

# St John's CE Primary School

Progression in Skills and Vocabulary with  
Associated Reasoning

EYFS – Y6

**Multiplication & Division  
(inc Number Facts) Strand  
(includes Ready to Progress Criteria)**



Completed October 2021

## Vocabulary Progression

The following section of this document lists mathematical vocabulary and phrases that children are required to understand and use as they move through the school for this strand of Mathematics. It is based on the published 2014 national curriculum, NCETM guidance and White Rose Maths. It lists the new vocabulary in the year in which it should be explicitly used and taught. Vocabulary from previous year group should be referred to in addition to that for each year group. It is designed to assist with the teaching of vocabulary across EYFS, KS1 and KS2 and is aligned with the White Rose schemes of learning. This document identifies in which year group vocabulary should be explicitly taught and introduced. However, language should be revisited in subsequent year groups to ensure children are consolidating their understanding. This document is fully editable so language can be moved into earlier or later year groups where necessary in line with latest research findings and subject association (NCETM) updates. Some vocabulary might be introduced earlier (shapes for instance) if necessary or as part of an activity, however this document ensures coverage is progressive. It is expected that key vocabulary is displayed on 'Maths Learning Walls' at appropriate times during the academic year and in line with the current topic area being taught within the class and is promoted through mathematical talk in lessons.

Vocabulary Progression							
Place Value							
EYFS		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Nursery	Reception						
	Double Half Group Share Equal Unequal	Double Halve Share Counting Counting sequence	Commutative Step Counting Estimate / Estimation Inverse Array Calculate Multiplication Multiply Multiplicand Multiplier Product Division Dividend Times tables	Multiple(s) Inverse operations Factor Product Multiplicand Multiplier Dividend Divisor Quotient Integer Decimal Remainder	Factor Factor pairs Distributive Associative Derive Remainder	Linear sequence Power (s) Prime Complement Associative Derivative	Interval Long division Multi-step Common factors Common multiples

## Skills & Reasoning Progression

The following section of this document lists mathematical skills that children should become fluent and proficient in their knowledge, understanding and application. It also includes examples of reasoning questions that could be used by teachers to encourage pupils to apply their knowledge and to reason their understanding in order to build a deeper, more complex understanding of different mathematical concepts beyond 'rote' learning or superficial understanding. It is based on the published 2014 national curriculum, NCETM guidance and White Rose Maths. It lists the new concepts that need to be taught in each year group and is aligned and arranged in order to support teachers to understand the previous step in a particular concept and also the next step (where the children have come from and should be secure with, and how this will then be applied in future year groups). This is not done to enable teachers to 'move children on' to the next year group step, hence the exemplification of reasoning questions to support teaching staff to deliver a 'depth, not breadth' approach. However, preceding steps can be used to aid the delivery of intervention support if children are not secure with the previous step of learning – this is also supported by the demarcation of 'Ready to Progress Criteria'. These are criteria that pupils must be secure with from their previous year group in order to allow them to master new content in their current year group. Links to NRich activities are also provided to enable teaching staff to link in Mathematical investigation where possible.

Number Facts - All of these statements are RPC CRITERIA and must be continually revisited throughout the year after teaching					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>1NF-1</b> Develop fluency in addition and subtraction facts within 10.	<b>2NF-1</b> Secure fluency in addition and subtraction facts within 10, through continued practice.	<b>3NF-1</b> Secure fluency in addition and subtraction facts that bridge 10, through continued practice.			
<b>1NF-2</b> Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers.	<b>1NF-2</b> Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers.  (Continued from Y1 to ensure retention of key facts)	<b>3NF-2</b> Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number.	<b>4NF-1</b> Recall multiplication and division facts up to 12 x 12, and recognise products in multiplication tables as multiples of the corresponding number.	<b>5NF-1</b> Secure fluency in multiplication table facts, and corresponding division facts, through continued practice.	
			<b>4NF-2</b> Solve division problems, with two-digit dividends and one-digit divisors, that		

			involve remainders, and interpret remainders appropriately according to the context.		
		<b>3NF-3</b> Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10).	<b>4NF-3</b> Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100)	<b>5NF-2</b> Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth).	

### Multiplication & Division – Fact Recall and Representation

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>RPC - 1NF-2</b> Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers.	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers  * <b>RPC - 2MD-1</b> Recognise repeated addition contexts, representing them with multiplication equations and calculating the product, within the 2, 5 and 10 multiplication tables	<b>RPC - 3NF-2</b> Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 AND 3 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number.	<b>RPC - 4NF-1</b> Recall multiplication and division facts up to 12 x 12, and recognise products in multiplication tables as multiples of the corresponding number.	<b>RPC – 5NF-1</b> Secure fluency in multiplication table facts, and corresponding division facts, through continued practice.	
	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward (from Place Value)	count from 0 in multiples of 4, 8, 50 and 100 (from Place Value)	count in multiples of 6, 7, 9, 25 and 1 000 (from Place Value)	count forwards or backwards in steps of powers of 10 for any given number up to 1 000 VVGBNYH000 (from Place Value)	

		<b>RPC - 3NF-3</b> Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 10).	<b>RPC - 4NF-3</b> Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 100).	<b>RPC - 5NF-2</b> Apply place-value knowledge to known additive and multiplicative number facts (scaling facts by 1 tenth or 1 hundredth).	
		<b>RPC - 3NPV-4</b> Divide 100 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 100 with 2, 4, 5 and 10 equal parts.	<b>RPC - 4NPV-4</b> Divide 1,000 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in multiples of 1,000 with 2, 4, 5 and 10 equal parts.	<b>RPC - 5NPV-4</b> Divide 1 into 2, 4, 5 and 10 equal parts, and read scales/number lines marked in units of 1 with 2, 4, 5 and 10 equal parts.	<b>RPC - 6NPV-4</b> Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts.
<b>Reasoning Examples – Fact Recall</b>					
	<p><b>Missing numbers</b>  <math>10 = 5 \times \square</math>            What number could be written in the box?</p> <p><b>Making links</b>            I have 30p in my pocket in 5p coins. How many coins do I have?</p>	<p><b>Missing numbers</b>  <math>24 = \square \times \square</math>            Which pairs of numbers could be written in the boxes?</p> <p><b>Making links</b> Cards come in packs of 4. How many packs do I need to buy to get 32 cards?</p>	<p><b>Missing numbers</b>  <math>72 = \square \times \square</math>            Which pairs of numbers could be written in the boxes?</p> <p><b>Making links</b> Eggs are bought in boxes of 12. I need 140 eggs; how many boxes will I need to buy?</p>	<p><b>Missing numbers</b>  <math>6 \times 0.9 = \square \times 0.03</math>  <math>6 \times 0.04 = 0.008 \times \square</math>            Which numbers could be written in the boxes?</p> <p><b>Making links</b> Apples weigh about 170 g each. How many apples would you expect to get in a 2 kg bag?</p>	<p><b>Missing numbers</b>  <math>2.4 \div 0.3 = \square \times 1.25</math>            Which number could be written in the box?</p>

Multiplication & Division – Mental Calculation					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
		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 (appears also in Written Methods)	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	multiply and divide numbers mentally drawing upon known facts	perform mental calculations, including with mixed operations and large numbers
	Show that multiplication of two numbers can be done in any order and that division of one number by another cannot		Recognise and use factor pairs and commutativity in mental calculations	Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000	Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375 for a simple fraction 3/8)
Reasoning Examples – Mental Calculation					
		<b>Use a fact</b> $20 \times 3 = 60$ . Use this fact to work out $21 \times 3 =$ $22 \times 3 =$ $23 \times 3 =$ $24 \times 3 =$	<b>Use a fact</b> $63 \div 9 = 7$ Use this fact to work out $126 \div 9 =$ $252 \div 7 =$	<b>Use a fact</b> $3 \times 75 = 225$ Use this fact to work out $450 \div 6 =$ $225 \div 0.6 =$  To multiply by 25 you multiply by 100 and then divide by 4. Use this strategy to solve $48 \times 25$ $78 \times 25$ $4.6 \times 25$	<b>Use a fact</b> $12 \times 1.1 = 13.2$ Use this fact to work out $15.4 \div 1.1 =$ $27.5 \div 1.1 =$

<p><b>Making links</b> If one teddy has two apples, how many apples will three teddies have? Here are 10 lego people. If 2 people fit into the train carriage, how many carriages do we need?</p>	<p><b>Making links</b> Write the multiplication number sentences to describe this array</p> <table border="1" data-bbox="436 231 732 303"> <tbody> <tr> <td>X</td> <td>X</td> <td>X</td> </tr> <tr> <td>X</td> <td>X</td> <td>X</td> </tr> </tbody> </table> <p>What do you notice? Write the division sentences.</p>	X	X	X	X	X	X	<p><b>Making links</b> <math>4 \times 6 = 24</math> How does this fact help you to solve these calculations? <math>40 \times 6 =</math> <math>20 \times 6 =</math> <math>24 \times 6 =</math></p>	<p><b>Making links</b> How can you use factor pairs to solve this calculation? <math>13 \times 12</math> (<math>13 \times 3 \times 4</math>, <math>13 \times 3 \times 2 \times 2</math>, <math>13 \times 2 \times 6</math>)</p>	<p><b>Making links</b> <math>7 \times 8 = 56</math> How can you use this fact to solve these calculations? <math>0.7 \times 0.8 =</math> <math>5.6 \div 8 =</math></p>	<p><b>Making links</b> <math>0.7 \times 8 = 5.6</math> How can you use this fact to solve these calculations? <math>0.7 \times 0.08 =</math> <math>0.56 \div 8 =</math></p>
X	X	X									
X	X	X									

Multiplication & Division – Written Calculation					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals (=) signs	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 (appears also in Mental Methods)	multiply two-digit and three-digit numbers by a one-digit number using formal written layout	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  * <b>RPC - 5MD-3</b> Multiply any whole number with up to 4 digits by any one-digit number using a formal written method.	multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
			<b>RPC - 4NF-2</b> Solve division problems, with two-digit dividends and one-digit divisors, that involve remainders, and interpret remainders appropriately according to the context.	<b>RPC - 5MD-4</b> Divide a number with up to 4 digits by a one-digit number using a formal written method, and interpret remainders appropriately for the context.	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
			<b>RPC - 4MD-1</b> Multiply and divide whole numbers by 10 and 100 (keeping to whole number quotients); understand this as equivalent to making a number 10 or 100 times the size.	Multiply and divide whole numbers and those including decimals by 10, 100 and 1000.  * <b>RPC - 5MD-1</b> Multiply and divide numbers by 10 and 100; understand this as equivalent to making a number 10 or 100 times the	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



			size, or 1 tenth or 1 hundredth times the size.	appropriate for the context
			<b>RPC - 4MD-2</b> Manipulate multiplication and division equations, and understand and apply the commutative property of multiplication.	use written division methods in cases where the answer has up to two decimal places (copied from Fractions (including decimals))
			<b>RPC - 4MD-3</b> Understand and apply the distributive property of multiplication.	use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy

<b>Reasoning Examples – Written Calculation</b>											
<p>Practical</p> <p>If we put two pencils in each pencil pot how many pencils will we need?</p>	<p><b>Prove It</b></p> <p>Which four number sentences link these numbers? 3, 5, 15? Prove it.</p>	<p><b>Prove It</b></p> <p>What goes in the missing box?</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>?</td> <td>?</td> </tr> <tr> <td>4</td> <td>80</td> <td>12</td> </tr> </table> <p>Prove it.</p> <p><b>How close can you get?</b></p> <p style="text-align: center;">■ ■ × ■</p> <p>Using the digits 2, 3 and 4 in the calculation above how close can you get to 100? What is the largest product? What is the smallest product?</p>	x	?	?	4	80	12	<p><b>Prove It</b></p> <p>What goes in the missing box?</p> <p>6 ■ × 4 = 512 Prove it.</p> <p><b>How close can you get?</b></p> <p>■ ■ ■ × 7</p> <p>Using the digits 3, 4 and 6 in the calculation above how close can you get to 4500? What is the largest product? What is the smallest product?</p> <p><b>Use the inverse</b></p>	<p><b>Prove It</b></p> <p>What goes in the missing box?</p> <p>12 ■ ÷ 6 = 212</p> <p>14 ■ ÷ 7 = 212</p> <p>22 ■ ÷ 7 = 321 r 6</p> <p>323 x ■ = 13243</p> <p>Prove it.</p>	<p><b>Prove It</b></p> <p>What goes in the missing box?</p> <p>18 ■ ÷ 12 = 157</p> <p>38 ■ ÷ 18 = 212.5</p> <p>33 ■ ÷ 8 = 421.5</p> <p>38 x ■ = 178.6</p> <p>Prove it.</p> <p><b>Can you find?</b></p> <p>Can you find the smallest number that can be added to or subtracted from 87.6 to make it exactly divisible by 8/7/18?</p>
x	?	?									
4	80	12									

		<p><b>Size of an answer</b> Will the answer to the following calculations be greater or less than 80</p> <p>23 x 3 = 32 x 3 = 42 x 3 = 36 x 2 =</p>	<p>Use the inverse to check if the following calculations are correct: 23 x 4 = 92 117 ÷ 9 = 14</p> <p><b>Size of an answer</b> Will the answer to the following calculations be greater or less than 300</p> <p>152 x 2 = 78 x 3 = 87 x 3 = 4 x 74 =</p>	<p><b>Use the inverse</b> Use the inverse to check if the following calculations are correct: 4321 x 12 = 51852 507 ÷ 9 = 4563</p> <p><b>Size of an answer</b> The product of a two digit and three digit number is approximately 6500. What could the numbers be?</p>	<p><b>Use the inverse</b> Use the inverse to check if the following calculations are correct: 2346 x 46 = 332796 27.74 ÷ 19 = 1.46</p> <p><b>Size of an answer</b> The product of a single digit number and a number with two decimal places is 21.34. What could the numbers be?</p>
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Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Count forwards and backwards in multiples of 2, 5 and 10, up to 10 multiples, beginning with any multiple, and count forwards and backwards through the odd numbers.	recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	Recall multiplication facts, and corresponding division facts, in the 10, 5, 2, 4 and 8 multiplication tables, and recognise products in these multiplication tables as multiples of the corresponding number.	Recall multiplication and division facts up to 12 x 12, and recognise products in multiplication tables as multiples of the corresponding number.		
			recognise and use factor pairs and commutativity in mental calculations (repeated)	identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.  <i>* RPC - 5MD-2 Find factors and multiples of positive whole numbers, including common factors and common multiples, and express a given number as a product of 2 or 3 factors.</i>	identify common factors, common multiples and prime numbers
				know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers	
				establish whether a number up to 100 is prime and recall prime numbers up to 19	
				recognise and use square numbers and cube numbers, and the notation for squared ( $^2$ ) and cubed ( $^3$ )	<i>calculate, estimate and compare volume of cubes and cuboids using standard units,</i>

					including centimetre cubed ( $\text{cm}^3$ ) and cubic metres ( $\text{m}^3$ ), and extending to other units such as $\text{mm}^3$ and $\text{km}^3$ (copied from Measures)
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**Reasoning Examples – Fact Recall**

<p><b>Spot the mistake</b> Use a puppet to count but make some deliberate mistakes.  e.g. 2 4 5 6 10 9 8 6 See if the pupils can spot the deliberate mistake and correct the puppet</p>	<p><b>True or false?</b>  When you count up in tens starting at 5 there will always be 5 units.</p>	<p><b>True or false?</b>  All the numbers in the two times table are even.  There are no numbers in the three times table that are also in the two times table.</p>	<p><b>Always, sometimes, never?</b>  Is it always, sometimes or never true that an even number that is divisible by 3 is also divisible by 6?  Is it always, sometimes or never true that the sum of four even numbers is divisible by 4?</p>	<p><b>Always, sometimes, never?</b> Is it always, sometimes or never true that multiplying a number always makes it bigger?  Is it always, sometimes or never true that prime numbers are odd?  Is it always, sometimes or never true that when you multiply a whole number by 9, the sum of its digits is also a multiple of 9?  Is it always, sometimes or never true that a square number has an even number of factors.</p>	<p><b>Always, sometimes, never?</b>  Is it always, sometimes or never true that dividing a whole number by a half makes the answer twice as big?  Is it always, sometimes or never true that when you square an even number, the result is divisible by 4?  Is it always, sometimes or never true that multiples of 7 are 1 more or 1 less than prime numbers?</p>
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Multiplication & Division – Combined Operations					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
					Use their knowledge of the order of operations to carry out calculations involving the four operations
Reasoning Examples – Combined Operations					
					<b>Which is correct?</b> Which of these number sentences is correct? $3 + 6 \times 2 = 15$ $6 \times 5 - 7 \times 4 = 92$ $8 \times 20 \div 4 \times 3 = 37$

<b>Multiplication &amp; Division – Problem Solving</b>					
Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
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	solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	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	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 $n$ objects are connected to $m$ objects	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
	<b>RPC - 2MD-2</b> <i>Relate grouping problems where the number of groups is unknown to multiplication equations with a missing factor, and to division equations (quotitive division).</i>	<b>RPC - 3MD-1</b> <i>Apply known multiplication and division facts to solve contextual problems with different structures, including quotitive and partitive division.</i>		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	