

'So in everything, do to others what you would have them do to you.'
Matthew 7:12



Calculation Policy

This policy contains the key written methods of calculation that are to be taught throughout the school. It has been written to ensure consistency and progression throughout the school.

The overall aim is that when children leave primary school they:

- have a secure knowledge of number facts and a good understanding of the four operations;
- make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads;
- have an efficient, reliable, formal, written method of calculation for each operation that they can apply with confidence when undertaking calculations that they cannot carry out mentally.

They can select the method by asking themselves:

'Can I do this in my head?'

'Can I do this in my head using drawings or jottings?'

'Do I need to use a written method?'

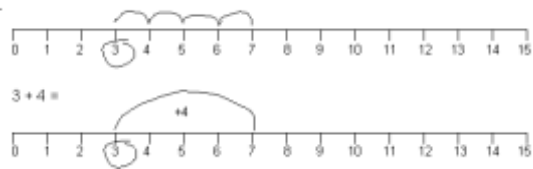



Although the main focus of this policy is on formal written methods it is important to recognise that the ability to calculate mentally lies at the heart of numeracy as in every written method there is an element of mental processing.

Although each method will be taught in the year group specified, children should not be discouraged from using previously taught methods with which they are secure, while the new concepts are becoming embedded.

Examples of the formal written methods for each of the four operations have been outlined alongside the objective from the National Curriculum.

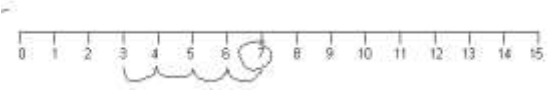
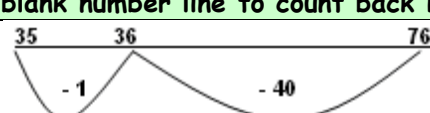
Addition - Written Calculations

Year 1 Number line	Objective
	Add one-digit and two-digit numbers to 20, including zero
Year 2 Using a blank number line	
Number line $25 + 36 = 61$  Partitioning $47 + 52 = 99$ $40 + 50 = 90$ $7 + 2 = 9$ $90 + 9 = 99$	Add numbers using concrete objects, pictorial representations, and mentally, including: <ul style="list-style-type: none"> • a two-digit number and ones TU + U • a two-digit number and tens TU + T • two two-digit numbers TU + TU • adding three one-digit numbers U + U + U Higher ability children to move to HTU + TU
Year 3 Column addition with carrying (see below *)	
$442 + 335 = 777$ $872 + 541 = 1413$ HTU ThHTU $\begin{array}{r} 442 \\ + 335 \\ \hline 777 \end{array}$ $\begin{array}{r} 872 \\ + 541 \\ \hline 1413 \\ 11 \end{array}$	<ul style="list-style-type: none"> • Add numbers with up to 3 digits, using the formal written methods of columnar addition • Estimate the answer to a calculation and use inverse operations to check answers
Year 4 Column addition with carrying (see below *)	
$442 + 335 = 777$ $872 + 541 = 1413$ HTU ThHTU $\begin{array}{r} 442 \\ + 335 \\ \hline 777 \end{array}$ $\begin{array}{r} 7872 \\ + 541 \\ \hline 8413 \\ 11 \end{array}$	<ul style="list-style-type: none"> • Add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate • Estimate and use inverse operations to check answers to a calculation
Year 5 Column addition (including decimals with up to 2 decimal places)	
$7176 + 6147 = 13323$ $4.28 + 7.99 = 12.27$ $\begin{array}{r} 7176 \\ + 6147 \\ \hline 13323 \end{array}$ $\begin{array}{r} 4.28 \\ + 7.99 \\ \hline 12.27 \\ 11\ 1 \end{array}$	<ul style="list-style-type: none"> • Add whole numbers with more than 4 digits, including using formal written methods (columnar addition) • Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • Use addition methods in a range of real life and problem based contexts.
Year 6 Column addition (including decimals with up to 3 decimal places)	
$7176 + 6147 = 13323$ $4.28 + 7.99 = 12.27$ $\begin{array}{r} 7176 \\ + 6147 \\ \hline 13323 \end{array}$ $\begin{array}{r} 4.28 \\ + 7.99 \\ \hline 12.27 \\ 11\ 1 \end{array}$	As above <ul style="list-style-type: none"> • Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy • Use addition methods in a range of real life and problem based contexts.

* Use expanded methods if necessary to support move to formal methods

$47 = 40 + 7$	or	47
$+ 76$		$+ 76$
$\underline{70 + 6}$		$\underline{13}$
$110 + 13 = 123$		$\underline{110}$
		$\underline{123}$

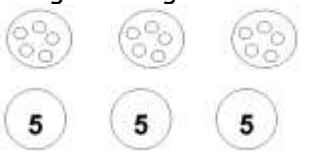
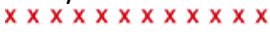


Subtraction - Written Calculations

Year 1 Number line		Objective
$7 - 4 = 3$ Using a number Line: (with divisions): 		Subtract one-digit and two-digit numbers to 20, including zero TU - U
Later use of blank number lines and later 100 squares		
Year 2 Using a blank number line to count back in multiples of 10 and 1		
$76 - 41 =$  Partitioning $76 - 41 = 35$ $76 - 40 = 36$ $36 - 1 = 35$		Subtract numbers using concrete objects, pictorial representations, and mentally, including: <ul style="list-style-type: none"> a two-digit number and ones TU - U a two-digit number and tens TU - T two two-digit numbers TU - TU Higher ability to move to HTU - TU
Year 3 Column subtraction (see below *)		
$242 - 131 = 111$ $74 - 27 = 47$ $6 \quad 1$ $\begin{array}{r} 242 \\ - 131 \\ \hline 111 \end{array}$ $\begin{array}{r} 74 \\ - 27 \\ \hline 47 \end{array}$		<ul style="list-style-type: none"> Subtract numbers with up to 3 digits, using the formal written methods of columnar subtraction Estimate the answer to a calculation and use inverse operations to check answers
Year 4 Column subtraction (see below *)		
$263 - 271 = 292$ $5 \quad 1$ $\begin{array}{r} 263 \\ - 271 \\ \hline 292 \end{array}$ $3675 - 1234 = 2441$ $\begin{array}{r} 3675 \\ - 1234 \\ \hline 2441 \end{array}$		<ul style="list-style-type: none"> Subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate Estimate and use inverse operations to check answers to a calculation
Year 5 Column subtraction (including decimals with up to 2 decimal places)		
$563 - 271 = 292$ $4 \quad 16 \quad 13$ $\begin{array}{r} 563 \\ - 271 \\ \hline 292 \end{array}$ $4.31 - 4.1 = 0.221$ $\begin{array}{r} 4.321 \\ - 4.100 \\ \hline 0.221 \end{array}$		<ul style="list-style-type: none"> Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction) Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy. Use subtraction methods in a range of real life and problem based contexts.
Year 6 Column subtraction (including decimals with up to 3 decimal places)		
$563 - 278 = 285$ $4 \quad 15 \quad 13$ $\begin{array}{r} 563 \\ - 278 \\ \hline 285 \end{array}$ $402.1 - 243.86 = 158.24$ $\begin{array}{r} 402.10 \\ - 243.86 \\ \hline 158.24 \end{array}$		As above <ul style="list-style-type: none"> Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. Use addition methods in a range of real life and problem based contexts.

*** Use expanded methods if necessary to support move to formal methods**

$77 - 45 = 32$ $70 + 7$ $- 40 + 5$ $\hline 30 + 2$	and	$75 - 27 = 47$ $60 \quad 14$ $- 70 + 4$ $- 20 + 7$ $\hline 40 + 7$
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Multiplication - Written Calculations

Year 1 Grouping		Objective						
<p>Making sets: e.g. 3 sets / lots of 5</p>  <p>leading to</p>		<ul style="list-style-type: none"> Solve simple one-step problems involving multiplication, calculating the answer using concrete objects, pictorial representations and arrays With the support of the teacher count in multiples of twos, fives and tens 						
Year 2 Grouping/Arrays/Repeated Addition								
<p>Arrays 1×12 2×6 3×4</p> <p>    </p> <p>1 row of 12 2 rows of 6 3 rows of 4</p> <p>Repeated Addition</p> <p>$4 \times 6 = 24$ $4 + 4 + 4 + 4 + 4 + 4 = 24$</p>		<ul style="list-style-type: none"> Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (\times) and equals ($=$) signs $TU \times U$ or $U \times TU$ - Know that it can be done in any order. Recall 2, 5 and 10 times tables 						
Year 3 Grid method leading to short multiplication (see below *)								
<p>$35 \times 7 = 245$</p> <table border="1" data-bbox="162 772 422 869"> <tr> <td>\times</td><td>30</td><td>5</td></tr> <tr> <td>7</td><td>210</td><td>35</td></tr> </table> <p>$210 + 35 = 245$</p> <p>$35 \times 7 = 245$</p> $\begin{array}{r} 35 \\ \times 7 \\ \hline 245 \\ 3 \end{array}$		\times	30	5	7	210	35	Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, progressing to efficient written methods
\times	30	5						
7	210	35						
Year 4 Short multiplication (see below *)								
<p>$89 \times 7 = 623$</p> $\begin{array}{r} 89 \\ \times 7 \\ \hline 623 \\ 6 \end{array}$ <p>$237 \times 7 = 948$</p> $\begin{array}{r} 237 \\ \times 7 \\ \hline 948 \\ 12 \end{array}$		Multiply two-digit and three-digit numbers by a one-digit number using a formal written layout						
Year 5 Short and long multiplication (including decimals in context)								
<p>$6481 \times 9 = 58329$</p> $\begin{array}{r} 6481 \\ \times 9 \\ \hline 58329 \\ 47 \end{array}$ <p>$56 \times 27 = 1512$</p> $\begin{array}{r} 56 \\ \times 27 \\ \hline 392 \\ 1120 \\ \hline 1512 \\ 1 \end{array}$		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						
Year 6 Long multiplication (including decimals in context)								
<p>$134 \times 32 = 4288$</p> $\begin{array}{r} 134 \\ \times 32 \\ \hline 268 \\ 4020 \\ \hline 4288 \end{array}$ <p>$124 \times 26 = 3224$</p> $\begin{array}{r} 124 \\ \times 26 \\ \hline 744 \\ 2480 \\ \hline 3224 \\ 11 \end{array}$		Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication						


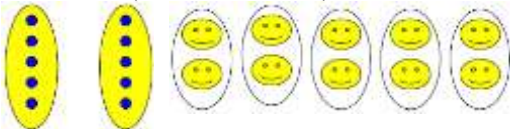
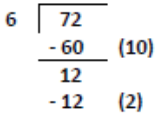
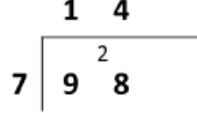
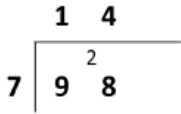
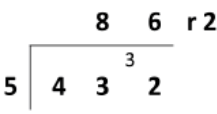
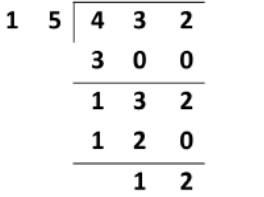
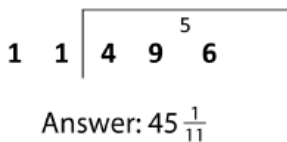
* Use expanded methods if necessary to support move to formal method

$$\begin{array}{r} 38 \\ \times 7 \\ \hline 56 \\ 210 \\ \hline 266 \end{array}$$

$8 \times 7 = 56$

$30 \times 7 = 210$

Division - Written Calculations

Year 1 Sharing ... leading to ... Grouping		Objective
 Share the apples between two people. Share 20 crayons between 2 pots.'' How many crayons are in each pot?' Children should move from sharing to grouping in a practical a practical way... 'Put 20 crayons into groups of 10. How many pots do we need?'		Solve simple one-step problems involving division, calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher Use arrays to solve early division  How many groups of two?' 'Five groups of two' How many groups of 5?' 'Two groups of five'
Year 2 Grouping		
Use arrays to support division $15 \div 5 = 3$ and $15 \div 3 = 5$. Use an empty number line to count forwards or back in equal steps		Calculate mathematical statements for division within the multiplication tables and write them using the division (\div) and equals (=) signs
Year 3 Use of inverse operation		
Use of inverse operation to solve division sums. $26 \div 5 = 5 \text{ r } 1$ $5 \times 5 = 25$ $25 + 1 = 26$		Write and calculate mathematical statements for division using the multiplication tables that they know, progressing to efficient written methods
Year 4 Chunking (including remainders) leading to short division		
$72 \div 6 = 12$ 	Leading to ... 	No specific objective for division written methods so ... As above
Year 5 Short division - dividing by a one digit number (Decimal division in context to be included)		
$98 \div 7 = 14$ 	$432 \div 5 = 86 \text{ r } 2$ 	Divide numbers up to 4 digits by a one-digit number using a formal written method of short division and interpret remainders appropriately for the context
Year 6 Short and Long division - dividing by a two digit number (Decimal division in context to be included)		
$432 \div 15 = 28 \text{ r } 12$ 	$496 \div 11 = 45 \text{ r } 1$  Answer: $45 \frac{1}{11}$	<ul style="list-style-type: none"> 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 Divide numbers up to 4 digits by a two-digit whole number using the formal written method of short division, and interpret remainders according to the context

* See below

* A further method for long division may be used

		2	8	·	8	
1	5	4	3	2	·	0
		3	0		↓	
		1	3	2		
		1	2	0	↓	
		1	2	0		
						0