



## TGMS MATHS PROGRESSION OF KNOWLEDGE & SKILLS



This document is a guide to how the White Rose Maths Curriculum links to the Key Stage 2 National Curriculum, and how the skills and knowledge progress through topics for each year group.

Topic	Year 3	Year 4	Year 5	Year 6
<b>Place Value: Count</b>	<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>✓ Count in multiples of 6, 7, 9, 25 and 1000</li> <li>✓ Count backwards through zero to include negative numbers</li> </ul>	<ul style="list-style-type: none"> <li>✓ Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000</li> <li>✓ Count forwards and backwards with positive and negative whole numbers, including through zero</li> </ul>	
<b>Place Value: Represent</b>	<ul style="list-style-type: none"> <li>✓ Identify, represent and estimate numbers using different representations</li> <li>✓ Read and write numbers up to 1000 in numerals and in words</li> </ul>	<ul style="list-style-type: none"> <li>✓ Identify, represent and estimate numbers using different representations</li> <li>✓ Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value</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> <li>✓ Read Roman numerals to 1000 (M) and recognise years written in Roman numerals</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>
<b>Place Value: Use and Compare</b>	<ul style="list-style-type: none"> <li>✓ Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)</li> <li>✓ Compare and order numbers up to 1000</li> </ul>	<ul style="list-style-type: none"> <li>✓ Find 1000 more or less than a given number</li> <li>✓ Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)</li> <li>✓ Order and compare numbers beyond 1000</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>✓ (Read, write), order and compare numbers up to 10,000,000 and determine the value of each digit</li> </ul>
<b>Place Value: Problems/ Rounding</b>	<ul style="list-style-type: none"> <li>✓ Solve number problems and practical problems involving these ideas</li> </ul>	<ul style="list-style-type: none"> <li>✓ Round any number to the nearest 10, 100 or 1000</li> <li>✓ Solve number and practical problems that involve all of the above and with increasingly large positive numbers</li> </ul>	<ul style="list-style-type: none"> <li>✓ Interpret negative numbers in context</li> <li>✓ Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10 000 and 100 000</li> <li>✓ Solve number problems and practical problems that involve all of the above</li> </ul>	<ul style="list-style-type: none"> <li>✓ Round any whole number to a required degree of accuracy</li> <li>✓ Use negative numbers in context, and calculate intervals across zero</li> <li>✓ Solve number and practical problems that involve all of the above</li> </ul>
<b>Addition and Subtraction: Calculations</b>	<ul style="list-style-type: none"> <li>✓ Add and subtract numbers mentally, including:               <ul style="list-style-type: none"> <li>&gt; a three-digit number and ones</li> <li>&gt; a three-digit number and tens</li> <li>&gt; a three-digit number and hundreds</li> </ul> </li> <li>✓ Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction</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>	<ul style="list-style-type: none"> <li>✓ Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)</li> <li>✓ Add and subtract numbers mentally with increasingly large numbers</li> </ul>	<ul style="list-style-type: none"> <li>✓ Perform mental calculations, including with mixed operations and large numbers</li> <li>✓ Use their knowledge of the order of operations to carry out calculations involving the four operations</li> </ul>
<b>Addition and Subtraction:</b>	<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>✓ 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>✓ 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>✓ Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</li> </ul>

<b>Problems</b>			<ul style="list-style-type: none"> <li>✓ Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</li> </ul>	
<b>Multiplication and Division: Recall/Use</b>	<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>✓ Recall multiplication and division facts for multiplication tables up to <math>12 \times 12</math></li> <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>	<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 (<math>^2</math>) and cubed (<math>^3</math>)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Identify common factors, common multiples and prime numbers</li> <li>✓ Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy</li> </ul>
<b>Multiplication and Division: Calculations</b>	<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>	<ul style="list-style-type: none"> <li>✓ Multiply two-digit and three-digit numbers by a one-digit number using a formal written layout</li> </ul>	<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>✓ Multiply and divide numbers mentally, drawing upon known facts</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> <li>✓ Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000</li> </ul>	<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 long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context</li> <li>✓ 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</li> <li>✓ Perform mental calculations, including with mixed operations and large numbers</li> </ul>
<b>Multiplication and Division: Problems</b>	<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 <math>n</math> objects are connected to <math>m</math> objects</li> </ul>	<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, such as <math>n</math> objects are connected to <math>m</math> objects</li> </ul>	<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 multiplication and division, including scaling by simple fractions and problems involving simple rates</li> </ul>	<ul style="list-style-type: none"> <li>✓ Solve problems involving addition, subtraction, multiplication and division</li> </ul>

<b>Multiplication and Division: Combined</b>			<ul style="list-style-type: none"> <li>✓ Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</li> </ul>	<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>
<b>Fractions: Recognise and Write</b>	<ul style="list-style-type: none"> <li>✓ 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</li> <li>✓ Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators</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>✓ Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten</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>✓ Recognise mixed numbers and improper fractions and convert from one form to the other</li> <li>✓ Write mathematical statements <math>&gt; 1</math> as a mixed number [for example, <math>\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1 \frac{1}{5}</math>]</li> </ul>	
<b>Fractions: Compare</b>	<ul style="list-style-type: none"> <li>✓ Recognise and show, using diagrams, equivalent fractions with small denominators</li> <li>✓ Compare and order unit fractions, and fractions with the same denominators</li> </ul>	<ul style="list-style-type: none"> <li>✓ Recognise and show, using diagrams, families of common equivalent fractions</li> </ul>	<ul style="list-style-type: none"> <li>✓ Compare and order fractions whose denominators are all multiples of the same number</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>✓ Compare and order fractions, including fractions <math>&gt; 1</math></li> </ul>
<b>Fractions: Calculations</b>	<ul style="list-style-type: none"> <li>✓ Add and subtract fractions with the same denominator within one whole [for example, <math>\frac{5}{7} + \frac{1}{7} = \frac{6}{7}</math>]</li> </ul>	<ul style="list-style-type: none"> <li>✓ Add and subtract fractions with the same denominator</li> </ul>	<ul style="list-style-type: none"> <li>✓ Add and subtract fractions with the same denominator and denominators that are multiples of the same number</li> <li>✓ Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams</li> </ul>	<ul style="list-style-type: none"> <li>✓ Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions</li> <li>✓ Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, <math>\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}</math>]</li> <li>✓ Divide proper fractions by whole numbers [for example <math>\frac{1}{3} \div 2 = \frac{1}{6}</math>]</li> </ul>
<b>Fractions: Solve Problems</b>	<ul style="list-style-type: none"> <li>✓ Solve problems that involve all of the above</li> </ul>	<ul style="list-style-type: none"> <li>✓ 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</li> </ul>		
<b>Decimals: Recognise, Write, Compare</b>		<ul style="list-style-type: none"> <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> <li>✓ Round decimals with one decimal place to the nearest whole number</li> <li>✓ Compare numbers with the same number of decimal places up to two decimal places</li> </ul>	<ul style="list-style-type: none"> <li>✓ Read and write decimal numbers as fractions [for example, <math>0.71 = \frac{71}{100}</math>]</li> <li>✓ Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents</li> <li>✓ Round decimals with two decimal places to the nearest whole number and to one decimal place</li> <li>✓ Read, write, order and compare numbers with up to three decimal places</li> </ul>	<ul style="list-style-type: none"> <li>✓ Identify the value of each digit in numbers given to three decimal places</li> </ul>

<p><b>Fractions, Decimals and Percentages</b></p>		<ul style="list-style-type: none"> <li>✓ Solve simple measure and money problems involving fractions and decimals to two decimal places</li> </ul>	<ul style="list-style-type: none"> <li>✓ Recognise the percent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal</li> <li>✓ Solve problems which require knowing percentage and decimal equivalents of <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{5}</math>, <math>\frac{2}{5}</math>, <math>\frac{4}{5}</math> and those fractions with a denominator of a multiple of 10 or 25</li> </ul>	<ul style="list-style-type: none"> <li>✓ Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, <math>\frac{3}{8}</math>]</li> <li>✓ Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts</li> </ul>
<p><b>Ratio and Proportion</b></p>				<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/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>
<p><b>Algebra</b></p>	<ul style="list-style-type: none"> <li>✓ Solve problems, including missing number problems</li> </ul>			<ul style="list-style-type: none"> <li>✓ Use simple formulae</li> <li>✓ Generate and describe linear number sequences</li> <li>✓ Express missing number problems algebraically</li> <li>✓ Find pairs of numbers that satisfy an equation with two unknowns</li> <li>✓ Enumerate possibilities of combinations of two variables</li> </ul>
<p><b>Using Measures</b></p>	<ul style="list-style-type: none"> <li>✓ Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Convert between different units of measure [for example, kilometre to metre; hour to minute]</li> <li>✓ Estimate, compare and calculate different measures</li> </ul>	<ul style="list-style-type: none"> <li>✓ Convert between different units of metric measure</li> <li>✓ Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints</li> <li>✓ Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling</li> </ul>	<ul style="list-style-type: none"> <li>✓ Solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 DP where appropriate</li> <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 3 DP</li> <li>✓ Convert between miles and kilometres</li> </ul>

<b>Money</b>	<ul style="list-style-type: none"> <li>✓ Add and subtract amounts of money to give change, using both £ and p in practical contexts</li> </ul>	<ul style="list-style-type: none"> <li>✓ Estimate, compare and calculate different measures, including money in pounds and pence</li> </ul>	<ul style="list-style-type: none"> <li>✓ Use all four operations to solve problems involving measure [for example, money]</li> </ul>	
<b>Time</b>	<ul style="list-style-type: none"> <li>✓ Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks</li> <li>✓ 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, a.m./p.m., morning, afternoon, noon and midnight</li> <li>✓ Know the number of seconds in a minute and the number of days in each month, year and leap year</li> <li>✓ Compare durations of events [for example to calculate the time taken by particular events or tasks]</li> </ul>	<ul style="list-style-type: none"> <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>	<ul style="list-style-type: none"> <li>✓ Solve problems involving converting between units of time</li> </ul>	<ul style="list-style-type: none"> <li>✓ Use, read, write and convert between standard units, converting measurements of time from a smaller unit of measure to a larger unit, and vice versa</li> </ul>
<b>Perimeter, Area and Volume</b>	<ul style="list-style-type: none"> <li>✓ Measure the perimeter of simple 2-D shapes</li> </ul>	<ul style="list-style-type: none"> <li>✓ Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres</li> <li>✓ Find the area of rectilinear shapes by counting squares</li> </ul>	<ul style="list-style-type: none"> <li>✓ Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres</li> <li>✓ Calculate and compare the area of rectangles (including squares) and including using standard units, square centimetres (cm<sup>2</sup>) and square metres (m<sup>2</sup>) and estimate the area of irregular shapes</li> <li>✓ Estimate volume [for example, using blocks to build cuboids] and capacity [for example, using water]</li> </ul>	<ul style="list-style-type: none"> <li>✓ Recognise that shapes with the same areas can have different perimeters and vice versa</li> <li>✓ Recognise when it is possible to use formulae for area and volume of shapes</li> <li>✓ Calculate the area of parallelograms and triangles</li> <li>✓ 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</li> </ul>
<b>2-D Shapes</b>	<ul style="list-style-type: none"> <li>✓ Draw 2-D shapes</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> <li>✓ Identify lines of symmetry in 2-D shapes presented in different orientations</li> </ul>	<ul style="list-style-type: none"> <li>✓ Distinguish between regular and irregular polygons based on reasoning about equal sides and angles</li> <li>✓ Use the properties of rectangles to deduce related facts and find missing lengths and angles</li> </ul>	<ul style="list-style-type: none"> <li>✓ Draw 2-D shapes using given dimensions and angles</li> <li>✓ Compare and classify geometric shapes based on their properties and sizes</li> <li>✓ Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius</li> </ul>

<b>3-D Shapes</b>	<ul style="list-style-type: none"> <li>✓ Make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them</li> </ul>		<ul style="list-style-type: none"> <li>✓ Identify 3-D shapes, including cubes and other cuboids, from 2-D representations</li> </ul>	<ul style="list-style-type: none"> <li>✓ Recognise, describe and build simple 3-D shapes, including making nets</li> </ul>
<b>Angles and Lines</b>	<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; 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>	<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> <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>✓ Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles</li> <li>✓ Draw given angles, and measure them in degrees</li> <li>✓ Identify: <ul style="list-style-type: none"> <li>&gt; angles at a point and one whole turn (total 360°)</li> <li>&gt; angles at a point on a straight line and ½ a turn (total 180°)</li> <li>&gt; other multiples of 90°</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>✓ Find unknown angles in any triangles, quadrilaterals, and regular polygons</li> <li>✓ Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles</li> </ul>
<b>Position and Direction</b>		<ul style="list-style-type: none"> <li>✓ Describe positions on a 2-D grid as coordinates in the first quadrant</li> <li>✓ Describe movements between positions as translations of a given unit to the left/right and up/down</li> <li>✓ Plot specified points and draw sides to complete a given polygon</li> </ul>	<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>	<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>
<b>Present and Interpret Data</b>	<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>✓ 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>✓ Complete, read and interpret information in tables, including timetables</li> </ul>	<ul style="list-style-type: none"> <li>✓ Interpret and construct pie charts and line graphs and use these to solve problems</li> </ul>
<b>Solve Statistical Problems</b>	<ul style="list-style-type: none"> <li>✓ Solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables</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>	<ul style="list-style-type: none"> <li>✓ Solve comparison, sum and difference problems using information presented in a line graph</li> </ul>	<ul style="list-style-type: none"> <li>✓ Calculate and interpret the mean as an average</li> </ul>