Delta 1 Scheme of Work

Term	Unit	Teaching hours	Programme of Study	Unit description
	1 Analysing and displaying data	11	describe, interpret and compare observed distributions of a single variable through: appropriate measures of central tendency (mean, mode, median) construct and interpret frequency tables construct and interpret bar charts construct and interpret pie charts construct and interpret vertical line (or bar) charts for ungrouped data construct and interpret vertical line (or bar) charts for grouped numerical data Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts Illustrate simple mathematical relationships between two variables (bivariate data) using scatter graphs	Compare two simple distributions using appropriate measures Calculate the mean from a simple frequency table Compare two distributions given summary statistics Recognise when it is appropriate to use mean, median or mode Use two way tables for discrete data Make inferences about data through extracting information from a two way table Construct and interpret pie charts and line graphs Use questionnaire responses to complete a data collection sheet Construct and interpret compound and dual (comparative) bar charts Interpret and / or compare bar graphs and frequency diagrams which are misleading Construct a simple frequency table with equal class intervals for continuous data Be able to use > or < correctly between two positive decimals. 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. Construct a frequency table with given equal class intervals for continuous data (boundary data given) Construct a frequency diagram from a grouped frequency table Find the modal class of a set of continuous data Construct line graphs for time series Construct and interpret scatter graphs Identify which graphs are the most useful in the context of the problem Use correlation to describe relations between sets of data Draw and use a line a best fit to estimate a missing value
	2 Number skills	11	order positive and negative integers use the concepts and vocabulary of prime numbers use the concepts and vocabulary of factors (or divisors) use the concepts and vocabulary of multiples use the concepts and vocabulary of common factors use the concepts and vocabulary of common multiples use the concepts and vocabulary of highest common factor use the concepts and vocabulary of lowest common multiple use the four operations, including formal written methods, with positive and negative integers use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals use integer powers and associated real roots (square, cube and higher) recognise powers of 2, 3, 4, 5	Find factor pairs using any whole number Find the HCF or LCM of 2 numbers less than 20 Multiply and divide negative integers by a positive integer Add and subtract integers – positive and negative integers Add and subtract negative integers from positive and negative integers Multiply and divide integers – positive and negative integers Multiply and divide negative integers by a negative integer Use index notation for squares and cubes and for positive integer powers of 10 Know all the squares of numbers less than 16 and be able to find the square root given the square number Give the positive and negative square root of a square number Extend mental calculations to squares and square roots Be able to estimate square roots of non square numbers less than 100 Mentally be able to calculate the squares of numbers less than 16 multiplied by a multiple of ten (e.g. 0.2, 300, 0.400) Divide three-digit by two-digit whole numbers Using rounding to the nearest 10 or a nice number (e.g. 62 to 63 when dividing by 9 etc.) Use mental strategies for multiplication – doubling and halving strategies Checking by an inverse operation (questions other than four rules, e.g. square roots checked with squaring) Be able to estimate answers to calculations involving 2 or more operations and BIDMAS Use index notation for small integer powers (e.g. $3 \times 2^3 = 24$) Extend mental calculations to cubes and cube roots Extend calculations to cubes and cube roots using mental methods and a calculator when appropriate Be able to find square roots by factorising Be able to find cube roots by factorising Be able to use mental strategies to solve word problems set in context using square roots and cubes roots mentally be able to work with calculations where the brackets are squared or square rooted Combine laws of arithmetic for brackets with mental calculations of cubes and squares Combine laws of arithmetic for brackets with mental calculations of square roots Combine laws of arithmetic for brackets with mental calculations of cube roots and square roots Understand which part of an expression is raised to a power by knowing the difference between $3 \times (7+8)^2$ and $3^2 \times (7+8)$ and $(3 \times (7+8))^2$
	Half-term test			
Autumn term	3 Equations, functions and formulae	11	use and interpret algebraic notation: ab in place of $a \times b$ use and interpret algebraic notation: $3y$ in place of $y + y + y$ and $3 \times y$ use and interpret algebraic notation: a^2 in place of $a \times a$ use and interpret algebraic notation: a^3 in place of $a \times a \times a$ use and interpret algebraic notation: a^2b in place of $a \times a \times b$ use and interpret algebraic notation: b/a in place of $a \div b$ use and interpret algebraic notation: brackets substitute numerical values into formulae and expressions, including scientific formulae understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors simplify and manipulate algebraic expressions to maintain equivalence: collecting like terms simplify and manipulate algebraic expressions to maintain equivalence: multiplying a single term over a bracket simplify and manipulate algebraic expressions to maintain equivalence: taking out common factors model situations or procedures by translating them into algebraic expressions or formulae	Simplify simple expressions by collecting like terms Understand the difference between $2n$ and n^2 Know that expressions involving repeated multiplication can be written as n , n^2, n^3 Simplify simple expressions involving powers but not brackets, by collecting like terms Construct expressions from worded description, using addition, subtraction and multiplication Construct expressions from worded description, using all 4 basic operations Express simple functions in symbols Know that the contents of brackets are evaluated first when using algebra Know that multiplication and division are carried out before addition and subtraction Substitute positive integers into expressions involving small powers Evaluate an expression by substituting a positive value into the expression x^2 Use the distributive law to take out numerical common factors Multiply a single term over a bracket Add, subtract, multiply and divide integers – extend to the distributive law $a(b + c)$ Substitute positive integers into simple formulae expressed in words Substitute integers into more complex formulae expressed in letter symbols Substitute positive integers into simple formulae expressed in letter symbols Substitute integers into more complex formulae (involving brackets and more than one operation) expressed in letter symbols Substitute positive and negative integers into simple formulae Identify the unknowns in a formula and a function Derive formulae expressed in letter symbols Understand the different role of letter symbols in formulae and functions Derive complex algebraic expressions and formulae
	4 Fractions	11	order decimals and fractions use the four operations, including formal written methods, with positive and negative fractions use the four operations, including formal written methods, with positive and negative improper fractions and mixed numbers define percentage as 'number of parts per hundred' interpret percentages and percentage changes as a fraction or a decimal express one quantity as a fraction of another, where the fraction is less than 1 express one quantity as a fraction of another, where the fraction is greater than 1	Use a diagram to compare two or more simple fractions use < and > to compare fractions with same denominator, or unit fractions with different denominators Simplify fractions by cancelling all common factors Express one number as a fraction of another. The numbers should be very simple (halves, quarters, thirds) Use fraction notation to express a smaller whole number as a fraction of a larger one Begin to add and subtract simple fractions and those with simple common denominators Add fractions by writing with a common denominator, where the denominators are 12 or less, where the answer is less than 1 Understand that when two positive fractions are added the answer is larger than either of the original two fractions Subtract fractions by writing with a common denominator, where the denominators are less than 12 and the first fraction is larger than the second Understand that when two positive fractions are subtracted the answer is less than the first fraction but may still be larger than the second Add and subtract simple fractions with denominators of any size Check addition or subtraction of fractions with an inverse calculation Add and subtract up to 3 fractions mixing both addition and subtraction into the calculation, with denominators less than or equal to 12 and the using the LCM denominator in the calculation – the answer can be a mixed number Extend the possible fractions that can be used in mental calculations by using halving and doubling strategies Calculate simple fractions of quantities and measurements (whole number answers) Calculate fractions of quantities and measurements (fraction answers) Multiply a fraction by an integer Multiply an integer by a fraction Understand the effect of multiplying a positive number by a fraction less than 1 Recall known facts including fraction to decimal conversions Recall of equivalent fractions and decimals and percentage including for fractions that are greater than 1 Use division to convert a fraction to a decimal Use halving and doubling strategies on fractions to find decimal equivalents of other fractions Interpret division as a multiplicative inverse. Know that 1 divided by 1/4 is the same as 1×4 Divide an integer by a fraction Understand the effect of dividing a positive number by a fraction less than 1 Multiply a fraction by a fraction (without cancelling) Cancel common factors before multiplying fractions Divide a fraction by a fraction Add mixed number fractions without common denominators, where the fraction parts add up to more than 1 Be able to enter time as a mixed number into a calculator Subtract mixed number fractions when the fractional part of the first fraction is all that is required for the calculation to take place Subtract mixed number fractions where the whole number part of the first fraction needs to be broken down to complete the calculation Multiply a fraction by a mixed number Divide a mixed number by a fraction
	End of term test			
	5 Angles and shapes	9	apply the properties of angles at a point apply the properties angles at a point on a straight line apply the properties vertically opposite angles understand and use the relationship between parallel lines and alternate and corresponding angles derive and use the sum of angles in a triangle use the sum of angles in a triangle to deduce the angle sum in any polygon derive properties of regular polygons	Solve simple geometrical problems showing reasoning Recognise and use vertically opposite angles Identify alternate angles Identify corresponding angles Identify alternate and corresponding angles on the same diagram Calculate angles in a triangle Solve geometric problems using side and angle properties of equilateral and isosceles triangles Understand a proof that the sum of the angles of a triangle is 180 degrees Understand a proof that the exterior angle of a triangle is equal to the sum of the two interior opposite angles Identify all the symmetries of 2D shapes Identify and begin to use angle, side and symmetry properties of quadrilaterals Find co-ordinates of points determined by geometric information Classify quadrilaterals by their geometric properties Understand a proof that the sum of the angles of a quadrilateral is 360 degrees

				Explain how to find the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons Calculate the interior and exterior angles of regular polygons Use the interior and exterior angles of regular and irregular polygons
Spring term	6 Decimals	11	understand and use place value for decimals understand and use place value for integers order decimals and fractions use the symbols =, ≠, <, >, ≤, ≥ work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 and 3/8) interpret percentages and percentage changes as a fraction or a decimal interpret percentages multiplicatively express one quantity as a percentage of another compare two quantities using percentages work with percentages greater than 100% interpret fractions and percentages as operators use standard units of mass, length, time, money and other measures, including with decimal quantities use approximation through rounding to estimate answers solve problems involving percentage change: percentage increase solve problems involving percentage change: decrease solve problems involving percentage change: original value problems solve problems involving percentage change: simple interest in financial mathematics	Order positive decimals as a list with the smallest on the left. Decimals should be to 4 or 5 significant figures Order negative decimals as a list with the smallest on the left Order positive decimals with the largest on the left. Decimals should be to 4 or 5 significant figures Order negative decimals as a list with the smallest on the left. Decimals should be to 2 or 3 significant figures Order negative decimals with the largest on the left. Decimals should be to 2 or 3 significant figures Use > or < correctly between two positive decimals. Decimals should be to 4 or 5 significant figures. Use > or < correctly between two negative decimals. Decimals should be to 2 or 3 significant figures Round numbers to two or three decimal places Write numbers as a decimal number of millions or thousands e.g. 23 600 000 as 23.6 million Round to an appropriate number of decimal places after calculations, e.g. money problems after division, perimeter when using the pi key and a radius in cm etc. Work with numbers rounded to whole numbers or to 1 or two decimal places to estimate solutions, e.g. average populations of cities under certain effects. Add and subtract more than two integers or decimals with up to two decimal places, but with varying numbers of significant figures and using a mixture of operations within the calculation Use standard column procedures to add and subtract integers and decimals of any size, including a mixture of large and small numbers with differing numbers of decimal places Subtract integers and decimals with up to two decimal places, but with varying numbers of significant figures Extend written methods to U.t × U Multiply and divide decimals with one or two places by single-digit whole numbers Use mental strategies for multiplication - partitioning two 2 digit numbers where one number includes a decimal (both numbers have two significant figures) Multiply integers and decimals including by decimals such as 0.6 and 0.06, 0.t × 0.t or 0.t × 0.0h, 0.0h × 0.t and 0.0h × 0.0h Multiply and divide by decimals, dividing by transforming to division by an integer Understand the effect of multiplying a positive number by a decimal less than 1 Use mental strategies for multiplication of decimals - doubling and halving strategies Understand where to position the decimal point by considering equivalent calculations which are given Use knowledge of place value to calculate the product of two decimals where one or both are less than 1 and at least one has two digits other than zero Multiply any number by 0.1 and 0.01 Know there are different ways of finding an approximate answer Divide integers and decimals including by decimals such as 0.6 and 0.06 divisions related to 0.t × 0.t or 0.t × 0.0h, 0.0h × 0.t and 0.0h × 0.0h Use knowledge of place value to calculate the division of two decimals where both are less than 1 and at least the first has two digits other than zero Multiply and divide by decimals, dividing by transforming to division by an integer Divide *E.p* by a two digit number to give *E.p* Multiply and divide decimals with one or two places by single-digit whole numbers Divide decimals with one or two places by single-digit whole numbers Understand that dividing by 0.1 or 0.01 are equivalent to dividing by 1/10th or 1/100th or multiplying by 10 or 100 Divide any number by 0.1 and 0.01 Know there are different ways of finding an approximate answer Recall of equivalent fractions, decimals and percentage including for fractions that are greater than 1. Match across all 3 types, and need to be simple fractions (1/2, 1/4, 1/5, 1/10) Use the equivalence of fractions, decimals and percentages to compare proportions Find equivalent fractions, decimals and percentages where percentages end in 0.5 Use strategies for finding equivalent fractions, decimals and percentages involving decimal percentages and decimals greater 0 Order fractions by converting them to decimals or otherwise Simplify converted terminating decimal to fraction convert a terminating decimal to a fraction and simplify the fraction Write terminating decimals as fractions Interpret rounded off recurring decimals displayed on a calculator as fractions – 2/3, 1/6, 1 2/3, 1 1/6 Convert terminating decimals to fractions really means like 0.745 = 745/1000, not 0.5 = 1/2 Extend the percentage calculation strategies with jottings to find any percentage Express one given number as a percentage of another Find the outcome of a given percentage increase Find the outcome of a given percentage decrease Use a unitary method Have strategies for calculating fractions and decimals of a given number
	Half-term test			
	7 Equations	9	rearrange formulae to change the subject use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)	Solve simple linear equations with integer coefficients, of the form $ax = b$ or $x +/- b = c$ e.g. $2x = 18$, $x + 7 = 12$ or $x - 3 = 15$ Solve simple two-step linear equations with integer coefficients, of the form $ax + b = c$ e.g. $3x + 7 = 25$ Substitute integers into formulae to give equations and solve Solve linear equations of the form $ax +/- b = cx +/- d$ Solve equations of the form $a(x +/- b) = c(x +/- d)$ [a or c can be 1] Find a positive and negative square root as a solution of an equation involving x^2 Construct and solve equations of the form $a(x +/- b) = c(x +/- d)$ [a or c can be 1] Use systematic trial and improvement to find the approximate solution to one decimal place of equations such as $x^3 + x = 50$
	End of term test			
Summer term	8 Multiplicative reasoning	11	use ratio notation reduce a ratio to simplest form divide a given quantity into two parts in a given part:part ratio divide a given quantity into two parts in a given part:whole ratio express the division of a quantity into two parts as a ratio understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction relate the language of ratios and the associated calculations to the arithmetic of fractions relate the language of ratios and the associated calculations to linear functions	Reduce a ratio to its simplest form Reduce a three part ratio to its simplest form by cancelling Simplify a ratio expressed in fractions or decimals Convert between larger area measures to smaller ones (e.g. cm² to mm²) Increase the knowledge of standard metric units to include tonne, hectare Simplify a ratio expressed in different units Compare ratios by changing them to the form 1:*m* or *m*:1 Divide a quantity into two parts in a given ratio, where ratio given in ratio notation Divide a quantity into more than 2 parts in a given ratio Write ratios as fractions, percentages Understand the relationship between ratio and proportion (convert proportions to ratios) Solve word problems involving direct proportion Use the unitary method to solve simple word problems involving ratio and direct proportion Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions
	9 Perimeter, area and volume	11	understand and use place value for measures use standard units of mass, length, time, money and other measures, including with decimal quantities round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures] understand and use standard mathematical formulae change freely between related standard units [for example time, length, area, volume/capacity, mass] derive formulae to calculate and solve problems involving perimeter of triangles, parallelograms, trapezia derive and apply formulae to calculate and solve problems involving area of triangles, parallelograms, trapezia derive and apply formulae to calculate and solve problems involving volume of cuboids (including cubes) calculate and solve problems involving composite shapes derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies	Find the area of triangles by counting i.e. adding full and partial squares Use a formula to calculate the area of triangles Deduce a formula for the area of a triangle Use a formula to calculate the area of parallelograms Deduce and use the formula for the area of a parallelogram Deduce a formula for the area of a trapezium Calculate the area of more complex shapes made from rectangles Calculate the perimeter and area of shapes made from rectangles Calculate areas of compound shapes made from rectangles and triangles Know and use geometric properties of cuboids Identify more complex nets of 3D shapes including irregular polyhedra Know and use geometric properties of shapes made from cuboids Know and use the formula for the volume of a cuboid Calculate volumes of shapes made from cuboids, for lengths given as whole numbers Calculate the surface area of cubes, without a net Use nets to calculate the surface area of simple cuboids Calculate the surface area of simple cuboids (without use of nets) Calculate surface areas of shapes made from cuboids, for lengths given as whole numbers Convert cm³ to ml and litres and vice versa Convert between area measures (e.g. mm² to cm², cm² to m², and vice versa) Convert between volume measures (e.g. mm³ to cm³, cm³ to m³, and vice versa) Know rough metric equivalents of imperial measures in daily use (feet, miles, pounds, pints, gallons)
	Half-term test			
	10 Sequences and graphs	10	appreciate the infinite nature of the sets of integers, real and rational numbers generate terms of a sequence from a term-to-term rule generate terms of a sequence from a position-to-term recognise arithmetic sequences find the *n*th term recognise geometric sequences and appreciate other sequences that arise	Understand the infinite nature of a set of integers Know that an arithmetic sequence is generated by a starting number *a* , then adding a constant number *d* Generate terms of a linear sequence using term to term using positive or negative integers Find a term given its position in a sequences like 10th number in 4× table is 40 (one operation on *n*) Recognise geometric sequences and other sequences that arise. Begin to use a linear expression to describe the *n* th term in a one-step arithmetic sequence Generate terms of a linear sequence using position to term with positive integers using the *n* th term. Begin to use linear expressions to describe the nth term in a two step arithmetic sequence (e.g *n* th term is $3n + 1$ or $2n - 3$) Generate terms of a linear sequence using position to term with negative integers Begin to use formal algebra to describe the *n* th term in an arithmetic sequence Generate and describe integer sequences such as powers of 2 and growing rectangles Generate terms from a complex practical context (e.g maximum crossing for a given number of lines) Predict how the sequence will continue and test for several more terms. Find the term-to-term rule for geometric sequences and continue to the next few terms Read *x* and *y* co-ordinates in all four quadrants Plot a coordinate in all four quadrants Know how to find the midpoint of a line segment Recognise straight line graphs parallel to *x* or *y* axis Find the midpoint of a horizontal or vertical line segment AB, using coordinates of these points (no diagrams) Find the midpoint of a diagonal line segment AB using the coordinate of these points (no diagrams) Plot a graph of a simple linear function in the first quadrant.

				Compare graphs of simple functions Generate four quadrant coordinate pairs of simple linear functions
				In tables of functions compare changes in y with corresponding changes in x and how this relates to the function
				Plot and recognise graphs of $y = x$ and $y = -x$
				Plot the graphs of simple linear functions in the form $y = mx + c$ in four quadrants
			End of term test	
			End of year test	

Delta 2 Scheme of Work

Term	Unit	Teaching hours	Programme of Study	Unit description
Autumn term	1 Factors and powers	9	use the concepts and vocabulary of prime factorisation use product notation and the unique factorisation property round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures] calculate possible errors resulting from estimating, expressed using inequality notation $a < x \leq b$	Find the prime factor decomposition of a number Know the prime factorisation of numbers up to 30, giving answers as powers Use prime factor decomposition to find the HCF or LCM of 2 numbers Establish index laws for positive powers where the answer is a positive power Apply the index laws for multiplication and division of positive integer powers Show that any number to the power of zero is 1 Understand that each of the headings in the place value system, to the right of the tens column, can be written as a power of ten Know the prefixes associated with 10^6, 10^9, 10^{12} (giga, mega and kilo) Understand the effect of multiplying or dividing by any integer power of 10 Understand the order in which to calculate expressions that contain powers and brackets in both the numerator and denominator of a fraction Round numbers to a given number of significant figures Use numbers of any size rounded to 1 significant figure to make standardized estimates for calculations with 1 step.
	2 Working with powers	10	use and interpret algebraic notation: coefficients written as fractions rather than as decimals use and interpret algebraic notation: brackets understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors simplify and manipulate algebraic expressions to maintain equivalence: collecting like terms simplify and manipulate algebraic expressions to maintain equivalence: multiplying a single term over a bracket use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)	Simplify simple expressions involving powers, but not brackets, by collecting like terms Simplify simple expressions involving index notation, i.e. $x^2 + 2x^2$, $p \times p^3$, $r^5 \div r^2$ Know and understand the meaning of an identity and use the identity sign Simplify expressions involving brackets and powers e.g. $x(x^2 + x + 4)$, $3(a + 2b) - 2(a + b)$ Establish index laws for positive powers of variables where the answer is a positive power Apply the index laws for multiplication and division of small integer powers, e.g. $a^3 \times a^2$, $x^5 \div x^2$ Know and use the general forms of the index laws for multiplication and division of positive integer powers. (e.g. $pa \times pb$, $pa \div pb$, $(pa)b$) Multiply a single term over a bracket e.g. $x(x + 4)$, $3x(2x - 3)$ Use the distributive law to take out single term algebraic factors, e.g. $x^3 + x^2 + x = x(x^2 + x + 1)$ Substitute positive and negative integers into linear expressions and expressions involving powers Construct and solve equations that involve multiplying out brackets by a negative number and collecting like terms (e.g. $4(2a - 1) = 32 - 3(2a - 2)$)
	Half-term test			
	3 2D shapes and 3D solids	12	understand and use standard mathematical formulae derive and apply formulae to calculate and solve problems involving volume of prisms (including cylinders) calculate and solve problems involving perimeters of circles calculate and solve problems involving areas of circles use Pythagoras' Theorem to solve problems involving right-angled triangles	Begin to use plans and elevations Visualise and use a wide range of 2D representations of 3D objects Analyse 3D shapes informally and through cross-sections, plans and elevations Calculate the volume and surface area of right prisms Calculate the lengths, areas and volumes in cylinders Convert between larger volume measures to smaller ones (e.g. m^3 to cm^3) Calculate the lengths and areas given the volumes in right prisms Use the formula for the circumference of a circle Know the names of parts of a circle Use the formulae to find area of a circle, given the radius or diameter Use the formulae for the area of a circle, given area, to calculate the radius or diameter Be able to correctly identify the hypotenuse Know the formula for Pythagoras' theorem and how to substitute in values from a diagram Use and apply Pythagoras' theorem to solve problems Given the coordinates of points A and B, calculate the length of AB
	4 Real-life graphs	10	understand and use standard mathematical formulae rearrange formulae to change the subject model situations or procedures by translating them into algebraic expressions or formulae find approximate solutions to contextual problems from given graphs of a variety of functions: including piece-wise linear graphs solve problems involving direct proportion solve proportion problems including graphical and algebraic representations use compound units such as speed, unit pricing and density to solve problems	Extend a proportion or relationship beyond known values (given proportion graphically or in words) Recognise graphs that show direct proportion Solve problems involving direct proportion with a graph Discuss and interpret real-life graphs Interpret information from a complex real life graph, read values and discuss trends Plot the graphs of a function derived from a real life problem Discuss and interpret linear and non linear graphs from a range of sources Recognise graphs showing constant rates of change, average rates of change and variable rates of change Plot a simple straight line graph (distance-time) Draw and use graphs to solve distance-time problems Identify misleading graphs and statistics – choosing the appropriate reasons from a small choice of options Identify misleading graphs and statistics – choosing the appropriate reasons from a wide choice of options, or writing their own reasons
	End of term test			
Spring term	5 Transformations	11	identify properties of, and describe the results of: translations identify properties of, and describe the results of: rotations identify properties of, and describe the results of: reflections construct similar shapes by enlargement without coordinate grids construct similar shapes by enlargement coordinate grids apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides	Describe a reflection, giving the equation of the line of reflection Show reflection on a coordinate grid in $y = x$, $y = -x$ Describe and carry out translations using column vectors Describe a rotation on a coordinate grid Know that translations, rotations and reflections preserve length and angle Know that translations, rotations and reflections map objects on to congruent images Enlarge 2D shapes, given a centre of enlargement and a positive whole number scale factor Describe 2D enlargements Enlarge 2D shapes, given a centre of enlargement outside the shape and a negative whole-number scale factor Enlarge 2D shapes, given a fractional scale factor Recognise that enlargements preserve angle but not length Enlarge 2D shapes and recognise the similarity of resulting shapes Transform 2D shapes by simple combinations of rotations, reflections and translations, using ICT Transform 2D shapes by more complex combinations of rotations, reflections and translations Identify reflection symmetry in 3D shapes Understand the implications of enlargement for perimeter Identify the scale factor of an enlargement as the ratio of the lengths of any two corresponding line segments Calculate areas and volumes of shapes after enlargement
	6 Fractions, decimals and percentages	9	interpret percentages and percentage changes as a fraction or a decimal interpret percentages multiplicatively express one quantity as a percentage of another compare two quantities using percentages work with percentages greater than 100%	Know fractional equivalents to key recurring decimals e.g. 0.333333..., 0.6666666..., 0.11111... Know the denominators of simple fractions that produce recurring decimals, and those that do not Convert a recurring decimal to a fraction Use an inverse operation Use the unitary method for an inverse operation Calculate percentage change, using the formula 'actual change/original amount × 100' – where formula is given Calculate percentage change, using the formula 'actual change/original amount × 100' – where formula is recalled Calculate compound interest and repeated percentage change
	Half-term test			
	7 Constructions and loci	11	draw and measure line segments and angles in geometric figures derive and use the standard ruler and compass constructions: perpendicular bisector of a line segment derive and use the standard ruler and compass constructions: constructing a perpendicular to a given line from/at a given point derive and use the standard ruler and compass constructions: bisecting a given angle recognise and use the perpendicular distance from a point to a line as the shortest distance to the line describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric use the standard conventions for labelling the sides and angles of triangle ABC	Construct a triangle given two sides and included angle (SAS) Construct a triangle given two angles and the included side (ASA) Use straight edge and compass to construct a triangle, given three sides (SSS) Use ruler and protractor to draw accurate nets of 3-D shapes, using squares, rectangles and triangles e.g. regular tetrahedron, square-based pyramid, triangular prism Use straight edge and compass to construct the mid-point and perpendicular bisector of a line segment Use straight edge and compass to construct the bisector of an angle Use straight edge and compass to construct the perpendicular from a point on a line segment Use straight edge and compass to construct a triangle, given right angle, hypotenuse and side (RHS) Use straight edge and compass to construct the perpendicular from a point to a line segment recognise and use the perpendicular distance from a point to a line as the shortest distance to the line Draw the locus equidistant between 2 points or from a point Draw the locus equidistant between 2 lines know that all the points equidistant from a single point in space form the surface of a sphere Draw the locus equidistant from a line and around a rectangle Produce shapes and paths by using descriptions of loci Use construction to find the locus of a point that moves according to a rule
	End of term test			
Summer term	8 Probability	11	record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes use appropriate language of probability use the 0–1 probability scale understand that probabilities of all possible outcomes sum to 1 generate theoretical sample spaces for single and combined events with equally likely and mutually exclusive outcomes use sample spaces for single and combined events to calculate theoretical probabilities.	Understand and use the probability scale from 0 to 1 Identify all possible mutually exclusive outcomes of a single event Find and justify probabilities based on equally likely outcomes in simple contexts Calculate the probability of a combination of events or single missing events of a set of mutually exclusive events using 'sum of outcomes = 1' Calculate the probability of the final event of a set of mutually exclusive events Know that if probability of event is p, probability of not occurring is $1 - p$ Understand relative frequency as an estimate of probability and know when to add or multiply probabilities Know how to calculate relative frequency Use relative frequency to make estimates Apply estimated probabilities to future data Estimate probabilities based on these data (collected from a simple experiment) Plot and use relative frequency diagrams, and recognise that with repeated trials experimental probability tends to a limit Use experimentation to complete a data collection sheet, e.g. throwing a die or data-logging Identify all mutually exclusive outcomes for two successive events with two or three outcomes in each event Use the vocabulary of probability to assign probability to events. Identify conditions for a fair game Draw and use tree diagrams to represent outcomes of two independent events and calculate probabilities Calculate the probability of independent and dependent events
	9 Scale drawings and measures	10	use scale factors use scale diagrams use maps interpret scale drawings know and use the criteria for congruence of triangles identify and construct congruent triangles	Use scales in maps and plans Use and interpret maps, using proper map scales (1:25 000) Draw diagrams to scale Use and interpret scale drawings, where scales use mixed units, and drawings aren't done on squared paper, but have measurements marked on them. Solve simple geometrical problems showing reasoning Distinguish between conventions, definitions and derived properties Solve geometric problems using side and angle properties of equilateral, isosceles and right-angled triangles and special quadrilaterals Solve problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons Make simple drawings, demonstrating accurate measurement of length and angle Use bearings to specify direction Solve angle problems involving bearings Begin to use congruency to solve simple problems in triangles and quadrilaterals Know and use the criteria for congruence of triangles Identify 2D shapes that are congruent or similar by reference to sides and angles Use the information given about the length of sides and size of angles to determine whether triangles are congruent, or similar Know that triangles given SSS, SAS, ASA or RHS are unique, but that triangles given SSA or AAA are not. Find points that divide a line in a given ratio, using the properties of similar triangles Use similarity to solve problems in 2-D shapes
	Half-term test			
	10 Graphs	12	recognise and use relationships between operations including inverse operations model situations or procedures by using graphs work with coordinates in all four quadrants recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane interpret mathematical relationships both algebraically and graphically reduce a given linear equation in two variables to the standard form $y = mx + c$ calculate and interpret gradients and intercepts of graphs of such linear equations numerically calculate and interpret gradients and intercepts of graphs of such linear equations graphically calculate and interpret gradients and intercepts of graphs of such linear equations algebraically	Plot the graphs of linear functions in the form $y = mx + c$ and recognise and compare their features Recognise that linear functions can be rearranged to give y explicitly in terms if x e.g. rearrange $y + 3x - 2 = 0$ in the form $y = 2 - 3x$ Recognise that straight line graphs can be written in the form $y = mx + c$ Be able to work out when a point is on a line Begin to consider the features of graphs of simple linear functions, where y is given explicitly in terms of x Without drawing the graphs, compare and contrast features of graphs such as $y = 4x$, $y = 4x + 6$, $y = x + 6$, $y = -4x$, $y = x - 6$ Know and use $y = mx + c$ for any straight line Know for a straight line $y = mx + c$, m is the gradient and m = (change in y)/(change in x) Recognise that any line parallel to a given line will have the same gradient. Know that a line perpendicular to the line $y = mx + c$, will have a gradient of $-1/m$ Recognise when lines are parallel or perpendicular from their equations Recognise when lines are parallel and where a line crosses the y-axis from the equation of the line Find the inverse of a linear function such as $x \rightarrow 2x + 5$, $x \rightarrow -2(x - 3)$, $x \rightarrow (x + 2)/4$, $x \rightarrow 5x - 4$ Recognise the graph of the inverse of simple linear functions Recognise that when the linear and inverse of a linear function such as $y = 2x$, $y = 3x$ are plotted, they are a reflection in the line $y = x$ Recognise geometric sequences and appreciate other sequences that arise Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear , exponential and reciprocal graphs Solve problems involving direct and inverse proportion, including graphical and algebraic representations
	End of term test			
	End of year test			

Delta 3 Scheme of Work

Term	Unit	Teaching hours	Programme of Study	Unit description
Autumn term	1 Powers and roots	11	distinguish between exact representations of roots and their decimal approximations interpret numbers in standard form A × 10n 1 ≤ A < 10, where n is a positive or negative integer or zero compare numbers in standard form A × 10n 1 ≤ A < 10, where n is a positive or negative integer or zero substitute numerical values into formulae and expressions, including scientific formulae	Find the reciprocal of simple numbers /fractions mentally, e.g. 10 and 1/10, 1/3 and 3 etc. Know that a number multiplied by its reciprocal is 1 Know that the reciprocal of a reciprocal is the original number Use the index laws to include negative power answers and understand that these answers are smaller than 1 Evaluate powers of fractions Write numbers greater than 10 in standard form Write number less than 10 in standard form Order numbers written in standard form Complete calculations using numbers written in standard form Use fractional indices and write a fractional power as a root Work out negative fractional powers of numbers Simplify expressions which include surds Present a concise and reasoned argument using surds Understand / use rational / irrational numbers Distinguish between exact representations of roots and their decimal approximations
	2 Quadratics	10	simplify and manipulate algebraic expressions to maintain equivalence: expanding products of two or more binomials generate terms of a sequence from a term-to-term rule generate terms of a sequence from a position-to-term recognise arithmetic sequences find the *n*th term recognise geometric sequences and appreciate other sequences that arise	Generate any term of a sequence when the *n* th term is given. Generate the next term in a quadratic sequence Find a term of a quadratic sequence with $T(n) = an^2$ for a given value of *n* Find the nth term of a quadratic sequence of the term with $T(n) = an^2 +/- b$ Find the nth term of a quadratic sequence of the term with $T(n) = an^2 +/- bn +/- c$ Generate the sequence of triangle numbers by considering the arrangement of dots and deduce that $T(n) = 1 + 2 + 3 + ... + n$, the sum of the series By looking at the spatial patterns of triangular numbers, deduce that the nth term is $n\ (n + 1)/2$ Multiply out brackets involving positive terms such as $(a + b)(c + d)$ and collect like terms Multiply out brackets involving positive and negative terms such as $(a + b)(c - d)$ or $(a - b)(c - d)$ and collect like terms Square a linear expression and collect like terms Derive and use identities for the product of two linear exoressions of the form $(a + b)(a - b) = a^2 - b^2$ and $(x + 2)(x - 2) = x^2 - 4$ Factorise a quadratic expression Factorise a perfect square Derive and use the difference of two squares Solve quadratics with first term *x* squared (no multiples of *x* squared)
	Half-term test			
	3 Inequalities, equations and formu	11	understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors rearrange formulae to change the subject use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)	Solve linear inequalities and represent the solution on a number line Multiply both sides of an inequality by a negative number Know that $a^0 = 1$ Use the index laws to include negative power answers and establish that these answers are smaller than 1 Explain the distinction between equations, formulae and functions Solve equations of the form $(ax +/- b)/c = (dx +/- e)/f$ (One of *c* or *f* should be 1) Construct and solve equations of the form $(ax +/- b)/c = (dx +/- e)/f$ (*c* and *f* are bigger than 1) Change the subject of a formula Use factorisation to make a given letter the subject of a formula Change algebraic fractions to equivalent fractions Change the subject of a complex formula that involves fractions, e.g. make *u* or *v* the subject of the formula $1/v + 1/u = 1/f$ Solve problems by finding a variable that is not the subject of a formula Simplify complex algebraic expressions
	4 Collecting and analysing data	12	use a calculator and other technologies to calculate results accurately and then interpret them appropriately describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete data describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving continuous and grouped data describe, interpret and compare observed distributions of a single variable through: appropriate measures of spread (range, consideration of outliers)	Select appropriate level of accuracy of data Select the range of possible methods that could be used to collect this data as primary data Select and discuss the range of possible sources that could be used to collect this data as secondary data From a range of sample sizes identify the most sensible answer Determine the sample size and degree of accuracy needed From a small choice of options identify ways to reduce bias in a sample or questionnaire Identify a random sample Use stem and leaf diagrams to find mode, median, mean, range Construct stem and leaf diagrams Use back to back stem and leaf diagrams to compare sets of data Construct a frequency diagram from a grouped frequency table, and use it to draw a frequency polygon. Compare two distributions using the shape of the distributions – frequency polygons. Construct and use frequency polygons to compare sets of data Estimate the range of a large set of grouped data Calculate an estimate of the mean of a large set of grouped data Estimate the mean from a frequency polygon Identify the class that contains the median of a set of grouped data from a table Calculate possible values of the set of data given summary statistics Find quartiles from raw data and present data in a box plot Find the lower and upper quartiles of a set of grouped data using a cumulative frequency chart and box and whisker diagram Draw a grouped frequency graph Estimate the median of a set of grouped data using a cumulative frequency chart Find the interquartile range of a large set of grouped data using a cumulative frequency chart Interpret / construct histograms
	End of term test			
Spring term	5 Multiplicative reasoning	10	solve problems involving direct proportion solve problems involving inverse proportion calculate and solve problems involving perimeters of circles calculate and solve problems involving areas of circles	Given a relationship (as proportion) graphically or in words, extend beyond known values (e.g. off lines of chart, or above pairs of values given Check by drawing graphs whether two variables are in direct proportion Set up equations to show direct proportion Recognise sets of data that are proportional Understand direct proportion as equality of ratio Use algebraic methods to solve problems involving variables in direct proportion Use expressions of the form y is proportional to x Use exoressions of the form v is proroortional to x^2 Identify data that is proportional to the inverse of a variable Understand / use inverse proportion Recognise the formulae for length of arcs in a circle Recognise the formulae for area of sectors in a circle Use the formulae for length of arcs and area of sectors of circles to solve problems
	6 Non-linear graphs	10	recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in *x* and *y* and the Cartesian plane find approximate solutions to contextual problems from given graphs of a variety of functions: reciprocal graphs	Construct a table of values, including negative values of *x* for a quadratic function such as $y = ax^2$ Recognise the graph of a quadratic function Construct a table of values, including neoative values of *x* for a function such as $v = ax^2 + b$ Find the line of symmetry and write down the turning point of a quadratic graph Explain the effect on a quadratic graph of changing the parameter Solve simple quadratic equations graphically, e.g. $x^2 - 10 = 0$, $2x^2 - 15 = 0$ Construct a table of values, including negative values of *x* for a function such as $y = ax^2 + bx$ and $y = ax^2 + bx + c$ Solve quadratic equations such as ax^2 + bx = 0 graphically and relate the solutions to quadratic factorisation Solve quadratic equations such as $x^2 + bx + c = 0$ graphically and relate the solutions to quadratic factorisation Construct a table of values, including negative values of *x* for a function such as $y = ax^3$ Recognise the oraohs of $v = x^2$, $v = 3x^2 + 4$, $v = x^3$ Recognise graphs of functions of the form $y = ax^2 + b$ and $y = ax^3$ Identify maxima, minima and lines of symmetry on quadratic and cubic graphs Construct models of real-life situations by drawing graphs and constructing algebraic equations Sketch / interpret graphs of reciprocal functions Recognise and use reciprocal graphs and graphs for inverse proportion
	Half-term test			
	7 Accuracy and measures	9	use compound units such as speed, unit pricing and density to solve problems round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures] use approximation through rounding to estimate answers calculate possible errors resulting from estimating, expressed using inequality notation $a < x \leq b$	Solve problems using constant rates and related formulae. Extend to simple conversions of compound measures (e.g. convert 2 m/s to km/hr) Solve problems using average rate of change and related formulae Identify the upper and lower bounds of a measurement by calculating +/- half of the unit used for rounding Identify upper and lower bounds for rounding of discrete and continuous data Calculate simple error intervals using inequality notation $a < x <= b$ Calculate the lower and upper bounds of area measurement Calculate the upper and lower bounds of compound measures Determine upper and lower bounds in complex problems Solve problems by understanding upper and lower bounds
	End of term test			
Summer term	8 Graphical solutions	11	understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factorsuse linear graphs to estimate values of *y* for given values of *x* and vice versa and to find approximate solutions of simultaneous linear equations use quadratic graphs to estimate values of *y* for given values of *x* and vice versa and to find approximate solutions of simultaneous linear equations understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors	Understand the steps required to solve a pair of simultaneous equations of the form $ax + y = b$, $y = ax$ Understand the steps required to solve a pair of simultaneous equations, when they are solved by addition. Equations are of the form $ax + y = b$, $x - y = c$ Understand the steps required to solve a pair of simultaneous, when they are solved by subtraction. Equations are of the form $ax + y = b$, $x + y = c$ Rearrange equations of the form ax+by=c to compare gradients and *y* - intercept Recognise that linear functions can be rearranged to give *y* explicitly in terms if *x*, e.g. rearrange $y + 3x - 2 = 0$ in the form $y = 2 - 3x$ Find the equation of the line between two points Understand the steps required to solve a pair of simultaneous equations, when they are solved by multiplication. Equations are of the form $ax + y = b$, $x +/- cy = d$ Identify the solution of simultaneous equations on a graph Solve inequalities in two variables by using linear graphs Solve more complex inequalities in two variables by using linear and quadratic graphs Construct models of real-life situations by drawing graphs and constructing algebraic equations
	9 Trigonometry	12	use trigonometric ratios in similar triangles to solve problems involving right-angled triangles use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders and pyramids to solve problems in 3D	Understand that the ratio of any two sides is constant in similar right-angles triangles Use the sine, cosine and tangent ratios to find the lengths of unknown sides in a right-angled triangle, using straight-forward algebraic manipulation, e.g. calculate the adjacent (using cosine), or the opposite (using sine or tangent ratios) Use the sine, cosine and tangent ratios to find the lengths of unknown sides in a right-angled triangle, using more complex algebraic manipulation, e.g. the hypotenuse (using cosine or sine), or adjacent (using the tangent ratio) Begin to use the trigonometric ratios to find the size of an angle in a right-angled triangle Use the appropriate ratio to find a length, or angle, and hence solve a two-dimensional problem Use sine / cosine / tangent of any size of angle and Pythagoras' theorem when solving problems in 3D Sketch graphs of sine / cosine / tangent functions for any angle, generating/interpreting them
	Half-term test			
	10 Mathematical reasoning	9	use known results to obtain simple proofs	Justify solutions to problems set in an unfamiliar context Generate fuller solutions using reasoned argument Construct models of real-life situations by drawing graphs and constructing algebraic equations Identify exceptional cases or counter-examples and explain why Use counter example to show why a statement is false Explore the effects of varying values and make convincing arguments to justify generalisations Justify generalisations, arguments or solutions and investigate whether particular cases can be generalised further Present a reasoned argument using algebra Use algebra to investigate an extension to a problem
	End of term test			
	End of year test			