

Grayshott Church of England Primary School Calculation Policy

**Multiplication and Division** 

This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added from Hampshire calculation guidance. It is a working document and will be revised and amended as necessary. Many variations have been included to provide teachers with a range of tools to support pupils in their grasp of number and calculation. To ensure consistency for pupils, it is important that that the mathematical language used in maths lessons reflects the vocabulary used throughout this policy.







	Calculation Guidance							
This guidance for ca	his guidance for calculation uses the 'concrete, pictorial, abstract' approach.							
	Concrete <u>Pictorial</u> <u>Abstract</u>							
Using physical o	bjects to solve maths problems	Using drawings to solve maths problems. This involves drawing representations of the physical objects that have been used in the previous stage as other models and diagrams.	Solving maths numbers using only numbers and symbols.					
National Curricului - Solve one-step pi the teacher.	Year 1           National Curriculum Objectives           - 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.							
In year 1, please no Multiplication (Year 1) Objective/skill:	ote that children are not expected to i Concrete	Pictorial	Abstract					
Solve one step problems using concrete and pictorial representations.	Children will begin by using concrete resources to count in steps of 2. Throughout year 1, they will explore this in steps of 5 and 10 too.	<ul> <li>Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to help them count in steps of 2</li> <li>Image: Children will begin to use pictures and their own representations to use pictures and their own representation to use pictures and their own representations and their own r</li></ul>	n visualThe children will begin to learn to form number sentences involving repeated addition.22 + 2 + 2 + 2 = 8unt on in the1					

## **National Curriculum Objectives**

Year 2

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including
- problems in contexts.

Multiplication (Year 2) Objective/ skill	Concrete	Pictorial	Abstract
Count in steps of two, five from 0 and in tens from any number, forward and backward.	Children learn to count in 2s, 5s, 10s building on their learning in year 1.	Children will begin to use pictorial representations and a number line to support them in counting both forwards and backwards in multiples of 2, 5 and 10.	Children will be able to say what the next number in a sequence is: What are the next two numbers in these sequences? a) 2, 4, 6, 8, ? b) 1, 11, 21, 31, ? c) 30, 25, 20, ?
Understand that multiplication is repeated addition. Write repeated addition as a	Children use concrete materials to add the same number together in the form of repeated addition. Children will be introduced to the multiplication symbol.	Children will be introduced to arrays to help them visualise a multiplicaton number sentence. 4 groups of 5 is 20. Children will then begin to represent this on a numberline.	Children will then be able to record a repeated addition number sentence or pictorial representation as a multiplication number sentence. One bag holds 5 apples. How many apples do 4 bags hold?
multiplication number sentence.	5 + 5 + 5 + 5 = 20 4 groups of 5 is 20. 4 x 5 = 20	$5 + 5 + 5 + 5 = 5 \times 4$ $5 \times 4 = 2 0$ $s \times 4 = 2 0$ $s \times 5 + 5 + 5 = 5 \times 4$	5 x 4 = 20.

		Year 3				
<ul> <li>National Curriculum Objectives</li> <li>Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.</li> <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> <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>						
Multiplication	Concrete	Pictorial	Abstract			
(Year 3) Objective/skill						
Recall multiplication	Children will build on their conceptual	Children will use structured number lines or arrays to help	Children will be able to recall their			
facts from the 3, 4 and	understanding of multiplication by applying	them calculate.	times tables in order to help them			
8x table.	their learning from year 2. Children will use	4 y 6 = 4 + 4 + 4 + 4 + 4	solve problems such as:			
	either Base 10 or place value counters (below) to represent the multiplication number sentence. <b>6 x 4</b>	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	There are 4 marbles in a jar. How many marbles in 6 jars?			
	0000 0000 0000		4 x 6 = 24			
		6 x 4 = 24				

Multiply a two-digit numbers by single digit.	Children will begin by using Base 10 and/or place value counters to partition the two- digit number and multiply them using existing times table knowledge. This supports children in using the <b>mental</b> <b>method</b> of <b>partitioning</b> .	Children will use their concrete representations to make pictorial representations of the calculation (children are taught to use crosses to represent the ones).	Children will progress to using a formal written method. Firstly, they will be taught the expanded formal written method. T O 1 5 4 X
	15 x 4. $ \begin{array}{c c c c c c c c c c c c c c c c c c c $	TensOnes $ $ $\times$ $\times$ $ $ $ $ $\times$ $ $ $\times$ $\times$ $	$\frac{4}{2} \frac{x}{0} (4 \times 5)$ $\frac{4}{0} (4 \times 10)$ $\frac{4}{6} 0$ By the end of year 3, they will have learnt to use the short formal written method. $\frac{T O}{1 5}$ $\frac{4 X}{6 0}$ $\frac{1}{2}$

National Curricu	Year 4													
- Recall multiplic - Multiply two-d	<ul> <li>Recall multiplication and division facts for multiplication tables up to 12 × 12</li> <li>Multiply two-digit and three-digit numbers by a one-digit number using the formal written method.</li> </ul>													
Multiplication (Year 4) Objectives	Concrete	Pictor	ial							Abst	ract			
Multiply three digit by one digit numbers using formal written	Children will use place value counters to set out a calculation.         245 x 4         Hundreds       Tens	Childr the gr 231 x	en will p id meth 3	orogress od.	to repr	esent	ing th	nis calculat	ion using	Child <u>expa</u> comp	ren v nded olete	vill th I forr a cal	nen l <b>nal v</b> lcula	learn to use the written method to ition:
layout.		3	200 600	30 90	1					They	6 0 6 9 will p	3 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(3 × (3 × (3 × : ress	1) 30) 200) to using the <u>short</u>
	Children will be taught to exchange ten ones for one ten and ten tens for one hundred.		600	+ 90	+3	= 6	9	3			H 2	T 4	0 5 4	etnod
											9	8	0	

National Curriculum	Year 5										
- Multiply numbers up	- 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 i	- Multiply and divide numbers mentally, drawing upon known facts.										
Multiplication(Year 5) Objectives	Concrete	Pictorial				Absti	act				
Multiply a one-digit number by using the formal written method.	If necessary, children will have an opportunity to use place value counters in order to support their understanding of the formal written method. 1826 x 3 = 5478	Children wi a pictorial a	ill use the co approach if i	oncrete resou required.	urces to form	Children will then progress to the <b>formal</b> written method for <u>short multiplication</u> .					
	Towards Try Ore						Th	н	т	0	
							1	8	2	6	
						×				3	
							5	4	7	8	
							2		1		
Multiply a two-digit number by a two digit number.	Children will use a concrete version of the grid method to help them complete two digit x two digit calculations.	Children wi calculation replacing tl	esenting the again but by	Children will then progress to the <b>formal</b> written method for <u>long multiplication</u> .							
	22 x 31 = 682	X	20	2				н	2	2	
				_			:	×	3	1	
		30	600	60			-	6	2	2	
	10         100         100         100           100         100         100         100         100	1	20	2			-	6	8	2	
		600 + 60 +	20 + 2 = 682	<u></u>	I		_				
Multiply a three- digit number by a two-digit number.	Children will use a concrete version of the grid method to help them complete two digit x two digit calculations.	Children wi calculation replacing tl	ill progress t using the <b>g</b> he counters	to then repre r <b>id method</b> a with digits.	esenting the again but by	Child writt	ren wi en me	ll thei <b>thod</b>	n proş <b>for <u>lo</u></b>	gress - ng m	to the <b>formal</b> ultiplication.

						1			Th	н	т	0	
		×	200	30	4					2	3	4	
		30	6,000	900	120				×		.3	2	
		2	400	60	8					4	6	8	
		6000 + 90	0 + 400 + 1	L20 + 60 +	8 = 7488	-			17	10	2	0	
									7	4	8	8	
		Yea	r 6										
- Multiply multi-digit	<b>Objectives</b> numbers up to 4 digits by a two-digit whole number u	sing the fo	rmal writte	en methor	d of long m	nultiplicatio	on.						
Multiplication (Year 6)	Concrete	Pict	orial				Abstr	act					
Multiply a four digit number by two digit number.	Children will progress straight to using the formal written method.						Childr know to sol numb	ren wi ledge ve cal pers m Th 2	ill lea of th lculat nultip H 7	T 2	app mal invo by tw O 9 8	ly the writte lving vo-dig	ir en method four-digit jit numbers.

		Division	
National Cu - Solv the	rriculum Objectives e one-step problems involving multiplicatior teacher.	representations and arrays with the support of	
Division (Year 1) Objectives	Concrete	Pictorial	Abstract
Solve one step problems by sharing.	Children will use a range of concrete resources to understand the term 'sharing' I have 12 sweets and share them between myself and a friend (2 people), how many will we each have?	Children will progress to using their own pictorial representations to share and group objects when attempting to solve a problem. If I share 12 equally between 2 groups, there will be 6 in each group.	Children are expected to solve division problems using <b>concrete</b> and <b>pictorial</b> approaches. They are <u>not</u> expected to record division number sentences formally using the division symbol.
Solve one step problems by grouping.	Children will also use a range of concrete resources to help them understand 'grouping.' I have 12 cookies to put in bags. If I put 2 in each bag how many bags will I need?	There are 12 altogether. There are 6 equal groups of 2.	

## National Curriculum Objectives:

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.

- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs

Year 2

- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including

pro	b	lems	in	contexts.

Division (Year 2)	Concrete	Pictorial	Abstract
Objective/skill			
Count in steps of 2, 3,	Children will learn to count using concrete	Children will begin to use a pictorial	Children will be able to be able to say what
and 5 from 0, and in	resources such as a beads string.	representations and a number line to support	the next number is in a sequence:
tens from any		them in counting both forwards and backwards	
number, forward and	- <b>00000-00000</b> -00000-	in multiples of 2, 3, 5 and 10. Children will be	a) 2, 4, 6, 8, ?
backward.		able to draw upon this knowledge to help them	b) 1, 11, 21, 31, ?
		answer division problems.	c) 30, 25, 20, ?
Use the division	Building on their learning in year 1, children	Children will progress to representing the	Children will progress to representing the
symbol to represent	will revisit solving one step problems using	problem pictorially in their maths books before	problem by recording it as a division number
a 1 step problem	concrete resources to understand <u>sharing</u>	recording what they have done in the form of a	sentence.
involving <u>sharing.</u>	and seeing this represented by the division	division number sentence.	
	symbol (children may use counters to		$20 \cdot E = 4$
	represent the apples).	There are 20 apples altogether.	$20 \div 5 = 4$
	There are 20 apples altogether	They are shared equally between 5 bags.	
	They are shared equally between 5 bags.	How many apples are in each bag?	
	How many apples are in each bag?		
	20 ÷ 5 = 4	20 ÷ 5 = 4	

Lise the division	Building on their learning in year 1 children	Children will progress to representing the	Children will progress to representing the
symbol to represent	will revisit solving one step problems using	problem nictorially in their maths books before	problem by recording it as a division number
a 1 step problem	concrete resources to understand grouping	recording what they have done in the form of a	sentence.
involving grouping.	and seeing this represented by the division	division number sentence.	
	symbol (children may use counters to		
	represent the apples).	There are 20 apples altogether.	20 . 5 . 4
		They are put in bags of 5.	$20 \div 5 = 4$
	There are 20 apples altogether.	How many bags are there?	
	They are put in bags of 5.		
	How many bags are there?	$\sim$	
		20 ÷ 4 = 5	
	$20 \div 4 = 5$		
Divide a two-digit	Children will use concrete resources such as	Children will progress to representing the	Children will then be able to use their
number by a single	Base 10 to help them divide a two digit	calculation in the form of a part-whole model.	knowledge of their times table facts to
digit by sharing.	number by a single digit. Children will learn	Children may begin with using their drawings of	respond to a division problem.
	to partition the number into tens and ones	Base 10 in the part-whole model to help them.	Children may still use the part-whole model
	and share them equally.	48 ÷ 2 = 24	to represent it.
	48 ÷ 2 = 24		48 ÷ 2 = 24
		$\begin{pmatrix} /(1) \\ \times \times \times \times \end{pmatrix}$	$\bigcirc$
			(48)
			$\sim$
			40 8
		$\downarrow$	÷ 2 ÷ 2
		$\downarrow^{\div 2} \qquad \downarrow^{\div 2}$	

		Year 3	
National Curriculum C - Recall and use multipl - Write and calculate m numbers, using mental - Solve problems, includ objects are connected t	<b>Objectives</b> ication and division facts for the 3, 4 and 8 multiplication table athematical statements for multiplication and division using t and progressing to formal written methods. ding missing number problems, involving multiplication and di to m objects.	es. he multiplication tables that they know, inclu vision, including positive integer scaling prot	uding for two-digit numbers times one-digit plems and correspondence problems in which n
Division (Year 3) Objective/skill	Concrete	Pictorial	Abstract
Divide a two-digit number by a single digit number (with an exchange)	Children will use Base 10 and/or place value counters to divide a two-digit number by a single digit. However, children will need to learn to exchange a ten for ten ones in order to divide it equally by the divisor. 52 ÷ 4	Children will use a part-whole model to draw representations of Base 10 or place value counters to help them divide the two-digit number. They will need to use their knowledge of flexible partitioning so that the two parts of the dividend can be divided equally by the divisor. 52 $\div$ 4	Children will be able to partition the dividend into two parts that can be equally divided by the divisor. 52÷ 4 = 13 40÷ 4 = 10 12÷ 4 = 3 10 + 3 = 13

		Year 4			
National Curriculum Objectives: - Recall multiplication and division facts for multiplication tables up to 12 × 12. - Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers. - Recognise and use factor pairs and commutativity in mental calculation.					
- Pupils practise to bec curriculum).	- Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers (non-statutory guidance from the national curriculum)				
Division (Year 4)	Concrete	Pictorial	Abstract		
Objective/skill					
Divide 2 digits by 1 digit (grouping)	In order to prepare for the formal method of calculation for division, children will learn to identify groups of the divisor by using concrete resources such as place value counters and a place value chart. 52 ÷ 4 How many groups of 4 tens can we make? How many groups of 4 ones can we make?	Children will progress to drawing the counters in a place value chart. 52 ÷ 4	By the end of the year, children will have been introduced to the formal method for division: 84 ÷ 4 21 48 ÷ 4 48 ÷ 4 48 tens ÷ 4 = 2 tens 48 ÷ 4 = 2 tens 84 ÷ 4 = 2 tens		
Divide 3 digits by 1 digit (sharing)	Children will use place value counters to partition a 3- digit number and divide each of the parts equally by the divisor. 844 ÷ 4 = 211	Children will progress to using the part- whole mode to divide the different parts of the dividend.	Children will progress to practising the formal method for short division. <b>705 ÷ 5</b>		



- 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

Division (Year 5)	Concrete	Pictorial	Abstract			
Objective/skill						
Divide 3 digit numbers by a	Children will revisit the concrete approach using place value counters. This will build upon their learning from year 4.	Children will progress to drawing the counters in a place value chart.	Children will then progress to the formal method for short division.			
single digit number (grouping)	856 ÷ 4	856 ÷ 4	856 ÷ 4			



- 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.

Division (Year 6)	Concrete	Pictorial	Abstract
Objective/skill			
Divide 3 or 4 digit			Children will build upon their learning from year 5 and
numbers by two			progress straight to the formal wrriten method.
digit numbers			432 ÷ 12
using <u>short</u>			
division.			

	I	1						
			7335 -	12 ÷ 15 0	0 4 4	3 6 4 <sub>3</sub> 7 8 13_	2 9 13_	
Divide three or four digit numbers by two digit numbers using long division.			Children will progress straight to the <b>formal method for</b> <b>long division.</b> In this method, children will learn to subtract in <b>efficient</b> <b>chunks.</b> In the example below, children learn to subtract in multiples of 15, drawing upon their knowledge of multiplication facts from that times table. <b>432 ÷ 15</b>					
			1 5 4 3 1 1 0 432 ÷ 1 2 -	2 8 7 7 3 2 0 0 (1 3 2 1 2 1 2 0 3 4 3 3 6	2 5 × 20) 5 × 8) 6 2 (×30	* 12 × 1 = 12 × 2 = 12 × 3 = 12 × 4 = 12 × 5 =	= 2 8 r 12 = 24 = 36 = 48 = 60	Children can also write multiples to help support them with the calculation. In this
				7	2 2 0	$12 \times 5 =$ $12 \times 6 =$ $12 \times 7 =$ $12 \times 8 =$ $12 \times 7 =$ $12 \times 10 =$	= 72 = 84 = 96 = 108 = 120	example, the 12x table has been written out to assist with the calculation.

## **Mental Strategies for Multiplication**

Year group	Strategy	Example
Year 2	Counting in multiples of 2, 5, 10.	Children use their knowledge of counting in different multiples to enable them to reach an answer to a multiplication question.
		What is 4 x 5? What is 4 lots of 5?
		<i>We can count on in 5s four times. 5, 10, 15, 20,</i>
		5 x 4 = 20
Year 3	Doubling and Halving	In year 3, children will be using their knowledge of doubles to 50, to help them derive multiplication facts.
		I know that 3 x 4 = 12. If I double 12, I will have calculated the answer to 6 x 4 which is 24.
Year 3	Partitioning	Partitioning means to split a number into smaller parts. Children will use their times table knowledge to help them do this.
		What is 14 x 3?
		<b>10 x 3 = 30</b>
		$4 \times 3 = 12$
		12 + 30 = <u>42</u>
Year 4	Rounding and adjusting	Children are taught to round numbers to the nearest 10, 100 or 1000. They will use this skill to
Year 5	_	efficiently calculate the answer to larger multiplication calculations.
Year 6		19 x 5
		<b>Round:</b> $50 \times 5 = 250$
		<b>Adjust:</b> 250 – 5 = 245