

## KS3 Maths Progress Pi 3-year Scheme of Work

### Pi 1 Scheme of Work

Term	Unit	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) construct and interpret frequency tables construct and interpret bar charts construct and interpret vertical line (or bar) charts for ungrouped data	Use a calculator effectively Represent and interpret data in tables, charts and diagrams Extract data and interpret discrete bar charts Construct on paper, and using ICT simple bar graphs and bar-line graphs Find 'most common' from a set of discrete data or grouped bar chart Extract data and interpret frequency tables Construct on paper, and using ICT, frequency diagrams for grouped discrete data  Collect data from a simple experiment and record in a simple frequency table  Extract data, interpret and draw conclusions from line graphs Find the mode from any bar chart Find the modal class for a small set of grouped discrete data Find the mode and range of a set of data. Calculate the median of a set of data Compare two simple distributions using the range, mode and median Calculate the mean for a small set of discrete data Draw conclusions from simple statistics for a single distribution	
	2 Calculating	12	understand and use place value for integers order positive and negative integers use the symbols =, ≠, <, >, ≤, ≥ use the four operations, including formal written methods, with positive and negative integers use integer powers and associated real roots (square, cube and higher) use a calculator and other technologies to calculate results accurately and then interpret them appropriately	Understand and apply the order in simple calculations (no brackets) Apply the principles of the commutative, distributive and associative laws with numbers  Add and subtract several numbers, looking for strategies Solve simple problems using ideas of ratio and proportion ('one for every ... and one in every ...')  Develop calculator skills involving negative number input, sign change, squares and square root keys  Consolidate the rapid recall of addition and subtraction facts and positive integer complements to 100  Use standard column procedures to add and subtract whole numbers Recognise and extend number sequences formed by counting on or counting back  Approximate before carrying out an addition or subtraction. Round positive whole numbers to the nearest 10  Consolidate the rapid recall of multiplication facts to 10 × 10 Know square numbers, 1 × 1 up to 10 × 10 Check a result by considering if it is of the right order of magnitude Multiply and divide integers by 10 and 100 and 1000 and explain the effect Divide a quantity into two parts in a given ratio where ratio is given in worded form  Order positive and negative integers in context; show positions on number lines	
	Half-term test				
	3 Expressions, functions and formulae	11	use and interpret algebraic notation: 3y in place of y + y + y and 3 × y substitute numerical values into formulae and expressions, including scientific formulae understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors	Find outputs of simple functions expressed in words Find outputs of simple functions in words and symbols Describe simple functions in words Find outputs of more complex functions expressed in words Simplify simple linear algebraic expressions by collecting like terms Construct expressions from worded description, using addition and subtraction  Construct expressions from worded description, using addition, subtraction and multiplication  Substitute positive integers into simple formulae expressed in words Substitute integers into simple formulae expressed in letter symbols Identify variables and use letter symbols Identify the unknowns in a formula and a function Understand the difference between an expression and a formula and the meaning of the key vocabulary 'term'  Derive simple formulae expressed in letter symbols	
4 Graphs	8	work with coordinates in all four quadrants	Interpret information from a simple real life graph, eg temperature (including negatives), rainfall; conversion graphs - metric units and currencies Read x and y coordinate in the first quadrant Plot a co-ordinate in the first quadrant Know and understand conventions and notation used for 2-D co-ordinates in the first quadrant  Read x and y co-ordinate in all four quadrants		

			Generate first quadrant co-ordinates that satisfy a simple linear rule; plot these
End of term test			
S P r i n g  t e r m	5 Factors and multiples	11	<p>use the concepts and vocabulary of prime numbers</p> <p>use the concepts and vocabulary of factors (or divisors)</p> <p>use the concepts and vocabulary of multiples</p> <p>use the concepts and vocabulary of common factors</p> <p>use the concepts and vocabulary of common multiples</p> <p>use the concepts and vocabulary of highest common factor</p> <p>use the concepts and vocabulary of lowest common multiple</p> <p>use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals</p> <p>use approximation through rounding to estimate answers</p> <p>use a calculator and other technologies to calculate results accurately and then interpret them appropriately</p>
	6 Decimals and measures	12	<p>understand and use place value for decimals</p> <p>understand and use place value for measures</p> <p>order decimals and fractions</p> <p>use the four operations, including formal written methods, with positive and negative decimals</p> <p>round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures]</p> <p>use approximation through rounding to estimate answers</p>
	Half-term test		
	7 Angles and lines	10	<p>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</p> <p>use the standard conventions for labelling the sides and angles of triangle ABC</p> <p>apply the properties of angles at a point</p> <p>apply the properties angles at a point on a straight line</p>
End of term test			
	8 Measuring and shapes	11	<p>calculate and solve problems involving composite shapes</p> <p>draw and measure line segments and angles in geometric figures</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>

Know and use the order of operations (four rules, not powers or brackets)

Develop calculator skills involving the use of clear keys and all operation keys

Recognise multiples of 2, 5, and 10 and 25

Extend written methods to  $HTU \times U$

Understand multiplication as it applies to whole numbers and know how to use associative, commutative and distributive laws.

Apply simple tests of divisibility (2, 9, 10, 5)

Extend written methods to  $HTU \div U$

Identify at least 2 factors of 2 digit numbers with 3 or 4 factors

Round up or down after division, depending on context

Recognise and use multiples and factors

Apply simple tests of divisibility (3, 6, 4)

Find common factors and primes

Identify numbers with exactly 2 factors (primes)

Recognise and use common factor, highest common factor and lowest common multiple

Apply simple tests of divisibility (3, 6, 9, 4)

Choose suitable units to estimate or measure length, mass and capacity

Record readings and estimates from scales to a suitable degree of accuracy

Read and interpret scales on a range of measuring instruments

Draw and measure lines to the nearest millimetre (in mm)

Use decimal notation for tenths and hundredths

Recognise the relationship between hundredths and tenths

Know what each digit represents in numbers with up to two decimal places

Read and write whole numbers in figures and words

Order decimals (including in context of measures)

Understand and use decimal notation and place value

Read and interpret scales involving decimals

Compare decimals in different contexts

Order metric units of measurement (e.g. 1 mm, 1 cm, 1 m, 1 km or equivalent)

Convert between large and small whole number metric units

Recognise and extend number sequences by counting in decimals.

Use standard column procedures to add and subtract decimals with up to two places

Consolidate and extend mental methods of calculation to include decimals

Round positive whole numbers to the nearest 10, 100 or 1000

Round decimals to one decimal place or to the nearest whole number

Enter and interpret numbers on a calculator in different contexts (decimals and money)

Enter money amounts on calculator

Round decimals to two decimal places in context of money only

Identify right angles and parallel lines

Know and use left and right, anticlockwise and clockwise

Describe angles as fractions of full turns –  $1/4$ ,  $1/2$ ,  $3/4$

Know and use compass points and  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$

Identify perpendicular lines

Distinguish between acute and obtuse angles

Use a protractor to measure acute angles to the nearest degree

Use correct notation for labelling lines and angles

Distinguish between acute, obtuse and reflex angles

Use a protractor to measure obtuse angles to the nearest degree

Begin to estimate the size of angles

Use a protractor to draw acute angles to the nearest degree

Know the sum of angles on a straight line

Know the sum of angles a round a point

Choose suitable metric units to estimate area

Use units of measurement to estimate and solve problems in everyday contexts involving length, area

Know names of regular polygons

Classify triangles (isosceles, equilateral, scalene) using equal sides.

S u m m e r  t e r m				Classify triangles (isosceles, equilateral, scalene) using equal angles Classify triangles (isosceles, equilateral, scalene) using lines of symmetry  Recognise properties of squares and rectangles Understand and measure perimeters of rectangles and regular polygons Calculate perimeters of rectangles and regular polygons Find the perimeter of a square/rectangle by counting Calculate the perimeter and area of shapes made from rectangles Use the formulae to calculate the area of a square/rectangle Identify simple angle, side and symmetry properties of triangles Recognise and visualise the symmetry of a 2D shape – line symmetry and rotation symmetry  Describe reflection symmetry of any triangle or quadrilateral Describe line symmetry properties of regular polygons Solve simple geometrical problems using properties of triangles Find the measurement of a side given the perimeter of squares and rectangles
	9 Fractions, decimals and percentages	11	order decimals and fractions define percentage as 'number of parts per hundred'	Order fractions with common denominators or unit fractions using diagrams  Use fraction notation to describe parts of shapes. Recognise when two fractions are equivalent with a diagram Cancel a fraction down to its simplest form Change an improper fraction to a mixed number Find simple fractions of whole number quantities Relate fractions to division Consolidate and extend mental methods of calculation to include fractions Consolidate and extend mental methods of calculation to include fractions. (Adding and subtracting fractions with common denominators)  Understand a percentage as the number of parts per 100 Convert a percentage to a number of hundredths or tenths Recognise the equivalence of fractions, decimals and percentages Find simple percentages of whole number quantities
	Half-term test			
	10 Transformations	8	know and use the criteria for congruence of triangles 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	Recognise where a shape will be after a reflection Recognise and visualise reflection in a mirror line Understand and use language associated with reflection Recognise where a shape will be after a translation Understand and use language associated with translations Recognise and visualise the transformation of a 2D shape; translation Visualise where a shape will be after a rotation Understand rotations using fraction of turn, and clockwise anticlockwise. Know and understand the term congruent Begin to understand that in congruent shapes, corresponding sides and angles are equal
End of term test				
End of year test				

## Pi 2 Scheme of Work

Term	Unit	Teaching hours	Programme of Study	Unit description
	1 Number properties and calculations	12	understand and use place value for integers 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 ratio notation reduce a ratio to simplest form divide a given quantity into two parts in a given part:part 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	Add and subtract integers with varying numbers of significant figures Understand how to use brackets in simple calculations Extend written methods to TU x TU and HTU x TU Add and subtract negative integers from positive and negative integers Multiply by zero Multiply and divide negative integers by a positive number Use ratio notation Reduce a ratio to its simplest form Reduce a three part ratio to its simplest form by cancelling Find equivalent ratios Solve simple problems using ratio expressed in words and in ratio notation Recognise the links between ratio and fractional notation Use direct proportion in simple contexts Use the unitary method to solve simple word problems involving ratio

A u t u m  t e r m	2 Shapes and measures in 3D	11	derive and apply formulae to calculate and solve problems involving volume of cuboids (including cubes)	<p>Know and use names of 3D shapes</p> <p>Identify 2D representations of 3D shapes</p> <p>Identify and count faces, edges, vertices</p> <p>Identify a prism and know it has a constant cross section</p> <p>Know and use geometric properties of cuboids and shapes made from cuboids</p> <p>Deduce properties of 3D shapes from 2D representations, including nets, 3D sketches and isometric drawings</p> <p>Identify nets of closed cubes and cuboids</p> <p>Identify nets of 3D shapes – regular and irregular polyhedra</p> <p>Use a ruler and compass to construct simple nets of 3D shapes</p> <p>Calculate the surface area of cubes</p> <p>Use nets to calculate the surface area of simple cuboids</p> <p>Find the volume of a cube and cuboid by counting cubes</p> <p>Know the formulae for the volume of cube and a cuboid</p> <p>Solve simple problems involving units of measurement in the context of length, area and capacity</p> <p>Convert <math>\text{cm}^3</math> to litres</p>
	Half-term test			
	3 Statistics	10	describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete data construct and interpret frequency tables construct and interpret bar charts construct and interpret pie charts	<p>Group data, where appropriate in equal class intervals</p> <p>Use experimentation to complete a data collection sheet, e.g. throwing a dice or data-logging</p> <p>Use questionnaire responses to complete a data collection sheet</p> <p>Interpret data from compound and comparative bar charts</p> <p>Construct a frequency table for grouped discrete data and draw a graph</p> <p>Construct compound bar graphs</p> <p>Interpret simple pie charts</p>
4 Expressions and equations	10	recognise and use relationships between operations including inverse operations 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	<p>Use arithmetic operations with algebra</p> <p>Simplify more complex linear algebraic expressions by collecting like terms, e.g. <math>x + 7 + 3x, 2b - 3a + 6b</math></p> <p>Find outputs and inputs of simple functions expressed in words or symbols using inverse operations</p> <p>Construct functions (completing a number machine)</p> <p>Understand the difference between an expression and an equation and the meaning of the key vocabulary 'term'</p> <p>Understand and identify the unknowns in an equation</p> <p>Solve simple linear equations with integer coefficients, of the form <math>ax = b</math> or <math>x +/- b = c</math>, e.g. <math>2x = 18, x + 7 = 12</math> or <math>x - 3 = 15</math></p> <p>Substitute solution back into equation to check it is correct</p> <p>Use distributive law with brackets, with numbers</p> <p>Know that expressions can be written in more than one way, e.g. <math>2 \times 3 + 2 \times 7 = 2(3 + 7)</math></p> <p>Begin to multiply a positive integer over a bracket containing linear terms, e.g. <math>4(x + 3)</math></p>	
End of term test				
S p r i n g  t e r m	5 Decimal calculations	10	understand and use place value for decimals order positive and negative integers order decimals and fractions use the symbols =, ≠, <, >, ≤, ≥ use the four operations, including formal written methods, with positive and negative decimals	<p>Be able to add decimals with up to two decimal places, but with varying numbers of decimal places</p> <p>Be able to add more than two decimals with up to two decimal places, but with varying numbers of decimal places</p> <p>Be able to subtract integers and decimals with up to two decimal places, but with varying numbers of decimal places</p> <p>Be able to add and subtract more than two decimals with up to two decimal places, but with varying numbers of decimal places and using a mixture of operations within the calculation.</p> <p>Extend the possible decimals that can be used in mental calculations by using halving and doubling strategies.</p> <p>Use mental strategies for multiplication – partitioning two 2 digit numbers where one number includes a decimal (both numbers have two significant figures)</p> <p>Multiply decimals with two places by single-digit whole numbers</p> <p>Multiply integers and decimals including by decimals such as 0.6 and 0.06, <math>0.1 \times 0.1</math> or <math>0.1 \times 0.0h</math>, <math>0.0h \times 0.1</math> and <math>0.0h \times 0.0h</math></p> <p>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</p> <p>Solve problems involving decimal numbers</p> <p>Choose the correct operation to use when solving decimal problems</p> <p>Round and order decimals</p> <p>Divide a quantity into two parts in a given ratio (whole numbers), where the answer is a decimal</p>
	6 Angles	10	draw and measure line segments and angles in geometric figures use the standard conventions for labelling the sides and angles of triangle ABC 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 derive and use the sum of angles in a triangle	<p>Use a protractor to measure reflex angles to the nearest degree</p> <p>Use correct notation for labelling triangles</p> <p>Use a protractor to draw reflex angles to the nearest degree</p> <p>Calculate angles around a point</p> <p>Use a protractor to draw obtuse angles to the nearest degree</p> <p>Use a protractor to draw reflex angles to nearest degree</p> <p>Identify interior and exterior angles in a shape</p> <p>Know the sum of angles in a triangle</p> <p>Calculate angles in a triangle</p> <p>Recognise and use vertically opposite angles</p> <p>Use a ruler and protractor to construct a triangle given two sides and the included angle (SAS)</p> <p>Use a ruler and protractor to construct a triangle given two angles and the included side (ASA)</p> <p>Use ruler and protractor to construct simple nets of 3D shapes, using squares, rectangles and triangles, e.g. square-based pyramid, triangular prism</p>

			Investigate triangles using Pythagoras' theorem
Half-term test			
7 Number properties	10	<p>use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals</p> <p>use integer powers and associated real roots (square, cube and higher)</p> <p>recognise powers of 2, 3, 4, 5</p> <p>use the concepts and vocabulary of prime numbers</p> <p>use the concepts and vocabulary of factors (or divisors)</p> <p>use the concepts and vocabulary of multiples</p> <p>use the concepts and vocabulary of common factors</p> <p>use the concepts and vocabulary of common multiples</p> <p>use the concepts and vocabulary of highest common factor</p> <p>use the concepts and vocabulary of lowest common multiple</p> <p>use the concepts and vocabulary of prime factorisation</p> <p>use product notation and the unique factorisation property</p> <p>use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals</p> <p>use integer powers and associated real roots (square, cube and higher)</p> <p>recognise powers of 2, 3, 4, 5</p> <p>use a calculator and other technologies to calculate results accurately and then interpret them appropriately</p>	<p>Know square numbers beyond 10 x 10</p> <p>Find corresponding roots</p> <p>Use the square root and change sign keys on a calculator</p> <p>Extend mental calculations to squares and square roots</p> <p>Use a calculator for cubes and cube roots</p> <p>Use the order of operations with brackets including in more complex calculations</p> <p>Use index notation for squares and cubes and for positive integer powers of 10</p> <p>Use index notation for small integer powers, e.g. <math>3 \times 2 \times 2 \times 2 = 3 \times 2^3</math></p> <p>Find LCM and HCF from lists of factors or multiples</p> <p>Find the prime factor decomposition of a number less than 100</p> <p>Find the HCF or LCM of 2 numbers less than 100 (using prime factor decomposition)</p> <p>Know all the squares of numbers less than 16 and know the square root given the square number.</p> <p>Check by an inverse operation (questions other than four rules, e.g. square roots checked with squaring)</p> <p>Work with calculations where the brackets are squared or square rooted</p> <p>Estimate square roots of non-square numbers less than 100, e.g. give integers that the roots lie between</p>
End of term test			
8 Sequences	11	<p>generate terms of a sequence from a term-to-term rule</p> <p>generate terms of a sequence from a position-to-term</p> <p>recognise arithmetic sequences</p> <p>find the nth term</p> <p>recognise geometric sequences and appreciate other sequences that arise</p>	<p>Generate terms of sequences arising from practical contexts</p> <p>Generate terms of simple sequences using term-to-term rules like +3 or -2</p> <p>Use the words finite, infinite, ascending and descending to describe sequences</p> <p>Understand the infinite nature of a set of integers</p> <p>Generate terms of a more complex sequence using term-to-term rules like x2 then +1 or -1 then x2'</p> <p>Generate terms of linear sequences using term-to-term with positive or negative integers</p> <p>Know that an arithmetic sequence is generated by a starting number a, then adding a constant number, d</p> <p>Generate and describe simple integer sequences, square and triangular numbers</p> <p>Recognise triangular numbers</p> <p>Generate and describe integer sequences such as powers of 2 and growing rectangles</p> <p>Recognise geometric sequences and appreciate other sequences that arise</p> <p>Find a term given its position in the sequences like tenth number in 4x table is 40 (one operation on n)</p> <p>Find a term of a practical sequence given its position in the sequence</p> <p>Generate terms of linear sequences using position-to-term with positive integers</p> <p>Begin to use linear expressions to describe the nth term in a one-step arithmetic sequence</p>
9 Fractions and percentages	11	<p>use the four operations, including formal written methods, with positive and negative fractions</p> <p>interpret percentages and percentage changes as a fraction or a decimal</p> <p>express one quantity as a percentage of another</p> <p>interpret fractions and percentages as operators</p>	<p>Use a diagram to compare two or more simple fractions with different denominators, and not unit fractions</p> <p>Calculate fractions of quantities and measurements</p> <p>Identify equivalent fractions.</p> <p>Begin to add and subtract simple fractions and those with simple common denominators</p> <p>Extend the possible fractions that can be used in mental calculations by using halving and doubling strategies.</p> <p>Add fractions by writing with a common denominator, where the denominators are 12 or less, where the answer is less than 1</p> <p>Understand that when two positive fractions are added the answer is larger than either of the original two fractions</p> <p>Simplify fractions by cancelling all common factors</p> <p>Express one number as a fraction of another (halves, quarters, thirds)</p> <p>Multiply a fraction by an integer</p> <p>Subtract fractions by writing with a common denominator, where the denominators are less than 12 and the first fraction is larger than the second</p> <p>Extend mental methods of calculation to include percentages</p> <p>Calculate simple percentages</p> <p>Use percentages to compare simple proportions</p> <p>Express one given number as a percentage of another</p>
Half-term test			
10 Probability	10	<p>record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes</p> <p>use appropriate language of probability</p> <p>use the 0-1 probability scale</p> <p>understand that probabilities of all possible outcomes sum to 1</p>	<p>Use the vocabulary of probability</p> <p>Use a probability scale with words</p> <p>Understand and use the probability scale from 0 to 1</p> <p>Identify all possible mutually exclusive outcomes of a single event</p> <p>Find and justify probabilities based on equally likely outcomes in simple contexts</p> <p>Know that if probability of event is p then probability of event not occurring is <math>1 - p</math></p> <p>Identify all mutually exclusive outcomes for two successive events with two outcomes in each event</p> <p>Estimate probabilities based on given experimental data</p> <p>When interpreting results of an experiment, use vocabulary of probability</p> <p>Use experimentation to complete a data collection sheet e.g. throwing a dice or data-logging</p> <p>Use the language of probability to compare the choice of <math>x/a</math> with <math>y/a</math></p>
End of term test			
End of year test			

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**Pi 3 Scheme of Work**

Term	Unit	Teaching hours	Programme of Study	Unit description
	1 Number calculations	10	use the four operations, including formal written methods, with positive and negative improper fractions and mixed numbers 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	Be able to add and subtract more than two integers with varying numbers of significant figures Be able to add and subtract more than two decimals with up to two decimal places Convert numbers such as 2 360 000 to 2.36 million Use mental strategies for multiplication - doubling and halving strategies Multiply 4-digit integers and decimals by a single digit integer Multiply 3- or 4-digit integers by a 2-digit integer Divide 3-digit integers by a single digit integer with remainder Divide 3-digit by 2-digit integers – no remainder Divide decimals with one or two places by single-digit integers Divide £.p by a 2-digit number to give £.p Divide an integer or decimal with 1 or 2 dp by a decimal number with 1 d.p. Multiply negative integers by a negative number Divide negative integers by a positive or negative numbers Understand the infinite nature of the set of real numbers (whole numbers and decimals here) Know all the squares of numbers less than 16 and give the positive and negative square root of a square number Work out cubes and cube roots mentally or with a calculator Use index notation for small integer powers, eg up to 5 Establish index laws for positive powers where the answer is a positive power Find the prime factor decomposition of a number >100 Find the HCF or LCM of 2 numbers less than 100 using prime factor decomposition Combine laws of arithmetic for brackets with mental calculations of squares, cubes and square roots Be able to work with decimals and a calculator with expressions that contain brackets, squares and square roots as well as the four operations Be able to estimate answers to calculations involving 2 or more operations
	2 Sequences and equations	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 $a \times a$ 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	Construct expressions from worded description, using all 4 basic operations, e.g. $30/x$ , $x - y$ , $m/2$ , $3m + 4$ , $a + a + 3$ , $a^2$ Know that multiplication and division are carried out before addition and subtraction, e.g. $ab + cd$ , $a \times b$ and $c \times d$ must be calculated before adding Simplify simple expressions in more than one variable, including positives and negatives, by collecting like terms Generate terms of a linear sequence using position-to-term with positive integers. Generate terms from a complex practical context (e.g. maximum crossings for a given number of lines) Generate terms of a linear sequence using position-to-term with negative integers. Begin to use linear expressions to describe the $n$ th term in a two-step arithmetic sequence. (e.g. $n$ th term is $3n + 1$ or $n/2 - 5$ ) Find outputs of more complex functions expressed in words (e.g. add 6 then multiply by 3) Solve simple two-step linear equations with integer coefficients, of the form $ax + b = c$ , e.g. $3x + 7 = 25$
Half-term test				
A u t u m  t e r m	3 Statistics	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 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	Select and identify the data related to a problem Select the range of possible methods that could be used to collect this data as primary or secondary data Discuss the range of possible methods that could be used to investigate a problem, e.g. questionnaire, survey, modelling, data logging, etc. Select appropriate level of accuracy of data from limited choices From a range of sample sizes identify the most sensible answer Discuss factors that may possibly affect the collection of data, e.g. time, place, type of people asked, phrasing of questions Find the mode and range from a frequency table Calculate the mean from a simple frequency table Draw conclusions from simple statistics for a single distribution Compare two simple distributions using the range and the median Compare two simple distributions using the range and the mean or range and mode Compare two distributions given summary statistics Recognise when it is appropriate to use mean, median, or mode in more complex cases Use two-way tables Construct a simple (no boundary data) frequency table with given equal class intervals for continuous data Identify discrete and continuous data Design tables recording discrete and continuous data Find the modal class of a set of continuous data Construct on paper and using ICT simple pie charts using categorical data, e.g. two or three categories Draw pie charts from data presented in a table. Interpret and plot scatter graphs and recognise anomalies Interpret and / or compare bar graphs (with crumple zones, different scales) and frequency diagrams where data is incomplete / scales are incorrect. Interpret and / or compare bar graphs and frequency diagrams which are misleading (with false origins, different scales etc.) Choose and justify appropriate diagrams, graphs and charts, using ICT as appropriate, to illustrate a short report of a statistical enquiry Identify further lines of enquiry from information provided for an initial enquiry
	4 Fractions, decimals and percentages	12	work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $7/2$ or 0.375 and $3/8$ ) interpret percentages multiplicatively express one quantity as a percentage of another compare two quantities using percentages	Be able to add and subtract more than two decimals with up to two decimal places, but with varying numbers of decimal places and using a mixture of operations within the calculation Recall known facts including fraction to decimal conversions

		<p>work with percentages greater than 100%</p> <p>solve problems involving percentage change: percentage increase</p> <p>solve problems involving percentage change: decrease</p> <p>solve problems involving percentage change: original value problems</p> <p>solve problems involving percentage change: simple interest in financial mathematics</p>	<p>Convert terminating decimals to fractions</p> <p>Learn fractional equivalents to key recurring decimals, e.g. 0.33333..., 0.6666666..., 0.11111...</p> <p>Interpret rounded off recurring decimals displayed on a calculator as fractions – 2/3, 1/6, 1 2/3, 1 1/6</p> <p>Know the denominators of simple fractions that produce recurring decimals, and those that do not</p> <p>Use division to convert a fraction to a decimal</p> <p>Add and subtract simple fractions with denominators of any size</p> <p>Check addition or subtraction of fractions with an inverse calculation</p> <p>Add and subtract mixed number fractions without common denominators</p> <p>Add and subtract up to 3 fractions mixing both addition and subtraction in the calculation</p> <p>Interpret division as a multiplicative inverse; know that 1 divided by 1/4 is the same as <math>1 \times 4</math></p> <p>Understand the effect of multiplying a positive number by a fraction less than 1</p> <p>Multiply a fraction by a fraction</p> <p>Divide an integer by a fraction</p> <p>Recall equivalent fractions, decimals and percentage</p> <p>Use the equivalence of fractions, decimals and percentages to compare proportions (i.e. compare a fraction and a percentage)</p> <p>Find the outcome of given percentage increase or decrease</p>
End of term test			
S p r i n g  t e r m	5 Geometry in 2D and 3D	10	<p>derive and apply formulae to calculate and solve problems involving volume of cuboids (including cubes)</p> <p>use scale diagrams</p> <p>use maps</p> <p>derive and apply formulae to calculate and solve problems involving volume of cuboids (including cubes)</p> <p>derive and use the standard ruler and compass constructions: perpendicular bisector of a line segment</p> <p>derive and use the standard ruler and compass constructions: constructing a perpendicular to a given line from/at a given point</p> <p>derive and use the standard ruler and compass constructions: bisecting a given angle</p> <p>recognise and use the perpendicular distance from a point to a line as the shortest distance to the line</p> <p>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</p> <p>understand and use the relationship between parallel lines and alternate and corresponding angles</p> <p>use the sum of angles in a triangle to deduce the angle sum in any polygon</p> <p>derive properties of regular polygons</p> <p>use the sum of angles in a triangle to deduce the angle sum in any polygon</p> <p>derive properties of regular polygons</p>
			<p>Identify alternate angles</p> <p>Identify corresponding angles</p> <p>Explain how to find the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons</p> <p>Use scales in maps and plans</p> <p>Make simple drawings, demonstrating accurate measurement of length and angle (draw accurately from a plan).</p> <p>Use straight edge and compasses to construct the midpoint and perpendicular bisector of a line segment</p> <p>Use straight edge and compasses to construct the bisector of an angle</p> <p>Recognise and use the perpendicular distance from a point to a line as the shortest distance to the line</p> <p>Visualise and use a wide range of 2D representations of 3D objects</p> <p>Analyse 3D shapes through informal 2D representations</p> <p>Begin to use plans and elevations.</p> <p>Find volumes of shapes made from cuboids</p> <p>Be able to correctly identify the hypotenuse</p> <p>Carry out an investigation leading to understanding of Pythagoras' theorem</p>
	6 Algebraic and real-life graphs	10	<p>use the sum of angles in a triangle to deduce the angle sum in any polygon</p> <p>model situations or procedures by using graphs</p> <p>work with coordinates in all four quadrants</p> <p>recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in <math>x</math> and <math>y</math> and the Cartesian plane</p> <p>interpret mathematical relationships both algebraically and graphically</p> <p>reduce a given linear equation in two variables to the standard form <math>y = mx + c</math></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>Draw conclusions based on the shape of line graphs</p> <p>Interpret information from a real-life graph</p> <p>Plot a graph of a simple linear function in the first quadrant</p> <p>Recognise straight-line graphs parallel to <math>x</math>- or <math>y</math>-axes</p> <p>Express simple functions in symbols, e.g. <math>y = x + 3</math> to draw graph</p> <p>Generate four quadrant coordinate pairs of simple linear functions</p> <p>Plot a simple straight-line graph (distance–time graphs)</p> <p>Discuss and interpret line graphs and graphs of functions from a range of sources</p> <p>Know how to find the midpoint of a line segment</p> <p>Find the midpoint of a horizontal (or vertical) line AB, using the coordinates of these points</p> <p>Interpret intercept of real-life graphs</p> <p>Plot the graphs of simple linear functions in the form <math>y = mx + c</math> in four quadrants</p>
Half-term test			
	7 Multiplicative reasoning	9	<p>use standard units of mass, length, time, money and other measures, including with decimal quantities</p> <p>change freely between related standard units [for example time, length, area, volume/capacity, mass]</p> <p>divide a given quantity into two parts in a given part:whole ratio</p> <p>relate the language of ratios and the associated calculations to the arithmetic of fractions</p> <p>solve problems involving direct proportion</p> <p>solve proportion problems including graphical and algebraic representations</p> <p>use compound units such as speed, unit pricing and density to solve problems</p>
			<p>Divide a quantity into two parts in a given ratio, where ratio given in ratio notation</p> <p>Divide a quantity into two parts in a given ratio (whole numbers), where the answer is a decimal</p> <p>Divide a quantity into more than 2 parts in a given ratio</p> <p>Reduce a ratio to its simplest form, where a ratio is expressed in different units</p> <p>Understand the relationship between ratio and proportion</p> <p>Use multiplicative reasoning to solve a problem</p> <p>Use the unitary method to solve simple word problems involving ratio and direct proportion</p> <p>Solve best buy / unit price problems</p> <p>Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction</p> <p>Recognise when values are in direct proportion by reference to the graph form</p> <p>Solve problems involving direct and inverse proportion, including graphical and algebraic representations</p> <p>Use units of measurement to calculate and solve problems in everyday contexts involving length, area, volume, mass, time and angle</p> <p>Convert between area measures (e.g. <math>\text{mm}^2</math> to <math>\text{cm}^2</math>, <math>\text{cm}^2</math> to <math>\text{m}^2</math>, and vice versa)</p> <p>Know rough metric equivalents of imperial measures in daily use (feet, miles, pounds, pints, gallons)</p>
End of term test			
	8 Algebraic and geometric formulae	13	<p>understand and use standard mathematical formulae</p> <p>rearrange formulae to change the subject</p> <p>model situations or procedures by translating them into algebraic expressions or formulae</p> <p>use algebraic methods to solve linear equations</p> <p>derive formulae to calculate and solve problems involving perimeter of triangles, parallelograms, trapezia</p> <p>derive and apply formulae to calculate and solve problems involving area of triangles, parallelograms, trapezia</p> <p>calculate and solve problems involving perimeters of circles</p> <p>calculate and solve problems involving areas of circles</p>
			<p>Find the measurement of a side given the perimeter of squares and rectangles, where one or more lengths are decimals</p> <p>Substitute integers into formulae expressed in letter symbols</p> <p>Derive formulae expressed in letter symbols</p> <p>Substitute integers into formulae (involving brackets and more than one operation) expressed in letter symbols</p> <p>Use a formula to calculate the area of triangles</p> <p>Calculate the perimeter and area of shapes made from rectangles</p>

S u m m e r  t e r m			calculate and solve problems involving composite shapes	<p>Understand the different role of letter symbols in formulae and functions</p> <p>Substitute positive and negative integers into simple formulae</p> <p>Calculate areas of compound shapes made from rectangles and triangles</p> <p>Use a formula to calculate the area of parallelograms</p> <p>Substitute integers into formulae to give equations and solve</p> <p>Know the names of parts of a circle</p> <p>Use a formula to calculate the circumference of a circle</p> <p>Use a formula to calculate the area of a circle</p> <p>Change the subject of a one-step formula</p>
	9 Probability	9	<p>record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes</p> <p>use appropriate language of probability</p> <p>use the 0–1 probability scale</p> <p>understand that probabilities of all possible outcomes sum to 1</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>Apply probabilities from experimental data to a different experiment in simple situations</p> <p>Identify all mutually exclusive outcomes for two successive events – with three outcomes in each event.</p> <p>Identify conditions for a fair game – from a small set of simple options</p> <p>Use two-way tables for discrete data. Complete and collect probabilities</p> <p>Use the language of probability to compare the choice of <math>x/a</math> with <math>x/b</math></p> <p>Apply probabilities from experimental data to a different experiment in applying to two step outcomes</p> <p>Find the probability from two-way tables</p> <p>Identify dependent and independent events</p> <p>Work out the probability of two independent events</p> <p>Draw and use tree diagrams to represent outcomes of two independent events and calculate probabilities</p>
	Half-term test			
10 Polygons and transformations	10	<p>use scale factors</p> <p>identify and construct congruent triangles</p> <p>construct similar shapes by enlargement without coordinate grids</p> <p>construct similar shapes by enlargement coordinate grids</p> <p>apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides</p>	<p>Solve simple geometrical problems using properties of triangles</p> <p>Understand and use the language associated with rotations</p> <p>Translate a shape on a coordinate grid</p> <p>Rotate a shape on a coordinate grid</p> <p>Reflect a shape on a coordinate grid</p> <p>Know that in congruent shapes, corresponding sides and angles are equal</p> <p>Solve simple geometrical problems showing reasoning</p> <p>Transform 2D shapes by simple combinations of rotations, reflections and rotations</p> <p>Plot points on a grid and identify resulting geometric shapes across all four quadrants</p> <p>Solve geometric problems using side and angle properties of equilateral and isosceles triangles</p> <p>Solve geometric problems using side and angle properties of equilateral, isosceles and right-angled triangles</p> <p>Classify quadrilaterals by their geometric properties</p> <p>Use the language and notation associated with enlargement</p> <p>Know that translations, rotations and reflections preserve length and angle</p> <p>Enlarge 2D shapes, given a centre of enlargement and a positive whole-number scale factor</p>	
End of term test				
End of year test				