

KS3 Maths Progress Theta 3-year Scheme of Work

Theta Year 7 Scheme of Work

Term	Unit Title	Teaching hours	Programme of study	Unit description	
A u t u m t e r m	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) and appropriate measures of spread (range, consideration of outliers) construct and interpret vertical line (or bar) charts for ungrouped and grouped data	Find the mode, median, mean and range for a set of data Compare sets of data using their ranges and averages Read and draw tally charts, tables, charts and line graphs, including for grouped data Use ICT to present data and construct charts	
	2 Number skills	12	use conventional notation for the priority of operations round numbers and measures to an appropriate degree of accuracy recognise and use relationships between operations including inverse operations use the four operations, including formal written methods, with positive and negative integers order positive and negative integers use the concepts and vocabulary of prime numbers, factors [or divisors] and prime numbers use integer powers and associated real roots (square, cube) use approximation through rounding to estimate answers	Know and use the priority of operations and laws of arithmetic Round whole number and decimals Check answers using various methods Use written methods to add, subtract, multiply and divide whole numbers Use positive and negative integers Recognise and use factors, multiples and prime numbers Know square numbers and their corresponding square roots Use index notation for squares, cubes and positive integer powers of 10	
	Half-term test				
	3 Expressions, functions and formulae	10	substitute numerical values into formulae and expressions, including scientific formulae simplify and manipulate algebraic expressions to maintain equivalence: collecting like terms, multiplying a term over a bracket use and interpret algebraic notation: $3y$ in place of $y + y + y$ and $3 \times y$ model situations or procedures by translating them into algebraic expressions or formulae	Describe and find outputs of simple functions Simplify expressions by collecting like terms Write expressions Substitute into formulae Write formulae	
4 Decimals and measures	12	understand and use place value for decimals order decimals and fractions use the symbols =, ≠, <, >, ≤, ≥ understand and use place value for measures work with coordinates in all four quadrants use the four operations, including formal written methods, with positive and negative decimals derive formulae to calculate and solve problems involving perimeter and area of parallelograms	Order and round decimals Use measures and conversions Read scales and plot coordinates Calculate with decimals Work out perimeter and area		
End of term test					
S p r i n g t e r m	5 Fractions	10	order decimals and fractions use the symbols =, ≠, <, >, ≤, ≥ use the four operations, including formal written methods, with positive and negative fractions define percentage as 'number of parts per hundred' interpret a percentage as a fraction or a decimal interpret fractions and percentages as operators	Compare fractions Simplify fractions Calculate with fractions (addition, subtraction and fractions of amounts) Work with equivalent fractions, decimals and percentages Find percentages of amounts	
	6 Probability	9	use appropriate language of probability use the 0–1 probability scale understand that probabilities of all possible outcomes sum to 1 record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes	Use the vocabulary of probability Understand and use the probability scale from 0 to 1 Calculate probability based on equally likely outcomes Calculate the probability of an event not happening Calculate experimental probability	
	Half-term test				
7 Ratio and proportion	10	solve problems involving direct proportion use ratio notation reduce a ratio to simplest form divide a given quantity into two parts in a given part:part ratio use scale factors understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction express the division of a quantity into two parts as a ratio	Solve problems involving direct proportion Understand and use ratios Use fractions to compare proportions Use percentages to compare proportions		
End of term test					
	8 Lines and angles	11	use the standard conventions for labelling the sides and angles of triangle ABC draw and measure line segments and angles in geometric figures apply the properties angles at a point and on a straight line apply the properties vertically opposite 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 use known results to obtain simple proofs	Identify and label angles and lines Use properties of 2-D shapes Estimate, measure and draw angles Draw triangles accurately Solve problems involving angles	

S u m m e r t e r m			use term-to-term to explain simple progressions	Understand properties, angle facts and problems involving quadrilaterals
	9 Sequences and graphs	10	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 work with coordinates in all four quadrants produce graphs of linear functions interpret mathematical relationships both algebraically and graphically	Generate and describe simple and more complex sequences including n th term Identify and plot coordinates in all four quadrants Recognise and plot straight line graphs Make links between graphs, sequences and functions
	Half-term test			
	10 Transformations	10	derive properties of regular polygons 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	Describe congruence Find enlargements and scale factors Identify line and rotational symmetry Describe reflections Describe rotations Describe translations Combine transformations
	End of term test			
End of year test				

Theta Year 8 Scheme of Work

Term	Unit Title	Teaching hours	Programme of study	Unit description
A u t u m t e r m	1 Number	11	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 concepts and vocabulary of prime factorisation 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	Divide £.p by a two digit number to give £.p Add and subtract integers – positive and negative numbers (with varying numbers of significant figures) Find the HCF or LCM of 2 numbers less than 100 Estimate square roots of non square numbers less than 100 Multiply and divide integers - positive and negative numbers Calculate squares, cubes and cube roots Add, subtract, multiply and divide integers. Extend to the distributive law $a(b + c)$ Find the prime factor decomposition of a number Use the function keys for powers and fractions Combine laws of arithmetic for brackets with mental calculations of cubes roots and square roots
	2 Area and volume	11	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 change freely between related standard units [for example time, length, area, volume/capacity, mass]	Calculate surface areas of cubes and cuboids Calculate areas of triangles, parallelograms, trapezia Calculate areas of compound shapes Calculate the volume of shapes made from cuboids Solve volume problems Convert between metric and imperial measures, and cm^3 and litres. Calculate the surface area of shapes made from cuboids
	Half-term test			
	3 Statistics, graphs and charts	12	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) 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	Calculate the mean from a simple frequency table, and using an assumed mean Interpret and construct pie charts Use complex two way tables Interpret scatter graphs, draw lines of best fit and use correlation Find the modal class of a set of continuous data Use stem and leaf diagrams to find mode, median, mean, range Identify misleading graphs and statistics
	4 Expressions and equations	11	use and interpret algebraic notation: ab in place of $a \times b$ 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: 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: taking out common factors use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)	Solve simple linear equations with integer coefficients Construct and solve linear equations Substitute integers into formulae and solve for missing values one- step equations Simplify simple expressions involving powers Multiply a single term over a bracket Use the distributive law to take out numerical common factors
End of term test				
	5 Real-life graphs	10	model situations or procedures by using graphs interpret mathematical relationships both algebraically and graphically	Draw and interpret line graphs Interpret information from a complex real-life graph, read values and discuss trends

S p r i n g t e r m			find approximate solutions to contextual problems from given graphs or a variety of functions: including piece-wise linear graphs	Draw, use and interpret conversion graphs Draw and use graphs to solve distance–time problems 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 Use graphs to solve distance–time problems Discuss and interpret real-life graphs
	6 Decimals and ratio	10	use the four operations, including formal written methods, with positive and negative decimals round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures] 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	Multiply and divide integers and decimals with up to two decimal places Divide a quantity in more than two parts in a given ratio, including decimal values Order positive and negative numbers, including decimals, as a list Multiply or divide any number by 0.1 and 0.01 Simplify a ratio expressed in decimals Round numbers to an appropriate degree of accuracy Use standard column procedures to add and subtract integers and decimals of any size Multiply and divide by decimals Use > or < correctly between two negative decimals
	Half-term test			
	7 Lines and angles	10	derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies understand and use the relationship between parallel lines and alternate and corresponding angles use the sum of angles in a triangle to deduce the angle sum in any polygon apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides	Classify quadrilaterals by their geometric properties Understand a proof that the sum of the angles of a triangle is 180° and of a quadrilateral is 360° Solve geometric problems using side and angle properties of triangles and special quadrilaterals Identify alternate angles and corresponding angles Calculate the interior and exterior angles of regular and irregular polygons Solve problems involving angles by setting up equations and solving them Solve geometrical problems showing reasoning
End of term test				
S u m m e r t e r m	8 Calculating with fractions	10	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 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 and 3/8) use standard units of mass, length, time, money and other measures, including with decimal quantities	Add and subtract fractions with any size denominator Multiply integers and fractions by a fraction Use fractions and decimals within calculations including brackets Find the reciprocal of a number Divide integers and fractions by a fraction Calculate with mixed numbers
	9 Straight-line graphs	10	recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane 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 solve problems involving direct proportion solve proportion problems including graphical and algebraic representations	Find gradients of lines Plot the graphs of linear functions Find midpoints of line segments Write the equations of straight line graphs in the form $y = mx + c$ Identify and describe examples of direct proportion Solve problems involving direct proportion
	Half-term test			
	10 Percentages, decimals and fractions	10	express one quantity as a percentage of another compare two quantities using percentages work with percentages greater than 100% interpret percentages multiplicatively	Order fractions by converting them to decimals or equivalent fractions. Find equivalent fractions, decimals and percentages. Express one number as a percentage of another Work out a percentage increase or decrease Solve percentage problems
End of term test				
End of year test				

Theta Year 9 Scheme of Work

Term	Unit Title	Teaching hours	2014 Programme of study	Unit description
	1 Indices and standard form	10	distinguish between exact representations of roots and their decimal approximations interpret numbers in standard form $A \times 10^n$ $1 \leq A < 10$, where n is a positive or negative integer or zero compare numbers in standard form $A \times 10^n$ $1 \leq A < 10$, where n is a positive or negative integer or zero	Establish index laws for positive powers where the answer is a positive power Understand which part of an expression is raised to a power Be able to simplify expressions containing powers Solve word problems using square roots and cube roots Know the prefixes associated with 10^{12} , 10^9 , 10^6 , 10^3 , 10^2 , 10^3 , 10^6 , 10^9 , 10^{12} Know that any number to the power of zero is 1

A u t u m n t e r m			Make and justify estimates and approximations of calculations involving more than two operations and BIDMAS
			Understand the order in which to calculate expressions that contain powers and brackets Apply the index laws for multiplication and division of integer powers
			Write and order numbers in standard index form
	2 Expressions and formulae	11	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 $a \div b$ simplify and manipulate algebraic expressions to maintain equivalence: expanding products of two or more binomials understand and use standard mathematical formulae rearrange formulae to change the subject
Half-term test			
3 Dealing with data	11	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 central tendency (mean, mode, median) describe, interpret and compare observed distributions of a single variable through: appropriate measures of spread (range, consideration of outliers) construct and interpret frequency tables Illustrate simple mathematical relationships between two variables (bivariate data) using scatter graphs	Select the range of possible methods that could be used to collect primary data Determine suitable sample size and degree of accuracy needed Design and use a data collection sheet for continuous grouped data Discuss factors that may affect the collection of data Design tables recording discrete and continuous data Identify key features of data sets described in either line graphs or scatter graphs – including exceptions and correlation From a small choice of options identify ways to reduce bias in a sample Find the modal class of a large set of data Use a line of best fit, drawn by eye, to estimate the missing value in a two variable data set Construct and use frequency polygons to compare sets of data Calculate estimate of mean from large sets of grouped data
4 Multiplicative reasoning	11	use compound units such as speed, unit pricing and density to solve problems work with percentages greater than 100% construct similar shapes by enlargement without coordinate grids construct similar shapes by enlargement coordinate grids interpret mathematical relationships both algebraically and geometrically	Enlarge 2D shapes, given a centre of enlargement and a positive whole number scale factor Find the centre of enlargement by drawing lines on a grid Round numbers to a given number of significant figures Solve 'original value' problems using inverse operation Enlarge 2D shapes, given a fractional scale factor Solve problems using compound measures Solve problems using constant rates and related formulae Calculate percentage change, using the formula $\text{actual change} / \text{original amount} \times 100$ – where formula is recalled
End of term test			
5 Constructions	10	use scale diagrams use maps 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 properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders and pyramids to solve problems in 3-D use the properties of surfaces of cones and spheres to solve problems in 3-D	Identify alternate and corresponding angles on the same diagram Analyse 3D shapes through cross-sections, plans and elevations Use and interpret maps and scale drawings 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 a triangle, given three sides (SSS) Use straight edge and compass to construct the perpendicular from a point to a line segment 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) Construct nets of triangular prism, pyramid and wedge shape using SSS or RHS for the triangular sections Draw and interpret loci
6 Equations, inequalities and proportionality	11	use and interpret algebraic notation: coefficients written as fractions rather than as decimals 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	Understand the difference between expression, equation, function and formula Construct and solve equations of the form $(ax + b)/c = (dx + e)/f$ (one of c or f should be 1) Find a positive square root as a solution of an equation involving x^2

S p r i n g t e r m		<p>simplify and manipulate algebraic expressions to maintain equivalence: collecting like terms</p> <p>simplify and manipulate algebraic expressions to maintain equivalence: multiplying a single term over a bracket</p> <p>simplify and manipulate algebraic expressions to maintain equivalence: taking out common factors</p> <p>simplify and manipulate algebraic expressions to maintain equivalence: expanding products of two or more binomials</p>	<p>Know and understand the meaning of an identity and use the identity sign</p> <p>Construct and solve equations of the form $a(bx +/ - c) = d(ex +/ - f)$ where negative signs are anywhere in the equation. (a or d are bigger than 1) e.g. $3(-2x - 1) = -4x + 1$</p> <p>Multiply both sides of an inequality by a negative number</p> <p>Solve simple linear inequalities in one variable and represent the solution on a number line e.g. $-6 < 2n = 4$ or $-9 < 2n + 3 = 7$</p> <p>Understand the steps required to solve a pair of simultaneous equations of the form $ax + y = b, y = ax$</p> <p>Use systematic trial and improvement to find the approximate solution to one decimal place of equations such as $x^3 = 29$</p> <p>Construct and solve equations that involve multiplying out brackets by a negative number and collecting like terms</p> <p>Find an unknown where it is not the subject of the formula and where an equation must be solved</p> <p>Solve more complex linear inequalities in one variable and represent the solution on a number line e.g. $3n + 2 < 11$ and $2n - 1 > 1$</p> <p>Understand the steps required to solve a pair of simultaneous, when they are solved by addition. Equations are of the form $ax + y = b, x - y = c$</p> <p>Use systematic trial and improvement to find the approximate solution to one decimal place of equations such as $x^3 + x = 50$</p>	
	Half-term test			
	7 Circles, Pythagoras and prisms	10	<p>calculate possible errors resulting from estimating, expressed using inequality notation $a < x \leq b$</p> <p>calculate and solve problems involving perimeters of circles</p> <p>calculate and solve problems involving areas of circles</p> <p>use Pythagoras' Theorem to solve problems involving right-angled triangles</p>	<p>Know the names of parts of a circle</p> <p>Use the formula for the circumference of a circle</p> <p>Round to an appropriate number of decimal places after calculations</p> <p>Use the formulae for the circumference, given the circumference, to calculate the radius or diameter</p> <p>Use the formula for area of a circle, given the radius or diameter</p> <p>Use the formulae for area of a circle, given area, to calculate the radius or diameter</p> <p>Know the formula for Pythagoras' theorem and how to substitute in values from a diagram</p> <p>Use and apply Pythagoras' theorem to solve problems</p> <p>Calculate the surface area and volume of right prisms (including cylinder)</p> <p>Calculate simple error intervals, such as $\pm 10\%$</p> <p>Identify and calculate upper and lower bounds</p> <p>Use inequality notation $a < x \leq b$</p>
End of term test				
S u m m e r t e r m	8 Sequences and graphs	12	<p>model situations or procedures by using graphs</p> <p>recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane</p> <p>reduce a given linear equation in two variables to the standard form $y = mx + c$</p> <p>calculate and interpret gradients and intercepts of graphs of such linear equations numerically</p> <p>calculate and interpret gradients and intercepts of graphs of such linear equations graphically</p> <p>calculate and interpret gradients and intercepts of graphs of such linear equations algebraically</p> <p>use linear graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations</p> <p>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</p> <p>find approximate solutions to contextual problems from given graphs of a variety of functions: including piece-wise linear graphs</p> <p>find approximate solutions to contextual problems from given graphs of a variety of functions: exponential graphs</p> <p>find approximate solutions to contextual problems from given graphs of a variety of functions: reciprocal graphs</p> <p>solve problems involving inverse proportion</p>	<p>Begin to use formal algebra to describe the nth term in an arithmetic sequence</p> <p>Generate terms of a linear sequence using position-to-term rule</p> <p>Generate the next term in a quadratic sequence</p> <p>Recognise geometric sequences and appreciate other sequences that arise</p> <p>Classify sequences as linear, geometric and quadratic</p> <p>Calculate and interpret gradient using $y = mx + c$</p> <p>Find and interpret the y-intercept from $y = mx + c$</p> <p>Plot graphs of quadratic functions by hand and using ICT</p> <p>Recognise that any line parallel to a given line will have the same gradient</p> <p>reduce a given linear equation in two variables to the standard form $y = mx + c$</p> <p>Identify the solution of simultaneous equations on a graph</p> <p>Use graphs to solve distance-time problems</p> <p>Construct a table of values, including negative values of x for a function such as $y = ax^3$</p>
	9 Probability	10	<p>enumerate sets and unions / intersections of sets systematically, using tables and grids</p> <p>enumerate sets and unions / intersections of sets systematically, using Venn diagrams</p> <p>generate theoretical sample spaces for single and combined events with equally likely and mutually exclusive outcomes</p> <p>use sample spaces for single and combined events to calculate theoretical probabilities.</p> <p>Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts</p>	<p>Calculate probabilities from two-way tables with more than two columns / rows each way</p> <p>Use the language of probability to compare the choice of x/a with x/b</p> <p>Use the language of probability to compare the choice of x/a with y/b</p> <p>Calculate the probability of a combination of events or single missing events of a set of mutually exclusive events using sum of outcomes is one</p> <p>Calculate estimates of probability from experiments or survey results</p> <p>Use experimental probabilities to predict outcomes</p> <p>Identify all mutually exclusive outcomes for two successive events</p> <p>Compare experimental and theoretical probabilities</p> <p>Enumerate sets and combinations of sets systematically, using tabular, grid and Venn diagrams</p> <p>Identify conditions for a fair game</p> <p>Use $P(A \text{ and } B) = P(A) \times P(B)$ for two independent events</p> <p>Complete and use tree diagrams to calculate probabilities</p>

Half-term test			
10 Comparing shapes	9	<p>know and use the criteria for congruence of triangles</p> <p>derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies</p> <p>identify and construct congruent triangles</p> <p>use trigonometric ratios in similar triangles to solve problems involving right-angled triangles</p>	<p>Use congruent shapes to help you solve problems about triangles and quadrilaterals, and explain all your reasoning</p> <p>Know whether two 2D shapes are similar, congruent or neither similar nor congruent</p> <p>Know that enlargements of 2D shapes produce similar shapes</p> <p>Use what you know about the sides and angles of two triangles to decide whether they are similar, congruent or neither similar nor congruent</p> <p>Know and use the criteria for congruence (SSS, SAS, ASA or RHS)</p> <p>Know that if two 2D shapes are similar, corresponding angles are equal and corresponding sides are in the same ratio</p> <p>Find points that divide a line in a given ratio, using the properties of similar triangles</p> <p>Know that the scale factor of an enlargement is the ratio of the lengths of any two corresponding line segments</p> <p>Use similarity to solve angle and side problems</p> <p>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)</p> <p>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)</p>
End of term test			
End of year test			