	• Label a triangle opposite, adjacent and hypotenuse • Use a calculator to work out inverse trig functions to find angles in right angled triangles • Use a calculator to work out missing sides in right angled triangles • 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°	Opposite Adjacent	
Step 9	• Find angles of elevation and angles of depression • Use Pythagoras' theorem to solve problems involving the area of triangles • Solve problems involving the application of both Pythagoras' theorem and trigonometry in right-angled triangles	Elevation Depression	
Step 10	• Understand, recall and use Pythagoras' theorem in 3D problems eg diagonal of a cuboid • Calculate the area of a triangle given the length of two sides and the included angle • Know and apply the cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$ to find unknown lengths • Know and apply the sine rule $a/\sin A = b/\sin B = c/\sin C$ to find unknown lengths and angles		
Step 11	• Know and apply Area = 1/2 ab sin C to calculate the sides or angles of any triangle • Know and apply the cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$ to find unknown angles • Use the sine and cosine rules to solve 2D and 3D problems • Find the angle between a line and a plane (but not the angle between two planes or between two skew lines)		
Step 12	• Recognise, sketch and interpret graphs of trigonometric functions (in degrees) for sin, cos and tan within the range -360° to +360°		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 5	Unit: Similarity		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Identify shapes that are the same (shape and size) from a group of shapes		
Step 2	• Identify shapes that are the same (shape and size) including when rotated, reflected etc from a group of shapes		
Step 3	• Understand that giving ASA or SAS means you have to have congruent triangles	congruent	
Step 4	• Use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS) to identify congruence		
Step 5	• Know and understand the term 'congruent' • Know that translations, rotations and reflections map objects on to congruent images		
Step 6	• Find the scale factor of similar shapes where the scale factor is a whole number • Identify 2D shapes that are congruent or similar by reference to sides and angles • Identify congruent shapes • Identify corresponding sides and angles in similar shapes • Identify shapes that are similar, including all regular polygons with equal numbers of sides • Know that triangles given SSS, SAS, ASA or RHS are unique, but that triangles given SSA or AAA are not • Recognise that all corresponding angles in similar shapes are equal in size when the corresponding lengths of sides are not equal in size • Use the scale factor of similar shapes to find missing lengths where the scale factor is a whole number	similar	
Step 7	• Begin to use congruency to solve simple problems in triangles and quadrilaterals • Find the scale factor of similar shapes where the scale factor is a fraction • Use the information given about the length of sides and sizes of angles to determine whether triangles are congruent, or similar • Use the scale factor of similar shapes to find missing lengths where the scale factor is a fraction		
Step 8	• Use similarity to solve problems in 2D shapes		
Step 9	• Use simple examples of the relationship between enlargement and areas and volumes of simple shapes and solids		
Step 10	• Use congruence to show that translations, rotations and reflections preserve length and angle, so that any figure is congruent to its image under any of these transformations		
Step 11	• Find the scale factor of similar shapes, given the area scale factor or volume scale factor		
Step 12	• Solve problems involving areas and volumes of similar shapes and solids		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 6	Unit: Quadratic and other algebraic graphs		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Read and plot coordinates in first quadrant		Coordinates links to map skills in Geography
Step 2	• Read and plot coordinates in all 4 quadrants		
Step 3	• Know square numbers to 225 and their associated square roots		
Step 4	• Plot the graph of $y=x^2$ where the rule is given in words		
Step 5	• Explore the graphs of $y=x^2+3$, $y=x^2-2$ etc using ICT and describe the findings		
Step 6	• Explore the graphs of $y=2x^2$ $y=3x^2$ using ICT and describe the findings		
Step 7	• Construct a table of values, including negative values of x for a function such as $y = ax^2$ • Generate points and plot graphs of simple quadratic functions, then more general functions • Recognise a graph which represents a quadratic function	Quadratic	
Step 8	• Generate points and plot graphs of simple cubic functions, then more general functions • Generate points and plot graphs of simple reciprocal functions e.g. y = 3/x using a calculator to generate points • Recognise a quadratic function from its equation and explain the shape of its graph	Reciprocal	
Step 9	• Identify and interpret roots, intercepts and turning points of a quadratic graph linking to algebraic methods of completing the square and factorising • Identify the line of symmetry of a quadratic graph • Use the discriminant to find the number of roots of a quadratic graph	Roots Turning points	
Step 10	• Find approximate solutions of a quadratic equation from the graph of the corresponding quadratic function • Identify and interpret roots and intercepts of a cubic graphs • Use quadratic and cubic graphs to find the solution to equations where the equation does not need to be rearranged		
Step 11	• Construct the graphs of simple loci including the circle $x^2 + y^2 = r^2$ for a circle of radius r centred at the origin of the coordinate plane • Find the gradient of the radius that meets the circle at a given point • By re-arranging an equation and drawing a straight line on a graph, find estimates for the solution of an equation		
Step 12	• Interpret transformations of graphs and write the functions algebraically, e.g. write the equation of f(x) + a or f(x - a) • Apply to the graph of y = f(x) the transformations y = –f(x), y = f(–x) and y = -f(–x) for linear, quadratic, cubic, sine and cosine functions • Apply to the graph of y = f(x) the transformations y = f(x) + a, y = f(ax), y = f(x + a) and y = af(x) for linear, quadratic, cubic, sine and cosine functions of x		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 6	Unit: Vectors		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Identify position, left right above below up down etc		
Step 2	• Translate a shape on a square grid one direction only eg 5 squares up OR 3 squares right	translate	
Step 3	• Translate a shape on a square grid two directions in words y eg 5 squares up then 3 squares right		
Step 4	• Use vector notation for translations		
Step 5	• Draw and translate simple shapes on the coordinate plane. Example: Plot the points (–6, 5), (–4, 3), (–2, 5), (–2, –1), (–4, –3), (–6, –1), and join them. Add the same number to the x-coordinates to slide the hexagon across, or to the y-coordinates slide the shape up.		
Step 6	• Represent column vectors graphically on a set of axes	Vector	
Step 7	• Represent vectors given graphically as column vectors • Work out the magnitude of a vector		
Step 8	• Add and subtract column vectors and calculate scalar multiples of column vectors • Understand the properties of negative vectors • Add and subtract simple whole number **algebraic** vectors to find the resultant eg know geometrically what 2a and a +b mean with no numerical column vector	scalar	
Step 9	• Add and subtract scalar multiples of column vectors, know geometrically what a+2b represents etc (abstract – no column vectors given) • Decide if 2 column vectors are parallel		
Step 10	• Calculate the resultant of two vectors • Calculate, and represent graphically, the sum of two vectors, the difference of two vectors and a scalar multiple of a vector • Solve geometrical problems in 2D using vector methods		
Step 11	• Prove lines are parallel/colinear	colinear	
Step 12	• Apply vector methods for simple geometrical proofs		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 6	Unit: Inequalities and functions		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Order a set of numbers		
Step 2	• Use the < and > symbols in between two whole numbers		
Step 3	• Use the correct notation to show inclusive and exclusive inequalities	inequality	
Step 4	• Show inequalities on a number line eg x > 4 no solving required		
Step 5	• Solve one step linear inequalities and represent on a number line		
Step 6	• Show inequalities on a number line • Write down whole number values that satisfy an inequality		
Step 7	• Know that when dividing an inequality by a negative number the inequality sign changes • Represent the solution set for inequalities using set notation • Solve linear inequalities in one variable and represent the solution on a number line e.g. 3n + 2 <11 and 2n - 1 >1		
Step 8	• Represent inequalities in one variable graphically • Solve more complex linear inequalities in one variable and represent on a number line e.g. -6 < 2n+4 or -9 < 2n + 3 < 7 • Solve more complex linear inequalities in one variable where the unknown is on both sides of the inequality		
Step 9	• Solve two simultaneous inequalities algebraically and show the solution set on a number line or give the integer solutions		
Step 10	• Solve linear inequalities in two variables graphically • Write the inequalities that represent a shaded region		
Step 11	• Solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values	Critical values	
Step 12	• Solve more complex quadratic inequalities coefficient of $x^2 > 1$		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

HALF TERM 6	Unit: Representing Data		
	Key retainable knowledge and skills	**Key vocabulary**	**Cross curricular links**
Step 1	• Answer simple questions about 'most likely' from a simple bar chart		Students will use a graphs to represent data in a range of subject areas. Geography and science but will also make graphs from data they have collected in life skills, food technology
Step 2	• Interpret and construct pictograms	pictogram	
Step 3	• Draw and interpret bar charts for discrete data • Draw and interpret line graphs for discrete data • Produce bar charts including dual bar charts	discrete	
Step 4	• Interpret dual bar charts • Extract data and interpret frequency tables • Group data, where appropriate in equal class intervals • Interpret and construct line graphs and use these to solve problems. • Interpret simple pie charts • Produce pie charts for categorical data and discrete/continuous numerical data • Read and interpret a range of tables, graphs, pictograms and bar charts and answer questions relating to data displayed in these. Example: Show a bar chart of the heights of children in a class. How many children are between one point two metres and one point two nine metres?"	Dual Pie chart	
Step 5	• Interpret and/or compare bar graphs and frequency diagrams that are misleading (with false origins, different scales etc.) • Interpret pie charts and line graphs taking into account different sized samples • Produce grouped frequency tables for continuous data • Construct and interpret data from compound and comparative bar charts • Design and use two-way tables for discrete and grouped data • Interpret and construct pie charts and use these to solve problems. Example: Show the data where 50 people were asked their favourite classic children's book. Construct a pie chart and use it to find out which is the most popular book" • Interpret data from complex compound and comparative bar charts	Grouped frequency Continuous data Discrete data	
Step 6	• Know and use the relationship between the angle in a sector of a pie-chart and frequency to solve problems • Make inferences about data through extracting information from a two way table • Draw scatter graphs • Interpret a scatter graph, describe the relationship it shows	relationship	
Step 7	• Use more complex two way tables • Appreciate that correlation is a measure of the strength of the association between two variables • Describe correlation by inspection: strong or weak; positive, negative or zero and interpret in context • Draw a line of best fit by eye and understand what they represent • Know that extrapolation might not be reliable • Understand that correlation does not imply causality	correlation	
Step 8	• Understand the difference between relationship and correlation • State how reliable their predictions are from interpolating and extrapolating apparent trends		
Step 9	• Construct a histogram with unequal class widths knowing the area represents the frequency	Histogram	
Step 10	• Interpret histograms from class intervals with unequal width • From a histogram complete a grouped frequency table • From a histogram understand and define frequency density • Understand and use frequency density		
Step 11	• Estimate the mean from a histogram		
Step 12	• Compare the distribution of data from a histogram using the median/quartiles		

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

Year 12	Term 1			Term 2			Term 3		
	Pure Maths	**Statistics**	**Mechanics**	**Pure Maths**	**Statistics**	**Mechanics**	**Pure Maths**	**Statistics**	**Mechanics**
Unit(s) – As outlined in 39 week plans	Unit 1 - Algebra and functions Unit 2 – Coordinate geometry Unit 3 - Algebra	Unit 1 - Statistical sampling Unit 2 - Data presentation and interpretation	Unit 6 – Quantities and Units Unit 7 –Kinematics 1	Unit 4 – Trigonometry Unit 5 – Vectors Unit 6 – Differentiation	Unit 3 - Probability Unit 4 - Statistical distributions	Unit 8 – Forces and Newton's Laws	Unit 7- Integration Unit 8 - Exponentials and logs	Unit 5 - Hypothesis testing	Unit 9 – Kinematics 2
Key Retainable Knowledge & Skills	**Unit 1 Algebra and functions** Algebraic expressions – basic algebraic manipulation, indices and surds Quadratic functions – factorising, solving, graphs and the discriminants Equations – quadratic/linear simultaneous Inequalities – linear and quadratic (including graphical solutions) Graphs – cubic, quartic and reciprocal Transformations – transforming graphs – f(x) notation **Unit 2 Coordinate geometry in the (x, y) plane** Straight-line graphs, parallel/perpendicular, length and area problems	**Unit 1 Statistical sampling** Introduction to sampling terminology; Advantages and disadvantages of sampling Understand and use sampling techniques; Compare sampling techniques in context **Unit 2 Data presentation and interpretation** Calculation and interpretation of measures of location; Calculation and interpretation of measures of variation; Understand and use coding Interpret diagrams for single-variable data; Interpret scatter diagrams and regression lines; Recognise and interpret outliers;	**Unit 6 Quantities and units** Introduction to mathematical modelling and standard S.I. units of length, time and mass Definitions of force, velocity, speed, acceleration and weight and displacement; Vector and scalar quantities **Unit 7 Kinematics 1 (constant acceleration)** Graphical representation of velocity, acceleration and displacement Motion in a straight line under constant acceleration; suvat formulae for constant acceleration; Vertical motion under gravity	**Unit 4 Trigonometry** Trigonometric ratios and graphs Trigonometric identities and equations **Unit 5 Vectors (2D)** Definitions, magnitude/direction, addition and scalar multiplication Position vectors, distance between two points, geometric problems **Unit 6 Differentiation** Definition, differentiating polynomials, second derivatives Gradients, tangents, normals, maxima and minima	**Unit 3 Probability** Mutually exclusive events; Independent events **Unit 4 Statistical distributions** Use discrete distributions to model real-world situations; Identify the discrete uniform distribution; Calculate probabilities using the binomial distribution (calculator use expected)	**Unit 8 Forces & Newton's laws** Newton's first law, force diagrams, equilibrium, introduction to i, j system Newton's second law, 'F = ma', connected particles (no resolving forces or use of F = μR); Newton's third law: equilibrium, problems involving smooth pulleys	**Unit 7 Integration** Definition as opposite of differentiation, indefinite integrals of x^n Definite integrals and areas under curves **Unit 8 Exponentials and logarithms** Exponential functions and natural logarithms	**Unit 5 Statistical hypothesis testing** Language of hypothesis testing; Significance levels Carry out hypothesis tests involving the binomial distribution	**Unit 9 Kinematics 2 (variable acceleration)** Variable force; Calculus to determine rates of change for kinematics Use of integration for kinematics problems i.e. $r = \int v\,dt,\ v = \int a\,dt$

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

	Circles – equation of a circle, geometric problems on a grid **Unit 3 Further algebra** Algebraic division, factor theorem and proof The binomial expansion	Draw simple conclusions from statistical problems							
Key Technical Vocabulary	Quadratic Reciprocal Factor theorem Binomial expansion	Discrete Continuous Statistic	Force Velocity Speed Acceleration Weight Displacement	Differentiate Derivative Normal Maxima Minima	Mutually exclusive Independent Binomial distribution	Equilibrium Smooth	Integration Integral (definite and indefinite) Exponential	Hypothesis Significance	Variable
Opportunities for Reading	Students could develop their understanding and interest in Mathematics by reading any/all of the following Why do buses come in threes? – Rob Easterway, Fermat's Last Theorem – Simon Singh Alex's Adventures in Numberland – Alex Bellos, The Simpsons and their Mathematical Secrets – Simon Singh								
Cross Curricular Links (Authentic Connections)	Skills used in Pure Maths are also applied to the statistics and mechanics elements of the course	Students studying geography, biology, psychology will experience a range of statistical methods	Students studying physics will meet similar concepts	Skills used in Pure Maths are also applied to the statistics and mechanics elements of the course	Students studying geography, biology, psychology will experience a range of statistical methods	Students studying physics will meet similar concepts	Skills used in Pure Maths are also applied to the statistics and mechanics elements of the course	Students studying geography, biology, psychology will experience a range of statistical methods	Students studying physics will meet similar concepts
Key Assessment	Students complete an end of unit assessment at the end of each unit for both Pure, Statistics and Mechanics elements of the A level Maths course. In addition there are 2 trial exams over the course of Y12 that test all knowledge and skills covered up to that point.								

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

Year 13	Term 1			Term 2			Term 3		
	Pure Maths	**Statistics**	**Mechanics**	**Pure Maths**	**Statistics**	**Mechanics**	**Pure Maths**	**Statistics**	**Mechanics**
Unit(s) – As outlined in 39 week plans	Unit 2 – Algebraic and partial fractions Unit 3 – Functions and modelling Unit 4 – Series and sequences Unit 5 – Binomial expansion Unit 6- Trigonometry	Unit 1 – Regression and correlation	Unit 4 – Moments Unit 5 – Forces at any angle	Unit 7 – Parametric equations Unit 8 – Differentiation Unit 9- Numerical Methods Unit 10 – Integration 1	Unit 2 – Probability Unit 3 – The Normal distribution	Unit 6- Applications of kinematics Unit 7 – Applications of forces	Unit 11 – Integration 2 Unit 12 – Vectors (3D) Revision	Revision of Y12 and Y13 content	Unit 8 – Further kinematics
Key Retainable Knowledge & Skills	**Unit 2 Algebraic and partial fractions** Simplifying algebraic fractions Partial fractions **Unit 3 Functions and modelling** Modulus function Composite and inverse functions Transformations Modelling with functions* *examples may be Trigonometric, exponential, reciprocal etc. **Unit 4 Series and sequences** Arithmetic and geometric progressions (proofs of 'sum formulae') Sigma notation Recurrence and iterations **Unit 5 The binomial theorem** Expanding (a + bx)n	**Unit 1 Regression and correlation** Change of variable Correlation coefficients Statistical hypothesis testing for zero correlation	**Unit 4 Moments** Forces' turning effect **Unit 5 Forces at any angle** Resolving forces Friction forces (including coefficient of friction μ)	**Unit 7 Parametric equations** Definition and converting between parametric and Cartesian forms Curve sketching and modelling **Unit 8 Differentiation** Differentiating sin x and cos x from first principles Differentiating exponentials and logarithms Differentiating products, quotients, implicit and parametric functions. Second derivatives (rates of change of gradient, inflections) Rates of change problems* (including growth and kinematics) *see Integration (part 2) –	**Unit 2 Probability** Using set notation for probability Conditional probability Questioning assumptions in probability **Unit 3 The Normal distribution** Understand and use the Normal distribution Use the Normal distribution as an approximation to the binomial distribution Selecting the appropriate distribution Statistical hypothesis testing for the mean of the Normal distribution	**Unit 6 Applications of kinematics** Projectiles **Unit 7 Applications of forces** Equilibrium and statics of a particle (including ladder problems) Dynamics of a particle	**Unit 11 Integration 2** Integration by substitution Integration by parts Use of partial fractions Areas under graphs or between two curves, including understanding the area is the limit of a sum (using sigma notation). Areas under curves expressed parametrically The trapezium rule Differential equations (including knowledge of the family of solution curves) **Unit 12 Vectors (3D)** Use of vectors in three dimensions; knowledge of column vectors and i, j and k unit vectors	**Revision of Y12 and Y13 content**	**Unit 8 Further kinematics** Constant acceleration (equations of motion in 2D; the i, j system) Variable acceleration (use of calculus and finding vectors $\dot{r}$ and $\ddot{r}$ at a given time) **Revision of Y12 and Y13 content**

	for rational n; knowledge of range of validity Expansion of functions by first using partial fractions **Unit 6 Trigonometry** Radians (exact values), arcs and sectors Small angles Secant, cosecant and cotangent (definitions, identities and graphs); Inverse trigonometrical functions; Inverse trigonometrical functions Compound* and double (and half) angle formulae *geometric proofs expected R cos (x ± α) or R sin (x ± α) Proving trigonometric identities Solving problems in context (e.g. mechanics)			Differential equations **Unit 9 Numerical methods*** Location of roots Solving by iterative methods (knowledge of 'staircase and cobweb' diagrams) Newton-Raphson method Problem solving **Unit 10 Integration 1** Integrating x^n (including when n = –1), exponentials and trigonometric functions. Integrating functions defined parametrically. Using the reverse of differentiation, and using trigonometric identities to manipulate integrals			**Revision of Y12 and Y13 content**		
Key Technical Vocabulary	Modulus Composite Inverse Arithmetic Geometric Radian Secant Cosecant Cotangent	Correlation coefficient	Moment Coefficient of friction	Cartesian Parametric Iteration	Conditional probability Normal distribution	Projectile Equilibrium	Differential equation		Constant/variable acceleration

Mathematics Curriculum Intent: Start to End Point Mapping – Curriculum Sequence Grids

Opportunities for Reading	Students could develop their understanding and interest in Mathematics by reading any/all of the following books: Why do buses come in threes? – Rob Easterway, Fermat's Last Theorem – Simon Singh Alex's Adventures in Numberland – Alex Bellos, The Simpsons and their Mathematical Secrets – Simon Singh								
Cross Curricular Links (Authentic Connections)	Skills used in Pure Maths are also applied to the statistics and mechanics elements of the course	Students studying geography, biology, psychology will experience a range of statistical methods	Students studying physics will meet similar concepts	Skills used in Pure Maths are also applied to the statistics and mechanics elements of the course	Students studying geography, biology, psychology will experience a range of statistical methods	Students studying physics will meet similar concepts	Skills used in Pure Maths are also applied to the statistics and mechanics elements of the course	Students studying geography, biology, psychology will experience a range of statistical methods	Students studying physics will meet similar concepts
Key Assessment	Students complete an end of unit assessment at the end of each unit for both Pure, Statistics and Mechanics elements of the A level Maths course. In addition a trial exams in Y13 tests all knowledge and skills covered in both Y12 and Y13.								