



## MATHEMATICS PROGRAMME OF STUDY COVERAGE AT BEAUFORT

The principle aim of Maths teaching at Beaufort is to ensure that all children gain secure knowledge and understanding (ie mastery) of the outcomes in the National Curriculum (2014).

*'The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.'* (National Curriculum page 3)

In practice, this means that the whole class should be working in the same area of Maths and learning objective, but perhaps at different levels of challenge and with different levels of support, with different resources and with pre/post-teaching support sessions for some children. This is how the learning is to be personalised.

Beaufort are adopting a Teaching for Mastery (TfM) approach using the Maths No Problem scheme, White Rose and Power Maths.

Maths should be taught for at least an hour every day from Year 1. It is recommended that you spend the majority (85%?) of your Maths lessons concentrating on Number, Calculations and Fractions.

Geometry, Measurement and Statistics are best covered using continuous provision or cross-curricular. Suggestions are highlighted in yellow below.



## EYFS - MATHEMATICS PROGRAMME OF STUDY COVERAGE

### Early learning goal - numbers

Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.

### Early learning goal - shape, space and measures

Children use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. They recognise, create and describe patterns. They explore characteristics of everyday objects and shapes and use mathematical language to describe them.



## YEAR 1 - MATHEMATICS PROGRAMME OF STUDY COVERAGE

<b>Using and applying</b>	
<p><b>Solving problems</b> Solve problems involving counting, adding, subtracting, doubling or halving in the context of measures, numbers or money.</p>	
<p><b>Representing</b> Describe a puzzle or problem using numbers, practical materials or diagrams; use these to solve the problem and set the solution in the original context.</p>	
<p><b>Enquiring</b> Answer a question by selecting and using suitable equipment and sorting information, shapes or objects; display results using tables and pictures.</p>	
<p><b>Reasoning</b> Describe simple patterns and relationships involving numbers or shapes; decide whether examples satisfy given conditions.</p>	
<p><b>Communicating</b> Describe ways of solving puzzles and problems, explaining choices and decisions orally or using pictures.</p>	
<b>Number and Place Value</b>	
Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number	<p>Pupils practise counting (1, 2, 3...), ordering (for example, first, second, third...), and to indicate a quantity (for example, 3 apples, 2 centimetres), including solving simple concrete problems, until they are fluent.</p> <p>Pupils begin to recognise place value in numbers beyond 20 by reading, writing, counting and comparing numbers up to 100, supported by objects and pictorial representations.</p> <p>They 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 (for example, odd and even numbers), including varied and frequent practice through increasingly complex questions.</p> <p>They recognise and create repeating patterns with objects and with shapes.</p>
Count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s	
Compare and order numbers from 0 up to 100; use < > and = signs	
Given a number, identify 1 more and 1 less	
Recognise the place value of each digit in a two-digit number (10s, 1s)	
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	

<b>Addition and Subtraction</b>	
Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs	Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, $9 + 7 = 16$ ; $16 - 7 = 9$ ; $7 = 16 - 9$ ).
Represent and use number bonds and related subtraction facts within 20	They should realise the effect of adding or subtracting 0. This establishes addition and subtraction as related operations.  Pupils combine and increase numbers, counting forwards and backwards.
Add and subtract one-digit and two-digit numbers to 20, including 0  Add 3 one-digit numbers.	They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.
Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = ? - 9$	
<b>Multiplication and Division</b>	
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	Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.  They make connections between arrays, number patterns, and counting in 2s, 5s and 10s.
<b>Fractions</b>	
Recognise, find and name a half as 1 of 2 equal parts of an object, shape or quantity	Pupils are taught half and quarter as 'fractions of' discrete and continuous quantities by solving problems using shapes, objects and quantities. For example, they could recognise and find half a length, quantity, set of objects or shape. Pupils connect halves and quarters to the equal sharing and grouping of sets of objects and to measures, as well as recognising and combining halves and quarters as parts of a whole.
Recognise, find and name a quarter as 1 of 4 equal parts of an object, shape or quantity	

## Measurement

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

Recognise and use symbols for pounds (£) and pence (p); combine coins to make small amounts

Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times

The pairs of terms: mass and weight, volume and capacity, are used interchangeably at this stage.

Pupils move from using and comparing different types of quantities and measures using non-standard units, including discrete (for example, counting) and continuous (for example, liquid) measurement, to using manageable common standard units.

In order to become familiar with standard measures, pupils begin to use measuring tools such as a ruler, weighing scales and containers.

Pupils use the language of time, including telling the time throughout the day, first using o'clock and then half past.

<b>Properties of Shape</b>	
Recognise, name, describe the properties of, compare and sort common 2-D and 3-D shapes.	Pupils handle common 2-D and 3-D shapes, naming these and related everyday objects fluently. They recognise these shapes in different orientations and sizes, and know that rectangles, triangles, cuboids and pyramids are not always similar to each other.
<b>Position &amp; Direction</b>	
Describe position, direction and movement, including whole, half, quarter and three-quarter turns	Pupils use the language of position, direction and motion, including: left and right, top, middle and bottom, on top of, in front of, above, between, around, near, close and far, up and down, forwards and backwards, inside and outside.
Order and arrange combinations of mathematical objects in patterns and sequences	Pupils make whole, half, quarter and three-quarter turns in both directions and connect turning clockwise with movement on a clock face.



## YEAR 2 MATHEMATICS PROGRAMME OF STUDY COVERAGE

<b>Using and applying</b>	
<p><b>Solving problems</b> Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures or pounds and pence.</p>	
<p><b>Representing</b> Identify or record the information or calculation needed to solve a puzzle or problem; carry out the steps or calculations and check the solution in the context of the problem.</p>	
<p><b>Enquiring</b> Follow a line of enquiry; answer questions by choosing and using suitable equipment and selecting, organising and presenting information in lists, tables and simple diagrams.</p>	
<p><b>Reasoning</b> Describe patterns and relationships involving numbers or shapes; make predictions and test these with examples.</p>	
<p><b>Communicating</b> Present solutions to puzzles and problems in an organised way; explain decisions, methods and results in pictorial, written or spoken form, using mathematical language and number sentences.</p>	
<b>Number and Place Value</b>	
<p>Count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward</p>	<p>Using materials and a range of representations, pupils practise counting, reading, writing and comparing numbers to at least 100 and solving a variety of related problems to develop fluency. They count in multiples of 3 to support their later understanding of a third.</p>
<p>Identify, represent and estimate numbers using different representations, including the number line</p>	<p>As they become more confident with numbers up to 100, pupils are introduced to larger numbers to develop further their recognition of patterns within the number system and represent them in different ways, including spatial representations.</p>
<p>Understand how to use place value (tens and units) and number facts to calculate and solve problems.</p>	<p>Pupils should partition numbers in different ways (for example, <math>23 = 20 + 3</math> and <math>23 = 10 + 13</math>) to support subtraction. They become fluent and apply their knowledge of numbers to reason with, discuss and solve problems that emphasise the value of each digit in two-digit numbers. They begin to understand 0 as a place holder.</p>

### Addition and Subtraction

<p>Solve problems with addition and subtraction:</p> <ul style="list-style-type: none"> <li>• using concrete objects and pictorial representations, including those involving numbers, quantities and measures</li> <li>• applying their increasing knowledge of mental and written methods</li> </ul>	<p>Pupils extend their understanding of the language of addition and subtraction to include sum and difference.</p> <p>Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using <math>3 + 7 = 10</math>; <math>10 - 7 = 3</math> and <math>7 = 10 - 3</math> to calculate <math>30 + 70 = 100</math>; <math>100 - 70 = 30</math> and <math>70 = 100 - 30</math>. They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, <math>5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5</math>). This establishes commutativity and associativity of addition.</p>
<p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p>	<p>Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.</p>
<p>Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> <li>• a two-digit number and 1s</li> <li>• a two-digit number and 10s</li> <li>• 2 two-digit numbers</li> <li>• 3 one-digit numbers</li> </ul>	
<p>Show that addition of 2 numbers can be done in any order (commutative) and subtraction of 1 number from another cannot</p>	
<p>Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems</p>	

### Multiplication and Division

<p>Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers</p>	<p>Pupils use a variety of language to describe multiplication and division.</p> <p>Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.</p>
<p>Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (<math>\times</math>), division (<math>\div</math>) and equals (<math>=</math>) signs</p>	

<p>Show that multiplication of 2 numbers can be done in any order (commutative) and division of 1 number by another cannot</p>	<p>Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, <math>40 \div 2 = 20</math>, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, <math>4 \times 5 = 20</math> and <math>20 \div 5 = 4</math>).</p>
<p>Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts</p>	
<p><b>Fractions</b></p>	
<p>Recognise, find, name and write fractions <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{2}{4}</math> and <math>\frac{3}{4}</math> of a length, shape, set of objects or quantity</p>	<p>Pupils use fractions as ‘fractions of’ discrete and continuous quantities by solving problems using shapes, objects and quantities. They 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. They meet <math>\frac{3}{4}</math> as the first example of a non-unit fraction.</p>
<p>Write simple fractions, for example <math>\frac{1}{2}</math> of <math>6 = 3</math> and recognise the equivalence of <math>\frac{2}{4}</math> and <math>\frac{1}{2}</math></p>	<p>Pupils should count in fractions up to 10, starting from any number and using the <math>\frac{1}{2}</math> and <math>\frac{2}{4}</math> equivalence on the number line (for example, <math>1\frac{1}{4}</math>, <math>1\frac{1}{2}</math>, <math>1\frac{3}{4}</math>, 2). This reinforces the concept of fractions as numbers and that they can add up to more than 1.</p>
<p><b>Measurement</b></p>	
<p>Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (<math>^{\circ}</math>C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels</p>	<p>Pupils use standard units of measurement with increasing accuracy, using their knowledge of the number system. They use the appropriate language and record using standard abbreviations.</p> <p>Comparing measures includes simple multiples such as ‘half as high’; ‘twice as wide’.</p>
<p>Compare and order lengths, mass, volume/capacity and record the results using <math>&gt;</math>, <math>&lt;</math> and <math>=</math></p>	<p>Pupils become fluent in telling the time on analogue clocks and recording it.</p>
<p>Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value</p>	<p>They become fluent in counting and recognising coins. They read and say amounts of money confidently and use the symbols £ and p accurately, recording pounds and pence separately.</p>
<p>Find different combinations of coins that equal the same amounts of money</p>	
<p>Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change</p>	

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	
<b>Properties of Shape</b>	
Identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line	<p>Pupils handle and 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 (for example, number of sides, number of faces). Pupils identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces.</p> <p>Pupils read and write names for shapes that are appropriate for their word reading and spelling.</p> <p>Pupils draw lines and shapes using a straight edge.</p>
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	
<b>Position &amp; Direction</b>	
Order and arrange combinations of mathematical objects in patterns and sequences	Pupils should work with patterns of shapes, including those in different orientations.
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)	Pupils use the concept and language of angles to describe 'turn' by applying rotations, including in practical contexts (for example, pupils themselves moving in turns, giving instructions to other pupils to do so, and programming robots using instructions given in right angles).
<b>Statistics</b>	
Interpret and construct simple pictograms, tally charts, block diagrams and tables	Pupils record, interpret, collate, organise and compare information (for example, using many-to-one correspondence in pictograms with simple ratios 2, 5, 10).
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	



## YEAR 3 MATHEMATICS PROGRAMME OF STUDY COVERAGE

<b>Using and applying</b>	
<b>Solving problems</b> Solve one and two step problems involving numbers, money or measures, including time, choosing and carrying out appropriate calculations.	
<b>Representing</b> Represent the information in a puzzle or problem, using numbers, image or diagrams; use these to find a solution and present it in context, where appropriate, using £p notation or units of measure.	
<b>Enquiring</b> Follow a line of enquiry by deciding what information is important; make and use lists, tables and graphs to organise and interpret the information.	
<b>Reasoning</b> Identify patterns and relationships involving numbers or shapes, and use these to solve problems.	
<b>Communicating</b> Describe and explain methods, choices and solutions to problems or puzzles, orally and in writing, using pictures and diagrams.	
<b>Number and Place Value</b>	
Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number	Pupils now use multiples of 2, 3, 4, 5, 8, 10, 50 and 100.  They use larger numbers to at least 1,000, applying partitioning related to place value using varied and increasingly complex problems, building on work in year 2 (for example, $146 = 100 + 40 + 6$ , $146 = 130 + 16$ ).  Using a variety of representations, including those related to measure, pupils continue to count in 1s, 10s and 100s, so that they become fluent in the order and place value of numbers to 1,000.
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	
<b>Addition and Subtraction</b>	
Add and subtract numbers mentally, including: <ul style="list-style-type: none"> <li>• a three-digit number and 1s</li> <li>• a three-digit number and 10s</li> <li>• a three-digit number and 100s</li> </ul>	Pupils practise solving varied addition and subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.  Pupils use their understanding of place value and

<p>Addition using formal written methods for</p> <ul style="list-style-type: none"> <li>• HTU + TU</li> <li>• HTU + HTU</li> </ul>	<p>partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to 3 digits to become fluent.</p>
<p>Subtraction using formal written methods for</p> <ul style="list-style-type: none"> <li>• HTU - TU</li> <li>• HTU - HTU</li> </ul>	
<p>Estimate the answer to a calculation and use inverse operations to check answers</p>	
<p>Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction</p>	
<b>Multiplication and Division</b>	
<p>Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables</p>	<p>Pupils continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.</p> <p>Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, <math>4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240</math>) and multiplication and division facts (for example, using <math>3 \times 2 = 6</math>, <math>6 \div 3 = 2</math> and <math>2 = 6 \div 3</math>) to derive related facts (<math>30 \times 2 = 60</math>, <math>60 \div 3 = 20</math> and <math>20 = 60 \div 3</math>).</p>
<p>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</p>	<p>Pupils develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division.</p>
<p>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</p>	<p>Pupils solve simple problems in contexts, deciding which of the 4 operations to use and why. These include measuring and scaling contexts, (for example 4 times as high, 8 times as long etc) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).</p>

<b>Fractions</b>	
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	<p>Pupils connect tenths to place value, decimal measures and to division by 10.</p> <p>They begin to 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.</p> <p>Pupils understand the relation between unit fractions as operators (fractions of), and division by integers.</p> <p>They continue to recognise fractions in the context of parts of a whole, numbers, measurements, a shape, and unit fractions as a division of a quantity.</p> <p>Pupils practise adding and subtracting fractions with the same denominator through a variety of increasingly complex problems to improve fluency.</p>
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, $5/7 + 1/7 = 6/7$ ]	
Compare and order unit fractions, and fractions with the same denominators	
Solve problems that involve all of the above	
<b>Measurement</b>	
Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)	<p>Pupils continue to measure using the appropriate tools and units, progressing to using a wider range of measures, including comparing and using mixed units (for example, 1 kg and 200g) and simple equivalents of mixed units (for example, 5m = 500cm).</p> <p>The comparison of measures includes simple scaling by integers (for example, a given quantity or measure is twice as long or 5 times as high) and this connects to multiplication.</p> <p>Pupils continue to become fluent in recognising the value of coins, by adding and subtracting amounts, including mixed units, and giving change using manageable amounts. They record £ and p separately. The decimal recording of money is introduced formally in year 4.</p> <p>Pupils use both analogue and digital 12-hour clocks and record their times. In this way they become fluent in and prepared for using digital 24-hour clocks in year 4.</p>
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]	
Measure the perimeter of simple 2-D shapes	

<b>Properties of Shape</b>	
Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them	Pupils' knowledge of the properties of shapes is extended at this stage to symmetrical and non-symmetrical polygons and polyhedra. Pupils extend their use of the properties of shapes. They should be able to 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.  Pupils connect decimals and rounding to drawing and measuring straight lines in centimetres, in a variety of contexts.
Recognise angles as a property of shape or a description of a turn	
Identify horizontal and vertical lines and pairs of perpendicular and parallel lines	
<b>Statistics</b>	
Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs	Pupils understand and use simple scales (for example, 2, 5, 10 units per cm) in pictograms and bar charts with increasing accuracy.
Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs	They continue to interpret data presented in many contexts.



## YEAR 4 MATHEMATICS PROGRAMME OF STUDY COVERAGE

<b>Using and applying</b>	
<b>Solving problems</b> Solve one and two step problems involving numbers, money or measures, including time; choose and carry out appropriate calculations, using calculator methods where appropriate.	
<b>Representing</b> Represent a problem or puzzle, using number sentences, statements or diagrams; use these to solve the problem; present and interpret the solution in the context of the problem.	
<b>Enquiring</b> Suggest a line of enquiry and the strategy needed to follow it; collect, organise and interpret selected information to find answers.	
<b>Reasoning</b> Identify and use patterns, relationships and properties of numbers or shapes; investigate a statement involving numbers and test it with examples.	
<b>Communicating</b> Report solutions to puzzles and problems, giving explanations and reasoning orally and in writing, using diagrams and symbols.	
<b>Number and Place Value</b>	
Count in multiples of 6, 7, 9, 25 and 1,000	<p>Using a variety of representations, including measures, pupils become fluent in the order and place value of numbers beyond 1,000, including counting in 10s and 100s, and maintaining fluency in other multiples through varied and frequent practice.</p> <p>They begin to extend their knowledge of the number system to include the decimal numbers and fractions that they have met so far.</p> <p>They connect estimation and rounding numbers to the use of measuring instruments.</p> <p>Roman numerals should be put in their historical context so pupils understand that there have been different ways to write whole numbers and that the important concepts of 0 and place value were introduced over a period of time.</p>
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 number	
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	

<b>Addition and Subtraction</b>	
Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	Pupils continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency).
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	
<b>Multiplication and Division</b>	
Recall multiplication and division facts for multiplication tables up to $12 \times 12$	<p>Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency.</p> <p>Pupils practise mental methods and extend this to 3-digit numbers to derive facts, (for example <math>600 \div 3 = 200</math> can be derived from <math>2 \times 3 = 6</math>).</p>
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	<p>Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers.</p> <p>Pupils write statements about the equality of expressions (for example, use the distributive law <math>39 \times 7 = 30 \times 7 + 9 \times 7</math> and associative law <math>(2 \times 3) \times 4 = 2 \times (3 \times 4)</math>). They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, <math>2 \times 6 \times 5 = 10 \times 6 = 60</math>.</p>
Recognise and use factor pairs and commutativity in mental calculations	<p>Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or 3 cakes shared equally between 10 children.</p>
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	

<b>Fractions</b>	
Recognise and show, using diagrams, families of common equivalent fractions	Pupils should connect hundredths to tenths and place value and decimal measure.
Count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10	They extend the use of the number line to connect fractions, numbers and measures.
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	Pupils understand the relation between non-unit fractions and multiplication and division of quantities, with particular emphasis on tenths and hundredths.
Add and subtract fractions with the same denominator	Pupils make connections between fractions of a length, of a shape and as a representation of one whole or set of quantities. Pupils use factors and multiples to recognise equivalent fractions and simplify where appropriate (for example, $6/9 = 2/3$ or $1/4 = 2/8$ ).
Recognise and write decimal equivalents of any number of tenths or hundreds	Pupils continue to practise adding and subtracting fractions with the same denominator, to become fluent through a variety of increasingly complex problems beyond one whole. Pupils are taught throughout that decimals and fractions are different ways of expressing numbers and proportions.
Recognise and write decimal equivalents to $1/4$ , $1/2$ , $3/4$	
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	Pupils' understanding of the number system and decimal place value is extended at this stage to tenths and then hundredths. This includes relating the decimal notation to division of whole number by 10 and later 100.
Compare numbers with the same number of decimal places up to 2 decimal places	They practise counting using simple fractions and decimals, both forwards and backwards.
Solve simple measure and money problems involving fractions and decimals to 2 decimal places	
<b>Measurement</b>	
Convert between different units of measure [for example, kilometre to metre; hour to minute]	Pupils build on their understanding of place value and decimal notation to record metric measures, including money.
Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres	They use multiplication to convert from larger to smaller units.  Perimeter can be expressed algebraically as $2(a + b)$ where a and b are the dimensions in the same unit.
Find the area of rectilinear shapes by counting squares	They relate area to arrays and multiplication.

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	
<b>Properties of Shape</b>	
Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes	Pupils continue to classify shapes using geometrical properties, extending to classifying different triangles (for example, isosceles, equilateral, scalene) and quadrilaterals (for example, parallelogram, rhombus, trapezium).
Identify acute and obtuse angles and compare and order angles up to 2 right angles by size	Pupils compare and order angles in preparation for using a protractor and compare lengths and angles to decide if a polygon is regular or irregular.
Identify lines of symmetry in 2-D shapes presented in different orientations	Pupils draw symmetric patterns using a variety of media to become familiar with different orientations of lines of symmetry; and recognise line symmetry in a variety of diagrams, including where the line of symmetry does not dissect the original shape.
Complete a simple symmetric figure with respect to a specific line of symmetry	
<b>Position and Direction</b>	
Describe positions on a 2-D grid as coordinates in the first quadrant	Pupils draw a pair of axes in one quadrant, with equal scales and integer labels. They read, write and use pairs of co-ordinates, for example (2, 5), including using co-ordinate-plotting ICT tools.
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	
<b>Statistics</b>	
Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs	Pupils understand and use a greater range of scales in their representations.  Pupils begin to 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 MATHEMATICS PROGRAMME OF STUDY COVERAGE

Using and applying	
<p><b>Solving problems</b> Solve one and two step problems involving whole numbers and decimals and all 4 operations, choosing and using appropriate calculation strategies, including calculator use.</p>	
<p><b>Representing</b> Represent a puzzle or a problem by identifying and recording the information or calculations needed to solve it; find possible solutions and confirm them in the context of the problem.</p>	
<p><b>Enquiring</b> Plan and pursue an enquiry; present evidence by collecting; organising and interpreting information; suggest extensions to the enquiry.</p>	
<p><b>Reasoning</b> Explore patterns, properties and relationships, and propose a general statement involving numbers or shapes; identify examples for which the statement is true or false.</p>	
<p><b>Communicating</b> Explain reasoning using diagrams, graphs and text; refine ways of recording using images and symbols.</p>	
Number and Place Value	
Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit	<p>Pupils identify the place value in large whole numbers.</p> <p>They continue to use number in context, including measurement. Pupils extend and apply their understanding of the number system to the decimal numbers and fractions that they have met so far.</p> <p>They should recognise and describe linear number sequences (for example, 3, 3½, 4, 4½...), including those involving fractions and decimals, and find the term-to-term rule in words (for example, add ½).</p>
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	
Addition and Subtraction	
Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	<p>Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency.</p> <p>They practise mental calculations with increasingly</p>
Add and subtract numbers mentally	

with increasingly large numbers	large numbers to aid fluency (for example, $12,462 - 2,300 = 10,162$ ).
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	
<b>Multiplication and Division</b>	
Identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers	<p>Pupils practise and extend their use of the formal written methods of short multiplication and short division). They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.</p> <p>They use and understand the terms factor, multiple and prime, square and cube numbers.</p> <p>Pupils 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 (for example, <math>98 \div 4 = 98/4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25</math>).</p> <p>Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1,000 in converting between units such as kilometres and metres.</p> <p>Distributivity can be expressed as <math>a(b + c) = ab + ac</math>.</p> <p>They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, <math>4 \times 35 = 2 \times 2 \times 35</math>; <math>3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10</math>).</p> <p>Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example <math>13 + 24 = 12 + 25</math>; <math>33 = 5 \times ?</math>).</p>
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	
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	

### Fractions (including decimals and percentages)

<p>Compare and order fractions whose denominators are all multiples of the same number</p>	<p>Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions.</p> <p>They extend their knowledge of fractions to thousandths and connect to decimals and measures.</p>
<p>Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths</p>	<p>Pupils connect equivalent fractions <math>&gt; 1</math> that simplify to integers with division and other fractions <math>&gt; 1</math> to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions.</p>
<p>Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements <math>&gt; 1</math> as a mixed number [for example, <math>2/5 + 4/5 = 6/5 = 1 \frac{1}{5}</math>]</p>	<p>Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions <math>&gt; 1</math>.</p>
<p>Add and subtract fractions with the same denominator, and denominators that are multiples of the same number</p>	<p>Pupils practise adding and subtracting fractions to become fluent through a variety of increasingly complex problems. They extend their understanding of adding and subtracting fractions to calculations that exceed 1 as a mixed number.</p>
<p>Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams</p>	<p>Pupils continue to practise counting forwards and backwards in simple fractions.</p> <p>Pupils continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities. Pupils extend counting from year 4, using decimals and fractions including bridging 0, for example on a number line.</p>
<p>Read and write decimal numbers as fractions [for example, <math>0.71 = 71/100</math>]</p>	<p>Pupils say, read and write decimal fractions and related tenths, hundredths and thousandths accurately and are confident in checking the reasonableness of their answers to problems.</p>
<p>Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents</p>	<p>They mentally add and subtract tenths, and one-digit whole numbers and tenths.</p>
<p>Round decimals with 2 decimal places to the nearest whole number and to 1 decimal place</p>	<p>They practise adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (for example, <math>0.83 + 0.17 = 1</math>).</p>

Read, write, order and compare numbers with up to 3 decimal places	<p>Pupils should go beyond the measurement and money models of decimals, for example, by solving puzzles involving decimals.</p> <p>Pupils should make connections between percentages, fractions and decimals (for example, 100% represents a whole quantity and 1% is 1/100, 50% is 50/100, 25% is 25/100) and relate this to finding 'fractions of'.</p>
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 denominator of a multiple of 10 or 25	
<b>Measurement</b>	
Convert between different units of metric measure [for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre]	<p>Pupils use their knowledge of place value and multiplication and division to convert between standard units.</p> <p>Pupils calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths. Missing measures questions such as these can be expressed algebraically, for example <math>4 + 2b = 20</math> for a rectangle of sides 2 cm and b cm and perimeter of 20cm.</p> <p>Pupils calculate the area from scale drawings using given measurements.</p> <p>Pupils use all 4 operations in problems involving time and money, including conversions (for example, days to weeks, expressing the answer as weeks and days).</p>
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 ( $\text{cm}^2$ ) and square metres ( $\text{m}^2$ ), and estimate the area of irregular shapes	
Estimate volume [for example, using $1 \text{ cm}^3$ 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	
<b>Properties of Shape</b>	
Identify 3-D shapes, including cubes and other cuboids, from 2-D representations	<p>Pupils become accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. They use conventional markings for parallel lines and right angles.</p> <p>Pupils use the term diagonal and make conjectures about the angles formed between sides, and between diagonals and parallel sides, and other properties of quadrilaterals, for example using dynamic geometry ICT tools.</p> <p>Pupils use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.</p>
Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles	
Draw given angles, and measure them in degrees ( $^{\circ}$ )	
Identify: <ul style="list-style-type: none"> <li>• angles at a point and 1 whole turn (total <math>360^{\circ}</math>)</li> <li>• angles at a point on a straight line and half a turn (total <math>180^{\circ}</math>)</li> <li>• other multiples of <math>90^{\circ}</math></li> <li>• use the properties of rectangles to deduce related facts and find missing lengths and angles</li> <li>• distinguish between regular and irregular polygons based on reasoning about equal sides and angles</li> </ul>	
<b>Position and Direction</b>	
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	Pupils recognise and use reflection and translation in a variety of diagrams, including continuing to use a 2-D grid and coordinates in the first quadrant. Reflection should be in lines that are parallel to the axes.
<b>Statistics</b>	
Solve comparison, sum and difference problems using information presented in a line graph	Pupils connect their work on coordinates and scales to their interpretation of time graphs.
Complete, read and interpret information in tables, including timetables	They begin to decide which representations of data are most appropriate and why.



## YEAR 6 MATHEMATICS PROGRAMME OF STUDY COVERAGE

<b>Using and applying</b>	
<b>Solving problems</b> Solve multi-step problems and problems involving fractions, decimals and percentages; choose and use appropriate calculation strategies at each stage, including calculator use.	
<b>Representing</b> Tabulate systematically the information in a puzzle or problem' identify the steps or calculations needed to solve it, using symbols where appropriate; interpret solutions in the original context and check their accuracy.	
<b>Enquiring</b> Suggest, plan and develop lines of enquiry; collect, organise and represent information; interpret results and review methods; identify and answer related questions.	
<b>Reasoning</b> Represent and interpret sequences, patterns and relationships involving numbers and shapes; suggest and test hypotheses; construct and use simple expressions and formulae in words then symbols eg the cost of $c$ pens at 15 pence each is $15c$ .	
<b>Communicating</b> Explain reasoning and conclusions, using words, symbols or diagrams as appropriate.	
<b>Number and Place Value</b>	
Read, write, order and compare numbers up to 10,000,000 and determine the value of each digit	Pupils 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 0	
Solve number and practical problems that involve all of the above	
<b>Addition, Subtraction, Multiplication and Division</b>	
Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication	Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.  They undertake mental calculations with increasingly large numbers and more complex calculations.  Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.  Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50, etc, but not to a specified number of significant figures.  Pupils explore the order of operations using
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	

<p>multiples and prime numbers</p> <p>Use their knowledge of the order of operations to carry out calculations involving the 4 operations</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</p> <p>Solve problems involving addition, subtraction, multiplication and division</p> <p>Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy</p>	<p>brackets; for example, <math>2 + 1 \times 3 = 5</math> and <math>(2 + 1) \times 3 = 9</math>.</p> <p>Common factors can be related to finding equivalent fractions.</p>
<b>Fractions (including decimals and percentages)</b>	
<p>Use common factors to simplify fractions; use common multiples to express fractions in the same denomination</p>	<p>Pupils should practise, use and understand the addition and subtraction of fractions with different denominators by identifying equivalent fractions with the same denominator. They should start with fractions where the denominator of one fraction is a multiple of the other (for example, <math>1/2 + 1/8 = 5/8</math>) and progress to varied and increasingly complex problems.</p> <p>Pupils should use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of), as numbers, and as equal parts of objects, for example as parts of a rectangle.</p> <p>Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction to find the whole quantity (for example, if quarter of a length is 36cm, then the whole length is <math>36 \times 4 = 144</math>cm).</p> <p>They practise calculations with simple fractions and decimal fraction equivalents to aid fluency, including listing equivalent fractions to identify fractions with common denominators.</p> <p>Pupils can explore and make conjectures about</p>
<p>Compare and order fractions, including fractions <math>&gt;1</math></p>	
<p>Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions</p>	
<p>Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, <math>1/4 \times 1/2 = 1/8</math>]</p>	
<p>Divide proper fractions by whole numbers [for example, <math>1/3 \div 2 = 1/6</math>]</p>	

Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8]	converting a simple fraction to a decimal fraction (for example, $3 \div 8 = 0.375$ ). For simple fractions with recurring decimal equivalents, pupils learn about rounding the decimal to three decimal places, or other appropriate approximations depending on the context. Pupils multiply and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. Pupils multiply decimals by whole numbers, starting with the simplest cases, such as $0.4 \times 2 = 0.8$ , and in practical contexts, such as measures and money.
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	Pupils are introduced to the division of decimal numbers by one-digit whole numbers, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication.
Use written division methods in cases where the answer has up to 2 decimal places	Pupils also develop their skills of rounding and estimating as a means of predicting and checking the order of magnitude of their answers to decimal calculations. This includes rounding answers to a specified degree of accuracy and checking the reasonableness of their answers.

### Ratio and Proportion

Solve problems involving the relative sizes of 2 quantities where missing values can be found by using integer multiplication and division facts	Pupils recognise proportionality in contexts when the relations between quantities are in the same ratio (for example, similar shapes and recipes).  Pupils link percentages or $360^\circ$ to calculating angles of pie charts.
Solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison	Pupils should consolidate their understanding of ratio when comparing quantities, sizes and scale drawings by solving a variety of problems. They might use the notation a:b to record their work.
Solve problems involving similar shapes where the scale factor is known or can be found	Pupils solve problems involving unequal quantities, for example, 'for every egg you need 3 spoonfuls of flour', '3/5 of the class are boys'. These problems are the foundation for later formal approaches to ratio and proportion.
Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples	

### Algebra

Use simple formulae	Pupils should be introduced to the use of symbols and letters to represent variables and unknowns in mathematical situations that they already understand, such as:
Generate and describe linear number sequences	
Express missing number problems	

algebraically	<ul style="list-style-type: none"> <li>• missing numbers, lengths, coordinates and angles</li> <li>• formulae in mathematics and science</li> <li>• equivalent expressions (for example, <math>a + b = b + a</math>)</li> <li>• generalisations of number patterns</li> <li>• number puzzles (for example, what 2 numbers can add up to)</li> </ul>
Find pairs of numbers that satisfy an equation with 2 unknowns	
Enumerate possibilities of combinations of 2 variables	
<b>Measurement</b>	
Solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places where appropriate	Pupils connect conversion (for example, from kilometres to miles) to a graphical representation as preparation for understanding linear/proportional graphs.
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	They know approximate conversions and are able to tell if an answer is sensible.  Using the number line, pupils use, add and subtract positive and negative integers for measures such as temperature.
Convert between miles and kilometres	They relate the area of rectangles to parallelograms and triangles, for example, by dissection, and calculate their areas, understanding and using the formulae (in words or symbols) to do this.
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	Pupils could be introduced to compound units for speed, such as miles per hour, and apply their knowledge in science or other subjects as appropriate.
Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres ( $\text{cm}^3$ ) and cubic metres ( $\text{m}^3$ ), and extending to other units [for example, $\text{mm}^3$ and $\text{km}^3$ ]	
<b>Properties of Shape</b>	
Draw 2-D shapes using given dimensions and angles	Pupils draw shapes and nets accurately, using measuring tools and conventional markings and labels for lines and angles.  Pupils describe the properties of shapes and explain how unknown angles and lengths can be derived from known measurements.  These relationships might be expressed algebraically for example, $d = 2 \times r$ ; $a = 180 - (b + c)$ .
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	

<p>Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles</p>	
<p><b>Position and Direction</b></p>	
<p>Describe positions on the full coordinate grid (all 4 quadrants)</p>	<p>Pupils draw and label a pair of axes in all 4 quadrants with equal scaling. This extends their knowledge of one quadrant to all 4 quadrants, including the use of negative numbers.</p>
<p>Draw and translate simple shapes on the coordinate plane, and reflect them in the axes</p>	<p>Pupils draw and label rectangles (including squares), parallelograms and rhombuses, specified by coordinates in the four quadrants, predicting missing coordinates using the properties of shapes. These might be expressed algebraically for example, translating vertex <math>(a, b)</math> to <math>(a - 2, b + 3)</math>; <math>(a, b)</math> and <math>(a + d, b + d)</math> being opposite vertices of a square of side <math>d</math>.</p>
<p><b>Statistics</b></p>	
<p>Interpret and construct pie charts and line graphs and use these to solve problems</p>	<p>Pupils connect their work on angles, fractions and percentages to the interpretation of pie charts.</p> <p>Pupils both encounter and draw graphs relating 2 variables, arising from their own enquiry and in other subjects.</p>
<p>Calculate and interpret the mean as an average</p>	<p>They should connect conversion from kilometres to miles in measurement to its graphical representation.</p> <p>Pupils know when it is appropriate to find the mean of a data set.</p>