

# **Calculation Policy**

(This policy has been drafted having regard for the school's Christian ethos.)

	Date	Signed	
Agreed by Staff:	June 2020	C Harris E Burden K Thornton	
Agreed by Governors:		Mrs N Ford Chair of Governors	
Lead:	Emily Burden, Carla Harris & Katie Thornton		
Review date:	June 2021		

**Our School Mission Statement** 

We see it as our mission to grow the whole child - intellectually, emotionally, physically, socially and spiritually. To provide them, within a Christian environment, with every learning opportunity possible and to empower them to be the leaders of tomorrow.



## **EYFS Calculation Policy**

Progression	Concrete	Pictorial	Abstract
DM 1: Count sets of objects/ sets of pictures and verbally compare e.g. more/ less	89988	******	
DM 2: Add one	<u>ÓÓÓÓÓÓÓ</u>	88888 <b>8</b>	5 + 1 = 6
DM 3: Combine two groups into one group and count all of them to find the total.		+	3 + 5 = 8
DM 4: Count on from the first number.	8		5 + 3 = 8
Subtraction	Concrete	Pictorial	Abstract
DM 1: Take one away from a group.	****-*	••••	5 - 1 = 6
DM 2: Take away a larger number and count group left.		12 - 5 = 7	12 - 5 = 7
DM 3: Count back on a number line with numbers already on it.			12 - 3 = 9

Multiplication	Concrete	Pictorial	Abstract
DM 1: Count practically in repeated groups/ patterns	10 10 10 A	4 x 2 = 8	2+2+2+2=8
DM 2: Double	80 80	2+2+4	2+2=4
DM 3: Count in 2's on a number line.		0 2 4 6 8	"2,4,6,8,10"
Division			
DM 1: Use objects then pictures or marks to share equally.	روانی روانی روانی	Sharing equally 8 sweets shared between 2 people, how many do they each get?	Share 8 sweets between 2 people. How many do they each get?



### Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to', 'is the same as' and regrouping.

Progression	Concrete	Pictorial	Abstract
1.1 Combining two parts to make a whole. https://www.youtube.com/watch?v= <u>SDgHrfUPVfg</u>		4 + 3 = 7 Four is a part, 3 is a part and the whole is	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven.
1.2 Starting at the bigger number and counting on https://www.youtube.com/watch?v=s BBQNVdXgMM	Counting on using number lines, cubes or Numicon.	A bar model which encourages the children to count on, rather than count all.	The abstract number line: 4 + 2 = 6
<ul> <li>1.3 Regrouping to make 10 using ten frames or Numicon.</li> <li>https://www.youtube.com/watch?v=m <u>WPgqkO6BTk</u></li> </ul>	6 + 5	Children to draw the ten frame and	Children to develop an understanding of equality e.g. $6 + \Box = 11$ $6 + 5 = 5 + \Box$ $6 + 5 = \Box + 4$

Year 2	2.1 Adding three single digits. https://www.youtube.com/watch?v=f_Gv 07gomhE	Using Numicon or ten frames.	Using pictures of ten frames or number line. 7 + 3 + 4	Use number bonds to make ten. 6 + 7 + 4 = 6 + 4 + 7 = 17
	2.2 Use dienes to add two numbers. (2 digit + 1 digit and 2 digit + 2 digit) <u>https://www.youtube.com/watch?v=e0</u> <u>WrQKR_V_8</u>	Continue to develop understanding of partitioning and place value. 41 + 8	Children to represent the dienes e.g. lines for tens and dot/crosses for ones. 10s 1s $1111$ $49$	41 + 8 Add the ones: 1 + 8 = 9 Add the tens: 40 + 9 = 49
	2.3 Use dienes to add two numbers with regrouping. (2 digit + 1 digit and digit + 2 digit) <u>https://www.youtube.com/watch?v=edfj</u> <u>5ac1xzQ</u>	36 + 25 (regrouping in the ones) 10s 1s 6 1	36 + 25	Expanded method: 36 + 25 Add the ones: 6 + 5 = 11 Add the tens: 30 + 20 = 50 50 + 11 = 61
Year 3	3.1 Column method- regrouping (up to 3 digits). Using dienes. <u>https://www.youtube.com/watch?v=7q0</u> <u>Qm17tPSw</u>	153 + 371 = 524 Hundreds Tens Ones	153 + 371 = 524	Introduce formal method: 153 + 371 524 1

	3.2 Column method- regrouping (up to 3 digits). Using place value counters. <u>https://www.youtube.com/watch?v=Uklr</u> <u>v-3Kigo</u>	243 + 368 = 611 $100s 10s 1s$ $6 1 1$		243 <u>+368</u> <u>611</u> <sup>1</sup> 1
Year 4	4.1 Column method regrouping (up to 4 digits). Using place value counters. https://www.youtube.com/watch?v=_I _nhABeknc		2162 + 1253	2162 + 1253 3515
Year 5	5.1 Column method- regrouping with more than 4 digits	See Year 4 if required.	See Year 4 if required.	1720cm 750cm <u>+ 1500cm</u> <u>3970cm</u> 1

5.2 Column method – decimals (up to 2 d.p.). Use place value counters. <u>https://www.youtube.com/watch?v=vxK4</u> <u>rC26Gig</u>	1.36 + 2.37	1.36 + 2.37 Ones tenths hundredths O O O O O O O O O O O O O O O O O O O	£1.36 $\underline{f2.37}$ $\underline{f2.37}$ $\underline{f2.37}$ $\underline{f2.37}$ $\underline{f2.37}$
---	-------------	--	--

Year 6	6. 1 Column methodregrouping with more than 4 digits	See Year 4 if required.	See Year 4 if required.	1720cm 750cm <u>+ 1500cm</u> <u>3970cm</u> 1
	6.2 Column method – decimals (up to 2 d.p.). Use place value counters.	See Year 5 if required.	See Year 5 if required.	f1.36 + <u>f2.37</u> <u>f3.73</u> 1

### Conceptual variation; different ways to ask children to solve 21 + 34

Visual representations Part-part-whole diagrams and bar	<u>Word problems</u> In year 3, there are 21 children and	Different forms of equations: 21	Concrete representations
models.	in year 4, there are 34 children. How many children in total?	+34	
21 34	Calculate the sum of twenty-one and thirty-four.	21 + 34 = = 21 + 34	Missing digit problems:
? 21 34		21 + 34 = 55. Prove it	10s     1s       Image: Constraint of the second sec



1.4 Taking away ones from a whole. <u>https://www.youtube.com/w</u> <u>atch?v=iByr97zAVmE</u>	Physically taking away objects from a whole. 4 - 3 = 1	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.	4 3 7 4 4 7 2 3
1.5 Counting back using a number line. tps://www.youtube.com/watch?v= <u>pkUWF3nnZ4</u>	Counting back (using number lines or number tracks) children start with 6 and count back 2. $6 - 2 = 4$ 1 2 3 4 5 6 7 8 9 10	6-2=4 $0 1 2 3 4 5 6 7 8 9 10$ $1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +$	6 – 2 = 4
1.6 Find the difference by counting on. https://www.youtube.com/watch? v=dit0PzgaNAo	Finding the difference (using cubes, Numicon or Cuisenaire rods). Find the difference between 8 and 5.	Children to draw the concrete resources they have used or used a bar model to illustrate what they need to calculate.	Find the difference between 8 and 5. 5 + 3 = 8

EYFS / Year 1

1.7 Make 10 using the ten	Making 10 using a ten frame. 14 - 5	Children to present the ten frame pictorially	Children to show how they can make ten by
frame		and discuss what they did to make ten.	partitioning the smaller number.
https://www.youtube.com/wateh			

	<u>v=gEgyUQXbbKA</u>			$ \begin{array}{c} 14 - 5 = 9 \\ 4 & 1 \\ 14 - 4 = 10 \\ 10 - 1 = 9 \end{array} $
Year 2	2.4 Counting back using a number line. https://www.youtube.com/watch? <u>v=rGZGcw5Vc7Q</u>	15 - 7	15 - 7 = 8 -5 -6 -10 -5	15 – 7 = 8
	2.5 Use dienes to subtract numbers up to 2 digits (without regrouping). https://www.youtube.com/watch? v=E4otyifoQeg	Column method using dienes. 48 - 7 10s 1s 4 1	Children to represent dienes pictorially. $ \begin{array}{c c} 10s & 1s \\ \hline 101 & 18 \\ \hline 101 & 18 \\ \hline 4 & 1 \end{array} $	48 – 7 = 41
	2.6 Use dienes to subtract numbers up to 2 digits (with regrouping). https://www.youtube.com/watch? <u>v=Dyi7hviblmU</u>	Column method using dienes. 41 – 26 105 15 105 15 105 15 105 15 5 105 15	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	41 – 26 = 15

3.3 Column method with regrouping– with place	Column method using place value counters. 234-88	234-88	Formal column method.
value counters and dienes			

Year 3	up to 3 digits. https://www.youtube.com/watch? v=2Rv1TaN-J0w https://www.youtube.com/watch? v=nqVjoR1yXdY	100s 10s 1s 100s 10 s 1s 100s 10s 1s 100s 10 s 1s 10 s 1s 1s 10 s 1s 1s 10 s 1s 1	100 10 11 12 00 000 0000 000000 1 00000 00000 00000 00000 00000 00000 0000	2 <sup>2</sup> 3 <sup>1</sup> 4 <u>- 88</u> <u>6</u>
	3.4 Finding the difference	Begin to find the difference by The difference between II and 14 is 3. counting on or back.	74 - 47 = 27	74 - 47 = 27
Year 4	4.2 Column method with regrouping (including regrouping thousands, hundreds, tens and ones).Up to 4 digits using place value counters. https://www.youtube.com/watch?	5342 - 1735	5342 - 1735	$5342 - 1735$ $4 3$ $5^{13} 4^{12}$ $- 1735$ $3.607$

Year 5	5.3 Abstract column method with regrouping (including numbers with more than 4 digits).	See Year 4 if required.	See Year 4 if required.	5342 - 1735 $4 3$ $5 3 4 12$ $- 1735$ $3 6 07$
	5.4 Column method for decimals up to 2 decimal places with place value counters. https://www.youtube.com/watch?	3.24 - 1.16	3.24 - 1.16	3 1 2 4 4 4 4 4 1 2
Year 6	6.3 Abstract column method with regrouping (including numbers with more than 4 digits).	See Year 4 if required.	See Year 4 if required.	$\begin{array}{c} 4 \\ 5 \\ 3 \\ 4 \\ 2 \\ - 1 \\ 7 \\ 3 \\ 6 \\ 0 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7$

6.4 Column method for decimals up to 2 decimal places with	See Year 5 if required.	See Year 5 if required.	See Year 5 if required.
place value counters			

## Conceptual variation; different ways to ask children to solve 391 - 186

Visual representations:	Word problems:	Different forms of equations:	Concrete representations:
Part-part-whole diagrams and bar models.	Raj spent £391, Timmy spent £186. How much more did Raj spend? Calculate the difference between 391 and 186.	391 <u>-186</u> What is 186 less than 391? Missing digit calculations 3 9	The difference between II and I4 is 3.
391 186 ?		= 391 - 186	

#### Multiplication

Key language: double, times, multiplied by, the product of, groups of, lots of, equal

groups, factors, regroup.

	Progression	Concrete	Pictorial	Abstract
Year 1/ EYFS	1.8 Counting in multiples (skip count in 2's, 5's and 10's)		0 2 4 6 8 0 5 10 15 20 25	"5, 10, 15, 20, 25…"
	1.9 Doubling https://www.youtube.com/watch?  v=gwDkWu8mgfo		Children to represent the practical resources in a picture and use a bar model.	3 + 3 = 6



	1.10 Repeated addition.	Repeated addition 3 × 4		3 × 4 = 12
	h <del>ttps://www.youtube.com/watch?</del> v=EoElxmyRf9M	4+4+4 There are 3 equal groups, with 4 in each group.		4 + 4 + 4 = 12
	1.11 Arrays <u>https://www.youtube.com/watch?</u> v=f3p4_5ast-4	Putting objectsinto arrays. $2 \log of 5$ $5 \log of 2 2$ $\times 5 = 5 \times 2$	Children describe arrays in different ways. 2 groups of 5 5 groups of 2	Children to be able to use an array to write a range of calculations e.g. 5 × 2 =10 2 x 5 = 10
Year 2	2.7 Number line to show repeated addition https://www.youtube.com/watch? <u>v=RsBlrg1uigc</u>	Number lines to show repeated groups. E.g. 3 × 4	Represent this pictorially alongside a number line	4 + 4 + 4 = 12 3 × 4 = 12

	2.8 Arrays - showing commutative multiplication https://www.youtube.com/wat <u>ch?v=t2q9ePsDwDg</u>	Use arrays to illustrate commutativity counters and pegs can be used. $2 \times 5$ = $5 \times 2$ $2 \log_{105 \text{ of } 5}$ $5 \log_{105 \text{ of } 2}$	Children to represent the arrays pictorially. 2 x 5 5 x 2	Children to be able to use an array to write a range of calculations e.g. $10 = 2 \times 5$ $5 \times 2 = 10$ 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5	
Year 3	<b>3.5 Multiplication by</b> partitioning 2d × 1d using dienes https://www.youtube.com/watch? v=uY7w48WVK6k Partition to multiply using dienes of Numicon.		$4 \times 15$ $6 \times 15$ $6 \times 10^{-10}$	Children to be encouraged to show the steps they have taken. $4 \times 15$ 10  5 $4 \times 5 = 20$ $4 \times 10 = 40$ <u>60</u>	
	3.6 Short multiplication ( 2 digit X 1 digit) <u>https://www.youtube.com/watch?</u> v=vhHxViOfQ	Short multiplication method. Use counters or dienes. 3 X 23 10s 1s 000 000 000 000 000 000 000 000 000 000 000 000	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Children to be encouraged to show the steps they have taken. $3 \times 3 = 9$ $3 \times 20 = \frac{60}{69}$ $\frac{\times 3}{69}$	

	3.7 Short multiplication with regrouping (2 digit X 1 digit) https://www.youtube.com/watch? v=DPhXev2lb21	Formal column method with place value 100s 10s 1s 100s 10s 1s 100s 10s 1s 000 000 000 000 000000	6 X 23 100 s 10 s 1 s 00 00 000 00 0000	Formal written method $6 \times 23 =$ 23 $\frac{\times 6}{138}$ $\frac{11}{11}$
Year 4	<ul> <li>4.3 Short multiplicationplace value counters.</li> <li>(2 and 3 digit X 1 digit) https://www.youtube.com/watch?</li> <li>v=G3gRW-2ZB k</li> </ul>	225 X 3 = 675	225 X 3 = 675 $100 s = 10 s = 15 = 000000$	$225 \times 3 = 675$ $225 \times 3 = 675$ $225 \times 3 = 675$ $\times 675$ 1
	4.4 Grid method to expanded method. (for 2- digit X 2-digit) https://www.youtube.com/watch? <u>v=anfh2w0wrz8</u>	Use abstract methods.	Use abstract methods.	First introduce children to the grid method. $56 \times 27 = 1512$ First introduce children to the grid method. $\frac{1}{50}$ $\frac{20}{1000}$ $\frac{7}{150}$ $\frac{5}{50}$ $\frac{1000}{120}$ $\frac{1512}{1512}$ 11
				the expanded method.

Year 5	5.5 Short multiplication Abstract only but might need a repeat of year 4 first (up to 4 digit X 1 digit) https://www.youtube.com/watch? v=3YScfFlbWsQ	See Year 4 if required	See Year 4 if required	$   \begin{array}{r}     2741 \\     X & 6 \\     \underline{16446} \\     42   \end{array} $
	Abstract only but might need a repeat of year 4 first (up to 4 digit X 2 digits)	See year 4 îi required.	see year 4 îi required.	$ \begin{array}{r}     132 \\     \times 56 \\     \overline{792} \\     \underline{6600} \\     \overline{7392} \end{array} $ (132 × 6) (132 × 50)
Year 6	6.5 Long multiplication Abstract method (up to 4 digits by a 2 digit number) https://www.youtube.com/watch? <u>v=9gHHTOL5514</u>	See year 4 if required.	See year 4 if required.	$\begin{array}{c} 132 \\ \times 56 \\ \hline 792 \\ 6600 \\ \hline 7392 \end{array} (132 \times 6) \\ \hline 7392 \end{array}$

## Conceptual variation; different ways to ask children to solve 6 × 23

Visu	al re	prese	entati	ons:			Word proble	ems:		Different				
	23	23	23	23	23	23	] Mai had to swim 23 lengths, 6 ti	forms of a	equation:		Concrete r	epresent	ations:	
L				?			week. How many lengths did she swim week?	in one Find the	product of 6 6 × 23	and 23	What is tl What is tl	he calcula he produ	ation? ct?	
	T	his im	hage s ★ ★ ★ me image	hows ★ ★ ★ ge to s	4x6 ★ 7 ★ 7 how 4		Using place value counters, prov prove that 6 x 23 = 138	/e × <u>23</u>	23 <u>× 6</u>		100s	10s	1s 000 000 000 000	

*	Key language	e: share, group, group d	<b>Division</b> s of, lots of, regroup divide livisor, dividend.	e, divided by	, remainder	
	Progression	Concrete	Pictorial	Abstract		
	1.12 Division by sharing objects into groups. https://www.youtube.com/watch?	Sharing using a range of objects. 6 ÷ 2	Represent the sharing pictorially.	6÷2=3 3 3		

EYFS / Year 1	v=a7RB-gesqAU			
	1.13 Division by making groups. https://www.youtube.com/watch? <u>v= I3f0526wC8</u>	Vertical and put them in groups of 3, how many groups?	Pictures of objects Each pot needs three pencils in. How many pots do we need?	12 ÷ 3 = 4

2.9 l £ https	Division by making groups. s://www.youtube.com/watch?	18 in groups of 6.		There are 3 groups of 6 in 18. 18 ÷ 6 = 3
---------------------	---	--------------------	--	--

Year 2	<u>v=9aicYLZiL2A</u>		18:6:3	
	2.10 Division within arrayslinking to multiplication. (Sharing and grouping) https://www.youtube.com/watch? v=95Y4UCivcww	15 shared between 3. 15 in groups of 5.	$\begin{array}{c} \hline \hline \\ $	15 ÷ 5 = 3 15 ÷ 3 = 5
	2.11 Division as counting up https://www.youtube.com/watch? <u>v=2c3FwEcCpyc</u>	How many groups of 2 in 6? Use a number line or Cuisenaire rods on a ruler. 6 ÷ 2	Children to represent division by counting up	6÷2 = 3

	3.8 To divide a two digit number by a one digit	Cuisenaire rods, above a ruler can also be used. 13 ÷ 4	Children to represent the lollipop pictorially.	ticks	13 ÷ 4 = 3 remainder 1
--	--	--	--	-------	------------------------

number with and without remainders. https://www.youtube.com/watch? v=d0mB9lprpwQ	Use of lollipop sticks to form wholessquares are made because we are dividing by 4. There are 3 whole squares, with 1 remainder. Use of numicon. How many groups of 3 in 20? 20 ÷	There are 3 whole squares, with 1 l	Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. <b>'3 groups of 4, with 1 left over'</b> $13 \div 4 = 3 r 1$ 4 4 4 4 1 4 1 4 1 12 $13$
3.9 Short Division To divide a two digit number by a one digit number with regrouping of tens and ones (no remainders) https://www.youtube.com/watch? <u>v=xE0gkVhATJg</u>	Short division using place value counters and dienes to group. $42 \div 3 = 14$	Children to represent the place value counters/dienes pictorially. $42 \div 3 = 14$	$\frac{14}{3}$ $42 \div 3 = 14$

ion using the
ion using the

	<u>v=HwX6PG0SSJQ</u> 1	100s       10s       1s         0       0       0       0         1       2       3         How many groups of 5 hundreds can you make with 6 hundred counters?	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	123 5 <sup>6</sup> 1 <sup>1</sup> 5
Year 5	5.7 Short division Dividing a 4 digit number by a 1 digit number including remainders	See Year 4 if required.	See Year 4 if required.	0 6 5 8. 4 ) 2 <sup>2</sup> 6 <sup>2</sup> 3 <sup>3</sup> 4 Remainder 2
	5.8 Short division Division problems with decimal numbers (up to 2 d.p) <u>https://www.youtube.com/wat</u> <u>ch?v=Jzolg7igNog</u>	0.8 ÷ 5	0.8÷5	$\frac{0.16}{50.8^{3}0}$

Year 6	6.6 Short division	See Year 4 if required.	See Year 4 if	f required.	4)	0 6 5 8. 2 <sup>2</sup> 6 <sup>2</sup> 3 <sup>3</sup> 4
	6.7 Long division/ chunking method (up to 4 digit by a 2 digit number) <u>https://www.youtube.com/</u> watch?v=y6TmgkHloOQ				203 14 2842 2800 - (2 0042 - ( 0000 - (	$ \begin{array}{r}                                     $
	Conceptual	variation; differe	nt way	ys to ask childrer	n to sol	ve
<u>Visual re</u> Using the below, h 5 sh	presentations: e part whole model ow can you divide 615 b without using ort division?	Word problems:I have £615 and share ibetween 5 bank accoundmuch will be in each accound615 pupils need to beinto 5 groups. How manybe in each group?	t equally nts. How unt? put will	Different forms of equation:		Character representations: What is the calculation? What is the answer? 100s 10s 1s 00000 00000 00000 00000
500 100 15		)		615 ÷ 5 = = 615 ÷ 5		

Calculation policy to be reviewed in line with policy schedule:			
Written by: C Harris, E Burden, K Thornton	June 2020		
Reviewed:			