Mathematics Skills and Knowledge Overview

KS1 and KS2 National Curriculum

Teaching sequence in Maths

- **Establish clear aims** - Teaching objectives and learning intentions made explicit to the class. Learning objectives refer to conceptual and procedural knowledge.
- Lessons may encompass one or all of the following elements: **fluency, problem solving, reasoning.**
- Lessons may be guided, practical (not in books) or whole class investigations.
- **Recap prior learning/assess** - Recap prior learning from previous writing units or previous year's learning through rapid recall opportunities and assessment for learning
- **Provide a relevant example/ model (representation and structure)** - Pupils are shown concrete resources/pictorial representations of concept. Where possible, links to real life learning made to give learning a purpose.
- **Demonstrate through live modelling** - Teacher models mathematical process (I do). Introduce STEM sentences.
- **Practise together** - Children practice mathematical process individually or in pairs (We do/You do). Allow pupils thinking time; pupils join in with fluency/reasoning/problem solving activity. Children are encouraged to use concrete/pictorial representations to support their reasoning and ability to solve problems.
- **Draw out key learning** - Provide opportunities for pupils to articulate their understanding aloud explaining the choices they have made as mathematicians and which method is most effective and why. Teacher to use questioning to deepen understanding.
- **Practice Variation** - When appropriate, teachers will represent the concept differently to prepare children to recognise it in unfamiliar contexts. This will allow children to spot connections/make links in their mathematical learning.

Key Concepts - Learning, working and talking like a mathematician

Being introduced to the key terms and vocabulary that a mathematician would use and encouraging use of correct vocabulary when writing and talking about maths.

Concepts	Explanation
Number	The first mathematical skill is basic number sense. Number sense is the order and
Pattern	The first mathematical skill is basic number sense. Number sense is the order and value of numbers. A number is a mathematical object used to count.
Shape and Space	Shape and space refers to the properties of objects and the consequences of how these objects are positioned. Space is a set with added structure. Shape is the
Measure	Measure is a number that shows the size or amount of something. Usually, the number is in reference to some standard measurement.
Geometry	Geometry is a branch of mathematics concerned with questions of shape, size, and relative position of figures and the properties of space.
Statistics	Statistics is the study of collection, analysis, interpretation, presentation and
Algebra	Algebra is a branch of mathematics dealing with symbols and the rules for
Reasoning	Mathematical reasoning is the skill that enables a learner to make use of all other mathematical skills. With mathematical reasoning, mathematics makes sense and can be understood.

Year 1

Number – Number and Place Value

Skills	Knowledge	End Points
count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s given a number, identify 1 more and 1 less identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least read and write numbers from 1 to 20 in numerals and words	Count, order and indicate a quantity. Begin to recognise place value in numbers beyond 20. Practise counting as reciting numbers and counting as enumerating objects, and counting in 2s, 5s, and 10s from different multiples to develop their recognition of patterns in the number system. Recognise and create repeating patterns with objects and with shapes.	Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number. Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens. Given a number, identify one more and one less.

Number – Addition and Subtraction

Skills	Knowledge	End Points
read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs represent and use number bonds and related subtraction facts within 20 add and subtract one-digit and two-digit numbers to 20, including 0 solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9	Number bonds to 10. Number bonds to 20. Realise the effect of adding or subtracting 0. Combine and increase numbers, counting forwards and backwards. Use the terms: put together, add, altogether, total, take away, distance between, different between, more than and less than.	Represent and use number bonds and related subtraction facts within 20.

Number – Multiplication and Division

Skills	Knowledge	End Points
solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	Group and share small quantities. Double numbers and quantities. Find simple fractions of objects, numbers and quantities. Use arrays, number patterns. Count in 2s, 5s and 10s.	Use concrete resources to solve one-step problems involving multiplication and division.

Number - Fractions			Measurement			Geometry – Properties of Shape/Position and Direction		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
recognise, find and name a half as 1 of 2 equal parts of an object, shape or quantity recognise, find and name a quarter as 1 of 4 equal parts of an object, shape or quantity	Half and quarters as 'fractions' of discrete and continuous quantities. Connect halves and quarters to the equal sharing and grouping of sets of objects and to measures. Recognise and combine halves and quarters as parts of a whole.	Recognise, find and name a half as one of two equal parts of an object, shape or quantity.	compare, describe and solve practical problems for: lengths and heights [for example, long/short, longer/shorter, tall/short, double/half] mass/weight [for example, heavy/light, heavier than, lighter than] capacity and volume [for example, full/empty, more than, less than, half, half full, quarter] time [for example, quicker, slower, earlier, later] measure and begin to record the following: lengths and heights mass/weight capacity and volume time (hours, minutes, seconds) recognise and know the value of different denominations of coins and notes sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening] recognise and use language relating to dates, including days of the week, weeks, months and years tell the time to the hour and half past the hour and draw the hands on a clock face to show these times	Use and compare different types of quantities and measures using non-standard units, and continuous measurement, to using manageable common standard units. Use measuring tools such as a ruler, weighing scales and containers. Use the language of time.	Lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]. Mass/weight [for example, heavy/light, heavier than, lighter than]. Capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]. Time [for example, quicker, slower, earlier, later]. Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	recognise and name common 2-D and 3-D shapes, including: 2-D shapes [for example, rectangles (including squares), circles and triangles] 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] describe position, direction and movement, including whole, half, quarter and three-quarter turns	Name common 2D and 3D shapes. Name related everyday objects. Recognise these shapes in different orientations and sizes. Know that rectangles, triangles, cuboids and pyramids are not always similar to each other. Use the language: left and right, top and bottom, on top of, in front of, above, between, around, near, close and far, up and down, forwards and backwards, inside and outside. Make whole, half, quarter and three-quarter turns in both directions. Connect turning clockwise with movement on a clock face.	Recognise and name common 2-D and 3-D shapes, including: 2-D shapes [for example, rectangles (including squares), circles and triangles]; 3-D shapes: [for example, cuboids (including cubes), pyramids and spheres].

Year 2

Number – Number and Place Value			Number – Addition and Subtraction			Number – Multiplication and Division		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward recognise the place value of each digit in a two-digit number (10s, 1s) identify, represent and estimate numbers using different representations, including the number line compare and order numbers from 0 up to 100; use <, > and = signs read and write numbers to at least 100 in numerals and in words use place value and number facts to solve problems	Use a range of representations to practice counting, reading, writing and comparing numbers to at least 100. Count in multiples of 3. Partition numbers in different ways to support subtraction. Understand 0 as a place holder.	Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward. Compare and order numbers from 0 up to 100; use <, > and = signs. Use place value and number facts to solve problems.	solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and 1s a two-digit number and 10s 2 two-digit numbers adding 3 one-digit numbers	Use the language: sum and difference. Practise addition and subtraction to 20 to become fluent in deriving facts. Check calculations, including by adding to check subtraction and adding numbers in a different order to check addition.	Using concrete objects and pictorial representations, including those involving numbers, quantities and measures. Applying their increasing knowledge of mental and written methods. Recall and use addition and subtraction facts: To 20 fluently.	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs show that multiplication of 2 numbers can be done in any order (commutative) and division of 1 number by another cannot solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	Become fluent in the 2, 5- and 10-times table and connect them to each other. Connect the 10 times table to place value. Connect the 5 times table to the divisions on the clock face. Begin to use other times tables and recall multiplication facts and use related division facts. Use grouping and sharing. Use arrays and repeated addition. Begin to relate these to fractions and measures. Use commutativity and inverse relations.	Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

			show that addition of 2 numbers can be done in any order (commutative) and subtraction of 1 number from another cannot recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems					
Number - Fractions			**Measurement**			**Geometry – Properties of Shape**		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity write simple fractions, for example $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$	Use 'fractions of' discrete and continuous quantities. Connect unit fractions to equal sharing and grouping, to numbers when they can be calculated, and to measures, finding fractions of lengths, quantities, sets of objects or shapes. Understand 3/4 as a non-unit fraction. Count in fractions up to 10, starting from any number and use the 1/2 and 2/4 equivalence on the number line.	Recognise, find, name and write fractions 1⁄3, 1⁄4, 2⁄4, and 3⁄4 of a length, shape, set of objects or quantity.	choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels compare and order lengths, mass, volume/capacity and record the results using >, < and = recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value find different combinations of coins that equal the same amounts of money solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change compare and sequence intervals of time tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times know the number of minutes in an hour and the number of hours in a day	Use standard units of measurement. Compare measures such as 'half as high'; 'twice as wide.' Tell the time on analogue clocks and record it. Count and recognise coins. Read and say amounts of money confidently and use the symbols £ and p accurately.	Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.	identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid] compare and sort common 2-D and 3-D shapes and everyday objects	Name a wide variety of common 2-D and 3-D shapes including: quadrilaterals and polygons and cuboids, prisms and cones, and identify the properties of each shape. Identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces. Read and write names for shapes that are appropriate for their word reading and spelling. Draw lines and shapes using a straight edge.	Compare and sort common 2-D and 3-D shapes and everyday objects.
Geometry – Position and Direction			**Statistics**					
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**			
order and arrange combinations of mathematical objects in patterns and sequences use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)	Patterns of shapes, including those in different orientation. Use the concept and language of angles to describe 'turn' by applying rotations.	Use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise).	interpret and construct simple pictograms, tally charts, block diagrams and tables ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity ask-and-answer questions about totalling and comparing categorical data	Record, interpret, collate, organize and compare information.	Ask and answer questions about totaling and comparing categorical data.			

Year 3

Number – Number and Place Value

Skills	Knowledge	End Points
count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number recognise the place value of each digit in a 3-digit number (100s, 10s, 1s) compare and order numbers up to 1,000 identify, represent and estimate numbers using different representations read and write numbers up to 1,000 in numerals and in words solve number problems and practical problems involving these ideas	Use multiples of 2, 3, 4, 5, 8, 10, 50 and 100. Use larger numbers to at least 1,000, applying partitioning related to place value. Use a variety of representation. Count in 1s, 10s and 100s. Become fluent in the order and place value of numbers to 1,000.	Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number. Recognise the place value of each digit in a three-digit number (hundreds, tens, ones). Solve number problems and practical problems involving these ideas.

Number – Addition and Subtraction

Skills	Knowledge	End Points
add and subtract numbers mentally, including: a three-digit number and 1s a three-digit number and 10s a three-digit number and 100s add and subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction estimate the answer to a calculation and use inverse operations to check answers solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	Practise solving varied addition and subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100. Use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to 3 digits to become fluent.	Add and subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds.

Number – Multiplication and Division

Skills	Knowledge	End Points
recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	Recall times tables. Through doubling connect the 2, 4 and 8 times tables. Develop- efficient mental methods to derive related facts. Use written methods for multiplication and division.	Recall and use multiplication and division facts for the; 3x table; 4x table; 8x table. Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.

Number - Fractions

Skills	Knowledge	End Points
count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators recognise and show, using diagrams, equivalent fractions with small denominators add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$] compare and order unit fractions, and fractions with the same denominators solve problems that involve all of the above	Connect tenths to place value, decimal measures and to division by 10. Understand unit and non-unit fractions as numbers on the number line, and deduce relations between them, such as size and equivalence. They should go beyond the [0, 1] interval, including relating this to measure. Understand the relation between unit fractions as operators (fractions of), and division by integers. Recognise fractions in the context of parts of a whole, numbers, measurements, a shape, and unit fractions as a division of a quantity. Add and subtract fractions with the same denominator.	Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10. Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators. Recognise and use fractions as numbers: unit fractions (numerator of 1) and non-unit fractions with small denominators.

Measurement

Skills	Knowledge	End Points
measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) measure the perimeter of simple 2-D shapes add and subtract amounts of money to give change, using both £ and p in practical contexts tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight know the number of seconds in a minute and the number of days in each month, year and leap year compare durations of events [for example, to calculate the time taken by particular events or tasks]	Use appropriate tools and units. Compare and use mixed units and simple equivalents of mixed units. Simple scaling by integers. Connect this to multiplication. Recognise the value of coins. Add and subtract amounts, including mixed units, and give change using manageable amounts. Record £ and p separately. Use both analogue and digital 12-hour clocks and record their times.	Measure, compare, add and subtract: Lengths (m/cm/mm). Mass (kg/g). Volume/capacity (l/ml). Add and subtract amounts of money to give change, using both £ and p in practical contexts. An analogue clock and 12-hour and 24-hour clocks.

Geometry – Properties of Shape

Skills	Knowledge	End Points
draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them recognise angles as a property of shape or a description of a turn identify right angles, recognise that 2 right angles make a half-turn, 3 make three-quarters of a turn and 4 a complete turn; identify whether angles are greater than or less than a right angle identify horizontal and vertical lines and pairs of perpendicular and parallel lines	Symmetrical and non-symmetrical polygons and polyhedra. Describe the properties of 2-D and 3-D shapes using accurate language, including lengths of lines and acute and obtuse for angles greater or lesser than a right angle. Connect decimals and rounding to drawing and measuring straight lines in centimetres.	Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle.

Statistics

Skills	Knowledge	End Points
interpret and present data using bar charts, pictograms and tables solve one-step and two-step questions [for example 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables	Understand and use simple scales in pictograms and bar charts. Interpret data.	Interpret and present data using bar charts, pictograms and tables.

Year 4

Number – Number and Place Value

Skills	Knowledge	End Points
count in multiples of 6, 7, 9, 25 and 1,000 find 1,000 more or less than a given number count backwards through 0 to include negative numbers recognise the place value of each digit in a four-digit number (1,000s, 100s, 10s, and 1s) order and compare numbers beyond 1,000 identify, represent and estimate numbers using different representations round any number to the nearest 10, 100 or 1,000 solve number and practical problems that involve all of the above and with increasingly large positive numbers read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of 0 and place value	Fluent in order and place value of numbers beyond 1,000. Count in 10s and 100s. Extend knowledge of the number system to include decimal numbers/fractions encountered so far. Connect estimation and rounding numbers to the use of measuring instruments. Roman numerals.	Count in multiples of 6, 7, 9, 25 and 1000. Count backwards through zero to include negative numbers Order and compare numbers beyond 1000. Round any number to the nearest 10, 100 or 1000.

Number – Addition and Subtraction

Skills	Knowledge	End Points
add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate estimate and use inverse operations to check answers to a calculation solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	Column addition and subtraction.	Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Number – Multiplication and Division

Skills	Knowledge	End Points
recall multiplication and division facts for multiplication tables up to 12 × 12 use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers recognise and use factor pairs and commutativity in mental calculations multiply two-digit and three-digit numbers by a one-digit number using formal written layout solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	Recall and use times tables and related division facts. Mental methods (extending to 3-digit numbers to derive facts). Formal written method of short multiplication and short division with exact answers. Equality of expressions using distributive law and associative law. Combine knowledge of number facts and rules of arithmetic to solve mental and written calculations.	Recall multiplication and division facts for multiplication tables up to 12 x 12.

Number – Fractions (including decimals)

Skills	Knowledge	End Points
recognise and show, using diagrams, families of common equivalent fractions count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10 solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number add and subtract fractions with the same denominator recognise and write decimal equivalents of any number of tenths or hundreds recognise and write decimal equivalents to $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}$ find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths round decimals with 1 decimal place to the nearest whole number compare numbers with the same number of decimal places up to 2 decimal places	Connect hundredths to tents and place value and decimal measure. Use number line to connect fractions, numbers and measures. Understand the relation between non-unit fractions and multiplication and division of quantities. Make connections between fractions of length, of a shape and as a representation of one whole or set of quantities. Use factors and multiples to recognise equivalent fractions and simplify where appropriate. Add and subtract fractions with the same denominator. Understand that decimals and fractions are different ways of expressing number and proportions. Understanding of number system and decimal place value of tenths and then hundredths. Decimal notation to division	Recognise and show, using diagrams, families of common equivalent fractions. Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. Round decimals with one decimal place to the nearest whole number. Solve simple measure and money problems involving fractions and decimals to two decimal places.

Measurement

Skills	Knowledge	End Points
convert between different units of measure [for example, kilometre to metre; hour to minute] measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres find the area of rectilinear shapes by counting squares estimate, compare and calculate different measures, including money in pounds and pence read, write and convert time between analogue and digital 12- and 24-hour clocks solve problems involving converting from hours to minutes, minutes to seconds, years to months, weeks to days	Record metric measures, including money. Use multiplication to convert from later to smaller units. Express perimeter algebraically where a and b are the dimensions in the same unit. Relate area to arrays and multiplication.	Convert between different units of measure [for example, kilometre to metre; hour to minute].

Geometry – Properties of Shape

Skills	Knowledge	End Points
compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes identify acute and obtuse angles and compare and order angles up to 2 right angles by size identify lines of symmetry in 2-D shapes presented in different orientations complete a simple symmetric figure with respect to a specific line of symmetry	Classify shapes using geometrical properties. Classify different triangles and quadrilaterals. Compare and order angles. Decide if a polygon is regular or irregular. Draw symmetrical patterns. Become familiar with different orientations of lines of symmetry/ Recognise lines of symmetry in a variety of diagrams, including where the line of symmetry does not dissect the original shape.	Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes. Identify lines of symmetry in 2-D shapes presented in different orientations.

solve simple measure and money problems involving fractions and decimals to 2 decimal places	of whole number by 10 and 100. Count using simple fractions and decimal forward and backwards. Make comparisons and order decimal amounts and quantities that are expressed to the same number of decimal places. Represent numbers with 1 or 2 decimal places in different ways.							
Geometry – Position and Direction			**Statistics**					
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**			
describe positions on a 2-D grid as coordinates in the first quadrant describe movements between positions as translations of a given unit to the left/right and up/down plot specified points and draw sides to complete a given polygon	Draw a pair of axes in one quadrant, with equal scales and integer labels. Read, write and use pairs of co-ordinates.	Plot specified points and draw sides to complete a given polygon.	interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs	Understand and use a greater range of scales in representations. Relate the graphical representation of data to recording change over time.	Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.			
Year 5								
Number – Number and Place Value			**Number – Addition and Subtraction**			**Number – Multiplication and Division**		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000 interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through 0 round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000 solve number problems and practical problems that involve all of the above read Roman numerals to 1,000 (M) and recognise years written in Roman numerals	Identify place value in large whole numbers. Use numbers in context, including measurement. Recognise and describe linear number sequences, including those involving fractions and decimals, and find the term-to-term rule in words.	Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero.	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) add and subtract numbers mentally with increasingly large numbers use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	Use the formal written method of columnar addition and subtraction. Practise mental calculations with increasingly large numbers to aid fluency.	Add and subtract whole numbers with more than 4 digits. Add and subtract numbers mentally with increasingly large numbers (example, 12,462 – 2300 = 10,162).	identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19 multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers multiply and divide numbers mentally, drawing upon known facts divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000 recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}) solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes	Use formal written methods of short multiplication and short division. Apply all times tables and related division facts. Use and understand the terms factors, multiple and prime, square and cube numbers. Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding. Use multiplication and division as inverses. Multiply and divide by powers of 10 in scale drawings. Multiple and divide by powers of 1,000 in converting between units such as kilometres and metres. Distributivity can be expressed as a(b + c) – ab + ac Understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalent statements. Use and explain the equals	Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes. Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

						solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	sign to indicate equivalence.	
Number – Fractions (including decimals and percentages)			**Measurement**			**Geometry – Properties of Shape**		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
compare and order fractions whose denominators are all multiples of the same number identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$] add and subtract fractions with the same denominator, and denominators that are multiples of the same number multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams read and write decimal numbers as fractions [for example, 0.71 = $\frac{71}{100}$] recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents round decimals with 2 decimal places to the nearest whole number and to 1 decimal place read, write, order and compare numbers with up to 3 decimal places solve problems involving number up to 3 decimal places recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per 100', and write percentages as a fraction with denominator 100, and as a decimal fraction solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and those fractions with a	Percentages, decimals and fractions are different ways of expressing proportions. Fractions to thousandths and connect to decimals and measures. Connect equivalent fractions >1 that simplify to integers with division and other fractions >1 to division with remainders. Use the number line. Improper and mixed fractions. Connect multiplication by a fraction to using fractions as operators (fractions of), and to division. Scaling by simple fractions, including fractions >1. Add and subtract fractions. Add and subtract fractions that exceed 1 as a mixed number. Count forward and backwards in simple fractions. Understand fractions as numbers, measures and operators by finding fractions of numbers and quantities. Count using decimals and fractions including bridging 0. Say, read and write decimal fractions and related tenths, hundredths and thousandths. Mentally add and subtract tenths, and one-digit whole numbers and tenths. Add and subtract decimals, including a mix of whole numbers and decimals, decimal with different numbers of decimal places, and complement of 1. Make connections between percentages, fractions and decimals.	Compare and order fractions whose denominators are all multiples of the same number. Read and write decimal numbers as fractions [for example, 0.71 = 71⁄100]. Read, write, order and compare numbers with up to three decimal places. Read, write, order and compare numbers with up to three decimal places. Solve problems which require knowing percentage and decimal equivalents of 1⁄2, 1⁄4, 1⁄5, 2⁄5, 4⁄5 and those fractions with a denominator of a multiple of 10 or 25.	convert between different units of metric measure [for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre] understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres calculate and compare the area of rectangles (including squares), including using standard units, square centimetres (cm²) and square metres (m²), and estimate the area of irregular shapes estimate volume [for example, using 1 cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water] solve problems involving converting between units of time use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling	Convert between standard units. Calculate the perimeter of rectangles and related composite shapes. Use the relations of perimeter or area to find unknown lengths. Express missing measure questions algebraically. Calculate the are from scale drawings using given measurements. Use all 4 operations including conversions.	Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre). Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres. Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2).	identify 3-D shapes, including cubes and other cuboids, from 2-D representations know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles draw given angles, and measure them in degrees (°) identify: angles at a point and 1 whole turn (total 360°) angles at a point on a straight line and half a turn (total 180°) other multiples of 90° use the properties of rectangles to deduce related facts and find missing lengths and angles distinguish between regular and irregular polygons based on reasoning about equal sides and angles	Draw lines with a ruler to the nearest millimeter. Measure with a protractor. Use conventional markings for parallel lines and right angles. Use the term diagonal and make conjectures about the angles formed between sides, and between diagonals and parallel sides, and other properties of quadrilaterals. Use angle sum facts. Make deductions about missing angles and relate these to missing number problems.	Draw given angles, and measure them in degrees (°). Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

denominator of a multiple of 10 or 25								

Geometry – Position and Direction			Statistics		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed	Recognise and use reflection and translations in a variety of diagrams. Use a 2-D grid and coordinates in the first quadrant.	Use the appropriate language to identify, describe and represent the position of a shape following a reflection or translation.	solve comparison, sum and difference problems using information presented in a line graph complete, read and interpret information in tables, including timetables	Connect work on coordinates and scales to their interpretation of time graphs. Begin to decide which representations of data are most appropriate and why.	Complete, read and interpret information in tables, including timetables.

Year 6

Number – Number and Place Value			Number – Addition, Subtraction, Multiplication and Division			Number – Fractions (including decimals and percentages)		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
read, write, order and compare numbers up to 10,000,000 and determine the value of each digit round any whole number to a required degree of accuracy use negative numbers in context, and calculate intervals across 0 solve number and practical problems that involve all of the above	Use the whole number system, including saying, reading and writing numbers accurately.	Round any whole number to a required degree of accuracy. Use negative numbers in context, and calculate intervals across zero.	multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context perform mental calculations, including with mixed operations and large numbers identify common factors, common multiples and prime numbers use their knowledge of the order of operations to carry out calculations involving the 4 operations solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why solve problems involving addition, subtraction, multiplication and division use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy	Use the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division. Mental calculations. Use all times tables to calculate mathematical statements. Round answers to a specified degree of accuracy. Explore the order of operations using brackets. Common factors can be related to finding equivalent fractions.	Multiply multi-digit numbers up to 4 digits by a two-digit whole number. Divide numbers up to 4 digits by a two-digit whole number and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	use common factors to simplify fractions; use common multiples to express fractions in the same denomination compare and order fractions, including fractions >1 add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$] divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$] associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$] identify the value of each digit in numbers given to 3 decimal places and multiply and divide numbers by 10, 100 and 1,000 giving answers up to 3 decimal places multiply one-digit numbers with up to 2 decimal places by whole numbers • use written division methods in cases where the answer has up to 2 decimal places • solve problems which require answers to be rounded to specified degrees of accuracy	Use and understand the addition and subtraction of fractions with different denominators by identifying equivalent fractions with the same denominator. Use a variety of images to support understanding of multiplication with fractions. Use understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represent a unit fraction to find the whole quantity. Calculations with simple fractions and decimal fraction equivalents. List equivalent fractions to identify fraction with common denominators. Explore and make conjectures about converting a simple fraction to a decimal fraction. Simple fractions with recurring decimal equivalents to learn about rounding the decimals to three decimal places. Multiply and divide numbers with up to 2 decimal places by one-digit and two-digit whole numbers. Multiply decimals by whole numbers. Division of decimal numbers by one-digit whole numbers. Recognise division calculations as the inverse of multiplication. Develop skills of rounding and estimating as a means of predicting and checking the	Use written division methods in cases where the answer has up to two decimal places. Solve problems which require answers to be rounded to specified degrees of accuracy. Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

						recall and use equivalences between simple fractions, decimals and percentages, including in different contexts	order of magnitude of their answers to decimal calculations.	
Ratio and proportion			**Algebra**			**Measurement**		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
solve problems involving the relative sizes of 2 quantities where missing values can be found by using integer multiplication and division facts solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison solve problems involving similar shapes where the scale factor is known or can be found solve problems involving unequal sharing and grouping using knowledge of fractions and multiples	Recognise proportionality in contexts when the relations between quantities are in the same ratio. Link percentages or 360° to calculating angles of pie charts. Consolidate understanding of ratio when comparing quantities, sizes and scale drawings by solving a variety of problems. Possibly use the notation a:b to record work. Solve problems involving unequal quantities.	Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison. Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.	use simple formulae generate and describe linear number sequences express missing number problems algebraically find pairs of numbers that satisfy an equation with 2 unknowns enumerate possibilities of combinations of 2 variables	Begin to understand the use of symbols and letters to represent variables and unknowns, such as: -missing numbers, lengths, coordinates and angles -formulae in mathematics and science -equivalent expressions -generalisations of number patterns -number puzzles	Use simple formulae.	solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places where appropriate use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to 3 decimal places convert between miles and kilometres recognise that shapes with the same areas can have different perimeters and vice versa recognise when it is possible to use formulae for area and volume of shapes calculate the area of parallelograms and triangles calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3]	Connect conversions to a graphical representation. Know approximates conversions. Use the number line to add and subtract positive and negative integers. Relate the area of rectangles to parallelograms and triangles. Understand and use formulae to do this. Possibly introduced to compound units for speed.	Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places.
Geometry – Properties of Shapes			**Geometry – Position and Direction**			**Statistics**		
Skills	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**	**Skills**	**Knowledge**	**End Points**
draw 2-D shapes using given dimensions and angles recognise, describe and build simple 3-D shapes, including making nets compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles	Draw shapes and nets accurately, using measuring tools and conventional markings and labels for lines and angle. Describe the properties of shapes and explain how unknown angles and lengths can be derived from known measurements. Relationships might be expressed algebraically.	Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons.	describe positions on the full coordinate grid (all 4 quadrants) draw and translate simple shapes on the coordinate plane, and reflect them in the axes	Draw and label pairs of axes in all 4 quadrants with equal scaling. Draw and label rectangles, parallelograms and rhombuses, specified by coordinates in the four quadrants, predicting missing coordinates using the properties of shapes. Might be expressed algebraically.	Describe positions on the full coordinate grid (all four quadrants).	interpret and construct pie charts and line graphs and use these to solve problems calculate and interpret the mean as an average	Connect work on angles, fractions and percentages to the interpretation of pie charts. Encounter and draw graphs relating 2 variables, arising from their own enquiry and in other subjects. Connect conversion from kilometres to miles in measurement to its graphical representation. Know when it is appropriate to find the mean of a data set.	Interpret pie charts and line graphs and use these to solve problems. Calculate and interpret the mean as an average.