

Without mathematics,  
there's nothing you can do.

Everything around you  
is mathematics.

Everything around you  
is numbers.

-Shakuntala Devi



MATHS

# Mathematics Intent

## Why do we teach mathematics?

Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics and a sense of enjoyment and curiosity about the subject.

# Mathematics Intent

## What is the aim of our curriculum for mathematics?

- Using a Maths Mastery approach and following the National Curriculum, we aim to ensure that all children:
  - become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
  - reason mathematically by following a line of enquiry, conjecturing relationships and generalisations and developing an argument, justification or proof using mathematical language
  - can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions
- Mathematics is an interconnected subject in which they need to be able to move fluently between representations of mathematical ideas. Children should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects. 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.

# Mathematics Intent

## What do we teach in our mathematics curriculum?

### Years 3 & 4

Pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers. Pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number. By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 x table and show precision and fluency in their work.

### Years 5 & 6

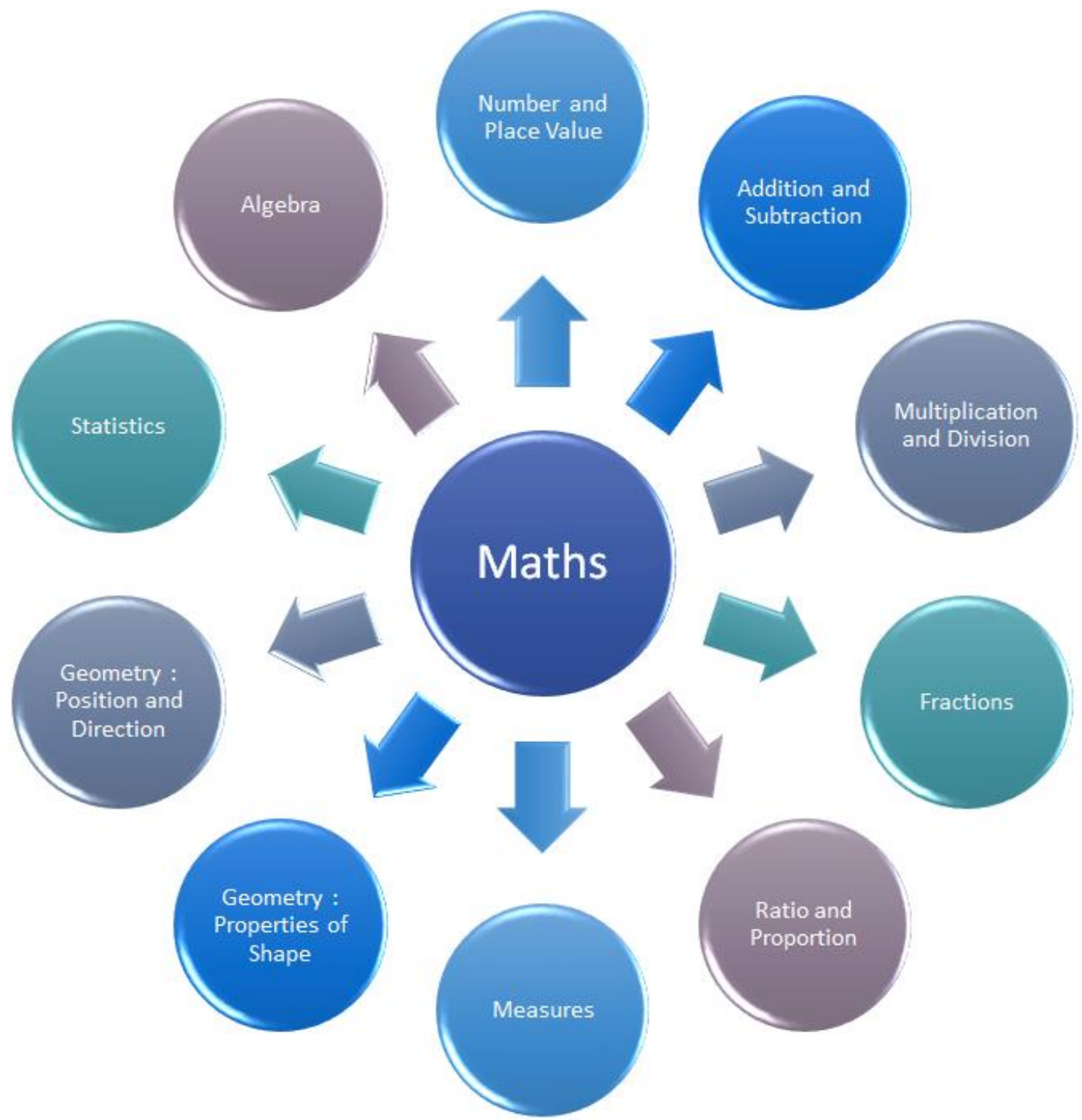
Pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. Pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them. By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages. Pupils should read, spell and pronounce mathematical vocabulary correctly.

## How is mathematics taught at Westende Junior School?

- Maths at Westende Junior School is taught using a 'mastery' approach. Mastering maths means pupils acquiring a deep, long-term, secure and adaptable understanding of the subject and being able to apply concepts in many different contexts. Maths is taught in mixed-ability class groups, where the focus is on all pupils working together on the same lesson content at the same time, as happens in Shanghai and several other regions that teach maths successfully. This ensures that all can master concepts before moving to the next part of the curriculum sequence, allowing no pupil to be left behind. If a pupil fails to grasp a concept or procedure, this is identified quickly and early intervention ensures the pupil is ready to move forward with the whole class.
- Teaching is based on the White Rose scheme with lesson design identifying the new mathematics that is to be taught, the key points and potential misconceptions to create a carefully sequenced journey through the learning. Procedural fluency and conceptual understanding are developed in tandem because each supports the development of the other.
- The main resource used is the White Rose Scheme which is supplemented where appropriate by additional resources identified by teachers e.g. Twinkl 'Diving into Maths Mastery', Power Maths, Target Maths, etc. Discussion is a key part of teaching with children being expected to explain their approach to questions; this allows for the development of deeper understanding as well as providing assessment opportunities. Each lesson begins with sharing the positives and going through the misconceptions from the previous lesson. The main section of each lesson follows the 'I do, We do, You do' approach with teacher models of the concept being followed by shared work before independent work that both reinforces pupils' procedural fluency and develops their conceptual understanding.
- Concrete resources are available in all classrooms with the expectation that children will move from the use of these through pictorial representations to abstract as they gain a secure mental model of the concept.
- Daily fluency sessions happen during maths starters, as well as arithmetic which is taught and tested weekly. In Year 3 and 4, children focus on developing knowledge of times tables through regular practice and Year 5 and 6 focus on consolidating fluency in all aspects of mental arithmetic. All year groups have access to Times Table Rockstars to ensure that all children stay focused and engaged in learning and consolidating their times tables; this underpins the rest of mathematic understanding and success.

# Mathematics

## Key Concepts



# Mathematics Progression Map

## – Number and Place Value

	Counting	Comparing Numbers	Rounding
3	<ul style="list-style-type: none"> <li>•Count from 0 in multiples of 4, 8, 50 and 100.</li> <li>•Find 10 or 100 more or less than a given number.</li> </ul>	<ul style="list-style-type: none"> <li>•Compare and order numbers up to 1000.</li> </ul>	
4	<ul style="list-style-type: none"> <li>•Count backwards through zero to include negative numbers.</li> <li>•Count in multiples of 6, 7, 9, 25 and 100.</li> <li>•Find 1 000 more or less than a given number.</li> </ul>	<ul style="list-style-type: none"> <li>•Compare and order numbers beyond 1000.</li> </ul>	<ul style="list-style-type: none"> <li>•Round any number to the nearest 10, 100 or 1 000.</li> </ul>
5	<ul style="list-style-type: none"> <li>•Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero.</li> <li>•Count forwards or backwards in steps of powers of 10 for any given number up to one million.</li> </ul>	<ul style="list-style-type: none"> <li>•Read, write, order and compare numbers to at least 1,000 000 and determine the value of each digit.</li> </ul>	<ul style="list-style-type: none"> <li>•Round any number up to 1000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.</li> </ul>
6	<ul style="list-style-type: none"> <li>•Use negative numbers in context, and calculate intervals across zero</li> </ul>	<ul style="list-style-type: none"> <li>•Read, write, order and compare numbers up to 10, 000 000 and determine the value of each digit.</li> </ul>	<ul style="list-style-type: none"> <li>•Round any whole number to a required degree of accuracy.</li> </ul>

# Mathematics Progression Map

## – Number and Place Value

	Identifying and Representing Numbers	Reading and Writing Numbers and Recognising Place Value	Problem Solving
3	<ul style="list-style-type: none"> <li>Identify, represent and estimate numbers using different representations.</li> </ul>	<ul style="list-style-type: none"> <li>Read and write numbers up to 1 000 in numerals and in words.</li> <li>Recognise the place value of each digit in a three-digit number.</li> </ul>	<ul style="list-style-type: none"> <li>Solve number problems and practical problems involving these ideas.</li> </ul>
4	<ul style="list-style-type: none"> <li>Identify, represent and estimate numbers using different representations.</li> </ul>	<ul style="list-style-type: none"> <li>Read Roman numerals to 100 and know that over time, the numeral system changed to include the concept of zero and place value.</li> <li>Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones).</li> </ul>	<ul style="list-style-type: none"> <li>Solve number and practical problems that involve all of the above and with increasingly large positive numbers.</li> </ul>
5		<ul style="list-style-type: none"> <li>Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit.</li> <li>Read Roman numerals to 1 000 (M) and recognise years written in Roman numerals.</li> </ul>	<ul style="list-style-type: none"> <li>Solve number problems and practical problems that involve all of the above.</li> </ul>
6		<ul style="list-style-type: none"> <li>Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit.</li> </ul>	<ul style="list-style-type: none"> <li>Solve number problems and practical problems that involve all of the above.</li> </ul>



# Mathematics Progression Map

## – Addition and Subtraction

	Mental Calculations	Written Calculations
3	<ul style="list-style-type: none"><li>•Add and subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds.</li></ul>	<ul style="list-style-type: none"><li>•Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.</li></ul>
4	<ul style="list-style-type: none"><li>•Add and subtract numbers mentally with increasingly large numbers.</li></ul>	<ul style="list-style-type: none"><li>•Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.</li></ul>
5	<ul style="list-style-type: none"><li>•Perform mental calculations, including with mixed operations and large numbers.</li></ul>	<ul style="list-style-type: none"><li>•Add and subtract whole numbers with more than 4 digits, including using formal written methods.</li></ul>
6	<ul style="list-style-type: none"><li>•Use knowledge of the order of operations to carry out calculations involving the four operations.</li></ul>	<ul style="list-style-type: none"><li>•</li></ul>

# Mathematics Progression Map

## – Addition and Subtraction

	Problem Solving	Inverse Operations
3	<ul style="list-style-type: none"><li>•Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</li></ul>	<ul style="list-style-type: none"><li>•Estimate the answer to a calculation and use inverse operations to check answers.</li></ul>
4	<ul style="list-style-type: none"><li>•Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.</li></ul>	<ul style="list-style-type: none"><li>•Estimate and use inverse operations to check answers to a calculation.</li></ul>
5	<ul style="list-style-type: none"><li>•Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</li></ul>	<ul style="list-style-type: none"><li>•Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.</li></ul>
6	<ul style="list-style-type: none"><li>•Solve multi-step problems involving all four operations in contexts, deciding which operations and methods to use and why.</li></ul>	<ul style="list-style-type: none"><li>•Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.</li></ul>

# Mathematics Progression Map

## – Multiplication and Division

	Multiplication and Division Facts	Order of Operations	Mental Calculations
3	<ul style="list-style-type: none"> <li>Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.</li> </ul>		<ul style="list-style-type: none"> <li>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.</li> </ul>
4	<ul style="list-style-type: none"> <li>Recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math>.</li> </ul>		<ul style="list-style-type: none"> <li>Use place value, known and derived facts to multiply and divide mentally, including multiplying by 0 and 1; dividing by 1; multiplying together three numbers.</li> <li>Recognise and use factor pairs and commutativity in mental calculations.</li> </ul>
5			<ul style="list-style-type: none"> <li>Multiply and divide numbers mentally drawing upon known facts.</li> <li>Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.</li> </ul>
6		<ul style="list-style-type: none"> <li>Use their knowledge of the order of operations to carry out calculations involving the four operations.</li> </ul>	<ul style="list-style-type: none"> <li>Perform mental calculations, including with mixed operations and large numbers.</li> </ul>

# Mathematics Progression Map

## – Multiplication and Division

	Written Calculations	Inverse Operations
3	<ul style="list-style-type: none"> <li>•Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, using mental and progressing to formal written methods.</li> </ul>	<ul style="list-style-type: none"> <li>•Estimate the answer to a calculation and use inverse operations to check answers.</li> </ul>
4	<ul style="list-style-type: none"> <li>•Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.</li> </ul>	<ul style="list-style-type: none"> <li>•Estimate and use inverse operations to check answers to a calculation.</li> </ul>
5	<ul style="list-style-type: none"> <li>•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.</li> <li>•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.</li> </ul>	
6	<ul style="list-style-type: none"> <li>•Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.</li> <li>•Divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context 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.</li> </ul>	<ul style="list-style-type: none"> <li>•Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.</li> </ul>

# Mathematics Progression Map

## – Multiplication and Division

	Problem Solving	Multiples, Factors, Primes, Squares and Cubes
3	<ul style="list-style-type: none"> <li>•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</li> </ul>	
4	<ul style="list-style-type: none"> <li>•Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems.</li> </ul>	<ul style="list-style-type: none"> <li>•Recognise and use factor pairs and commutativity in mental calculations.</li> </ul>
5	<ul style="list-style-type: none"> <li>•Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes.</li> <li>•Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign.</li> <li>•Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.</li> </ul>	<ul style="list-style-type: none"> <li>•Identify multiples and factors, including finding all factor pairs of a number and common factors of two numbers.</li> <li>•Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.</li> <li>•Establish whether a number up to 100 is prime and recall prime numbers up to 19.</li> <li>•Recognise and use square numbers and cube numbers, and the notation for squared (<sup>2</sup>) and cubed (<sup>3</sup>).</li> </ul>
6	<ul style="list-style-type: none"> <li>•Solve problems involving addition, subtraction, multiplication and division.</li> </ul>	<ul style="list-style-type: none"> <li>•Identify common factors, common multiples and prime numbers.</li> </ul>

# Mathematics Progression Map

## – Fractions

	Counting in Fractions	Recognising Fractions	Comparing Fractions
3	<ul style="list-style-type: none"> <li>Count up and down in tenths.</li> </ul>	<ul style="list-style-type: none"> <li>Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.</li> <li>Recognise that tenths arise from dividing an object into 10 equal parts and in dividing one – digit numbers or quantities by 10.</li> <li>Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators.</li> </ul>	<ul style="list-style-type: none"> <li>Compare and order unit fractions, and fractions with the same denominators.</li> </ul>
4	<ul style="list-style-type: none"> <li>Count up and down in hundredths.</li> </ul>	<ul style="list-style-type: none"> <li>Recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.</li> </ul>	
5		<ul style="list-style-type: none"> <li>Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.</li> </ul>	<ul style="list-style-type: none"> <li>Compare and order fractions whose denominators are all multiples of the same number.</li> </ul>
6			<ul style="list-style-type: none"> <li>Compare and order fractions, including fractions <math>&gt;1</math>.</li> </ul>

# Mathematics Progression Map

## – Fractions

	Comparing Decimals	Equivalence (including Fractions, Decimals and Percentages)	Rounding Decimals
<b>3</b>		<ul style="list-style-type: none"> <li>•Recognise and show, using diagrams, equivalent fractions with small denominators.</li> </ul>	
<b>4</b>	<ul style="list-style-type: none"> <li>•Compare numbers with the same number of decimal places up to two decimal places.</li> </ul>	<ul style="list-style-type: none"> <li>•Recognise and show, using diagrams, families of common equivalent fractions.</li> <li>•Recognise and write decimal equivalents of any number of tenths or hundredths.</li> <li>•Recognise and write decimal equivalents to <math>\frac{1}{4}</math>; <math>\frac{1}{2}</math>; <math>\frac{3}{4}</math>.</li> </ul>	<ul style="list-style-type: none"> <li>•Round decimals with one decimal place to the nearest whole number.</li> </ul>
<b>5</b>	<ul style="list-style-type: none"> <li>•Read, write, order and compare numbers with up to three decimal places.</li> </ul>	<ul style="list-style-type: none"> <li>•Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.</li> <li>•Read and write decimal numbers as fractions (e.g. <math>0.71 = \frac{71}{100}</math>).</li> <li>•Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.</li> <li>•Recognise the per cent symbol (%) and understand that per cent relates to “number of parts per hundred” and write percentages as a fraction with denominator 100.</li> </ul>	<ul style="list-style-type: none"> <li>•Round decimals with two decimal places to the nearest whole number and to one decimal place.</li> </ul>
<b>6</b>	<ul style="list-style-type: none"> <li>•Identify the value of each digit in numbers given to three decimal places.</li> </ul>	<ul style="list-style-type: none"> <li>•Use common factors to simplify fractions; use common multiples to express fractions in the same denomination.</li> <li>•Associate a fraction with division and calculate decimal fraction equivalents (e.g. <math>0.375</math>) for a simple fraction (e.g. <math>\frac{3}{8}</math>).</li> <li>•Recall and use equivalences between simple fractions, decimals and percentages, including indifferent contexts.</li> </ul>	<ul style="list-style-type: none"> <li>•Solve problems which require answers to be rounded to specified degrees of accuracy.</li> </ul>

# Mathematics Progression Map

## – Fractions

	Adding and Subtracting Fractions and Decimals	Multiplying and Dividing Fractions and Decimals
3	<ul style="list-style-type: none"> <li>• Add and subtract fractions with the same denominator within one whole (e.g. <math>\frac{5}{7} + \frac{1}{7} = \frac{6}{7}</math>).</li> </ul>	
4	<ul style="list-style-type: none"> <li>• Add and subtract fractions with the same denominator.</li> </ul>	<ul style="list-style-type: none"> <li>• Find the effect of dividing a one- or two-digit number by 10 and 100.</li> </ul>
5	<ul style="list-style-type: none"> <li>• Add and subtract fractions with the same denominator and multiples of the same number.</li> <li>• Recognise and convert mixed numbers and improper fractions.</li> </ul>	<ul style="list-style-type: none"> <li>• Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.</li> </ul>
6	<ul style="list-style-type: none"> <li>• Add and subtract fractions with different denominators and mixed numbers.</li> </ul>	<ul style="list-style-type: none"> <li>• Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. <math>\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}</math>).</li> <li>• Multiply one-digit numbers with up to two decimal places by whole numbers.</li> <li>• Divide proper fractions by whole numbers (e.g. <math>\frac{1}{3} \div 2 = \frac{1}{6}</math>).</li> <li>• Multiply one-digit numbers with up to two decimal places by whole numbers.</li> <li>• Multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places.</li> <li>• Identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000.</li> <li>• Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction.</li> <li>• Use written division methods in cases where the answer has up to two decimal places.</li> </ul>



# Mathematics Progression Map

## – Ratio and Proportion

Ratio and Proportion	
3	.
4	.
5	.
6	<ul style="list-style-type: none"><li>•Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.</li><li>•Solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison.</li><li>•Solve problems involving similar shapes where the scale factor is known or can be found.</li><li>•Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.</li></ul>

# Mathematics Progression Map

## – Ratio and Proportion

### Comparing and Estimating

- |   |  |
|---|--|
| 3 | <ul style="list-style-type: none"><li>•Compare durations of events, for example to calculate the time taken by particular events or tasks.</li><li>•Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight.</li></ul>   |
| 4 | <ul style="list-style-type: none"><li>•Estimate, compare and calculate different measures, including money in pounds and pence.</li></ul>  |
| 5 | <ul style="list-style-type: none"><li>•Calculate and compare the area of squares and rectangles including using standard units, square centimetres (<math>\text{cm}^2</math>) and square metres (<math>\text{m}^2</math>) and estimate the area of irregular shapes (also included in measuring).</li><li>•Estimate volume (e.g. using <math>1 \text{ cm}^3</math> blocks to build cubes and cuboids) and capacity (e.g. using water).</li></ul> |
| 6 | <ul style="list-style-type: none"><li>•Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (<math>\text{cm}^3</math>) and cubic metres (<math>\text{m}^3</math>), and extending to other units such as <math>\text{mm}^3</math> and <math>\text{km}^3</math>.</li></ul>   |

# Mathematics Progression Map

## – Measures

### Comparing and Estimating

- |          |  |
|----------|--|
| <b>3</b> | <ul style="list-style-type: none"><li>• Compare durations of events, for example to calculate the time taken by particular events or tasks.</li><li>• Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight.</li></ul>   |
| <b>4</b> | <ul style="list-style-type: none"><li>• Estimate, compare and calculate different measures, including money in pounds and pence.</li></ul>   |
| <b>5</b> | <ul style="list-style-type: none"><li>• Calculate and compare the area of squares and rectangles including using standard units, square centimetres (<math>\text{cm}^2</math>) and square metres (<math>\text{m}^2</math>) and estimate the area of irregular shapes (also included in measuring).</li><li>• Estimate volume (e.g. using <math>1 \text{ cm}^3</math> blocks to build cubes and cuboids) and capacity (e.g. using water).</li></ul> |
| <b>6</b> | <ul style="list-style-type: none"><li>• Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (<math>\text{cm}^3</math>) and cubic metres (<math>\text{m}^3</math>), and extending to other units such as <math>\text{mm}^3</math> and <math>\text{km}^3</math>.</li></ul>  |

# Mathematics Progression Map

## – Measures

### Measuring and Calculating

- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml).

**3** •Measure the perimeter of simple 2-D shapes.

- Add and subtract amounts of money to give change, using both £ and p in practical contexts.

- Estimate, compare and calculate different measures, including money in pounds and pence.

**4** •Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres.

- Find the area of rectilinear shapes by counting squares.

- Use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling.

**5** •Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres.

- Calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm<sup>2</sup>) and square metres (m<sup>2</sup>) and estimate the area of irregular shapes.

- Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.

- Recognise that shapes with the same areas can have different perimeters and vice versa.

**6** •Calculate the area of parallelograms and triangles.

- Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm<sup>3</sup>) and cubic metres (m<sup>3</sup>), and extending to other units.

- Recognise when it is possible to use formulae for area and volume of shapes.

# Mathematics Progression Map

## – Measures

### Telling the Time

- 3**
- 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, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight.

- 4**
- 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.

- 5**
- Solve problems involving converting between units of time.

**6**

# Mathematics Progression Map

## – Measures

### Converting Units of Measurement

- |          |  |
|----------|--|
| <b>3</b> | <ul style="list-style-type: none"><li>• Know the number of seconds in a minute and the number of days in each month, year and leap year.</li></ul>   |
| <b>4</b> | <ul style="list-style-type: none"><li>• Convert between different units of measure (e.g. kilometre to metre; hour to minute).</li><li>• Read, write and convert time between analogue and digital 12 and 24-hour clocks.</li><li>• Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.</li></ul>  |
| <b>5</b> | <ul style="list-style-type: none"><li>• Convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre).</li><li>• Solve problems involving converting between units of time.</li><li>• Understand and use equivalences between metric units and common imperial units such as inches, pounds and pints.</li></ul>  |
| <b>6</b> | <ul style="list-style-type: none"><li>• 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.</li><li>• Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.</li><li>• Convert between miles and kilometres.</li></ul> |

# Mathematics Progression Map

## – Measures

	Angles
	<ul style="list-style-type: none"><li>•Recognise angles as a property of shape or a description of a turn.</li><li>•Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn.</li></ul>
3	<ul style="list-style-type: none"><li>•Identify whether angles are greater than or less than a right angle.</li><li>•Identify horizontal and vertical lines and pairs of perpendicular and parallel lines</li></ul>
4	<ul style="list-style-type: none"><li>•Identify acute and obtuse angles and compare and order angles up to two right angles by size.</li></ul>
	<ul style="list-style-type: none"><li>•Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles.</li></ul>
5	<ul style="list-style-type: none"><li>•Identify:<ul style="list-style-type: none"><li>•Angles at a point and one whole turn (total <math>360^\circ</math>)</li><li>•Angles at a point on a straight line and <math>\frac{1}{2}</math> a turn (total <math>180^\circ</math>)</li><li>•Other multiples of <math>90^\circ</math>.</li></ul></li></ul>
6	<ul style="list-style-type: none"><li>•Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.</li></ul>

# Mathematics Progression Map

## – Geometry: Properties of Shapes

	Identifying and Drawing Shapes and their Properties	Comparing and Classifying Shapes
	<ul style="list-style-type: none"> <li>•Draw 2-D shapes and make 3-D shapes using modelling materials</li> </ul>	
<b>3</b>	<ul style="list-style-type: none"> <li>•Recognise 3-D shapes in different orientations and describe them.</li> </ul>	
<b>4</b>	<ul style="list-style-type: none"> <li>•Identify lines of symmetry in 2-D shapes presented in different orientations.</li> <li>•Complete a simple symmetric figure with respect to a specific line of symmetry.</li> </ul>	<ul style="list-style-type: none"> <li>•Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes.</li> </ul>
<b>5</b>	<ul style="list-style-type: none"> <li>•Identify 3-D shapes, including cubes and other cuboids, from 2-D representations.</li> <li>•Draw given angles, and measure them in degrees (<math>^{\circ}</math>).</li> </ul>	<ul style="list-style-type: none"> <li>•Use the properties of rectangles to deduce related facts and find missing lengths or angles.</li> <li>•Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.</li> </ul>
<b>6</b>	<ul style="list-style-type: none"> <li>•Recognise, describe and build simple 3-D shapes, including making nets.</li> <li>•Illustrate and name parts of circles, including radius, diameter and circumference.</li> <li>•Draw 2-D shapes using given dimensions and angles.</li> <li>•Recognise, describe and build simple 3-D shapes, including making nets.</li> </ul>	<ul style="list-style-type: none"> <li>•Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons.</li> </ul>



# Mathematics Progression Map

## – Geometry: Position and Direction

### Position, Direction and Movement

- |   |   |
|---|---|
|   | <ul style="list-style-type: none"><li>•Describe positions on a 2-D grid as coordinates in the first quadrant.</li></ul>   |
| 3 | <ul style="list-style-type: none"><li>•Describe movements between positions as translations of a given unit to the left/right and up/down.</li></ul>  |
| 4 | <ul style="list-style-type: none"><li>•Plot specified points and draw sides to complete a given polygon.</li></ul>  |
| 5 | <ul style="list-style-type: none"><li>•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.</li></ul> |
| 6 | <ul style="list-style-type: none"><li>•Describe positions on the full coordinate grid (all four quadrants).</li><li>•Draw and translate simple shapes on the coordinate plane and reflect them in the axes.</li></ul>     |

# Mathematics Progression Map

## – Statistics

	Interpreting, Constructing and Presenting Data	Solving Problems
3	<ul style="list-style-type: none"><li>• Interpret and present data using bar charts, pictograms and tables.</li></ul>	<ul style="list-style-type: none"><li>• Solve one-step and two-step questions [e.g. 'How many more?' And 'how many fewer?'] using information presented in scaled bar charts and pictograms and tables.</li></ul>
4	<ul style="list-style-type: none"><li>• Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.</li></ul>	<ul style="list-style-type: none"><li>• Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.</li></ul>
5	<ul style="list-style-type: none"><li>• Complete, read and interpret information in tables, including timetables.</li></ul>	<ul style="list-style-type: none"><li>• Solve comparison, sum and difference problems using information presented in a line graph.</li></ul>
6	<ul style="list-style-type: none"><li>• Interpret and construct pie charts and line graphs and use these to solve problems.</li></ul>	<ul style="list-style-type: none"><li>• Calculate and interpret the mean as an average.</li></ul>

# Mathematics Progression Map – Algebra

	Equations	Formulae	Sequences
3			
4			
5			
6	<ul style="list-style-type: none"><li>•Express missing number problems algebraically.</li><li>•Find pairs of numbers that satisfy number sentences involving two unknowns.</li><li>•Enumerate all possibilities of combinations of two variables.</li></ul>	<ul style="list-style-type: none"><li>•Use simple formulae.</li></ul>	<ul style="list-style-type: none"><li>•Generate and describe linear number sequences.</li></ul>