



Boothferry Primary School Calculation Policy

NC Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
<p>1. Column addition with numbers with more than 4 digits. Hundred thousands, ten thousands, thousands, hundreds, tens, ones, add, plus, addends, total, sum Add whole numbers with more than 4 digits, including using a formal written method (columnar addition).</p>	<p>16,603 + 17,245</p>	<p>Children can draw their own place value chart and circles to represent counters.</p>	<p>Children should be familiar with exchanging and renaming in more than 1 place value column from their calculation learning in Y3&4.</p> $\begin{array}{r} 16603 \\ + 17245 \\ \hline 3848 \end{array}$ <p style="text-align: center; margin-left: 100px;">1</p> <p>Extend this with numbers which have up to 6 or 7 digits, exchanging in 1 column before multiple columns.</p> $\begin{array}{r} 81,059 \\ 3,668 \\ 15,301 \\ + 20,551 \\ \hline 120,579 \end{array}$ <p>Then add several numbers of increasing complexity.</p>
<p>2. Column addition with numbers with decimal places. Decimal point, tenths, hundredths, thousandths Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation.</p>	<p>Once children are confident adding decimal numbers, apply learning to the context of measures inc. money.</p>	<p>Children can draw their own place value chart and circles to represent counters.</p>	<p>Decimal points do not need a place value column and carries should still be placed underneath where the total is being calculated.</p> $\begin{array}{r} 2.66 \\ + 2.58 \\ \hline 5.24 \end{array}$ <p style="text-align: center; margin-left: 100px;">1 1</p> <p>When adding numbers with different numbers of place value columns, align the decimal points then add zeros as place holders.</p> $\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ + 1.300 \\ \hline 93.511 \\ \hline 212 \end{array}$

Y5-6 ADDITION



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<p>3. Estimation and inverse</p> <p>Estimate, round, approximate, inverse, opposite</p> <p>Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.</p>	<p><i>See Y5 subtraction for use of place value counters to check using inverse.</i></p>	<p>Inverse: Use bar models to show the relationship between the numbers in any calculation.</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <tr> <td colspan="2" style="padding: 2px 10px;">28913</td> </tr> <tr> <td style="padding: 2px 10px;">23517</td> <td style="padding: 2px 10px;">5396</td> </tr> </table> <p>23517 + 5396 = 28913 5396 + 23517 = 28913 28913 – 23517 = 5396 28913 – 5396 = 23517</p> <p><i>Children should draw their own bars and understand that the placement of the dividing line between the bars is relative to the place value of the numbers. Each bar = 1 square deep in maths books.</i></p>	28913		23517	5396	<p>Inverse: see Y5 subtraction for using column subtraction to check calculations identified using the bar model.</p> <p>Estimation: throughout addition, children should be taught to estimate to predict/ check their answers.</p> <p>Eg. 23517 + 5396 = 28913 Rounded to the nearest 1000s: 24000 + 5000 = 29000</p> <p><i>Building on work in place value, discuss when to round to the nearest 1000/100/10.</i></p>
28913							
23517	5396						

Notes and guidance (non-statutory)

Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see [Mathematics Appendix 1](#)).

They practise mental calculations with increasingly large numbers to aid fluency (for example, 12 462 – 2300 = 10 162).

Only addition example in NC appendix 1:

$$\begin{array}{r}
 7 \quad 8 \quad 9 \\
 + \quad 6 \quad 4 \quad 2 \\
 \hline
 1 \quad 4 \quad 3 \quad 1 \\
 \hline
 1 \quad 1
 \end{array}$$



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Y5-6 SUBTRACTION

NC Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract															
<p>1. Column subtraction with numbers with more than 4 digits.</p> <p>Hundred thousands, ten thousands, thousands, hundreds, tens, ones, add, plus, addends, total, sum</p> <p>Subtract whole numbers with more than 4 digits, including using a formal written method (columnar subtraction).</p>	<p>As Y4, with further columns following the same process:</p> <p>$7001 - 3456 =$</p> <p>1. Can't take 6 ones from 1 one: take 1 thousand and make 10 hundreds. 2. Take 1 hundred and make 10 tens. 3. Take 1 ten and make 10 ones. 4. $11 - 6, 9 - 5, 9 - 4, 6 - 3$</p>	<p>Children can draw their own place value chart and circles to represent counters.</p>	<p>Children should be familiar with exchanging and renaming in more than 1 place value column from their calculation learning in Y3&4.</p> <p>Extend this with numbers which have up to 6 or 7 digits, exchanging in 1 column before multiple columns.</p>															
<p>2. Column subtraction with numbers with decimal places.</p> <p>Decimal point, tenths, hundredths, thousandths</p> <p>Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation.</p>	<p>Once children are confident adding decimal numbers, apply learning to the context of measures inc. money.</p> <p style="text-align: center;">The price difference is £2.80.</p>	<p>Children can draw their own place value chart and circles to represent counters.</p>	<p>Decimal points do not need a place value column. When subtracting numbers with different numbers of place value columns, align the decimal points then add zeros as place holders.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>$1 - 0.24 =$ </p> <table style="font-family: monospace; border-collapse: collapse;"> <tr> <td style="padding: 2px;">1.00</td> <td style="padding: 2px;">0.09</td> <td style="padding: 2px;">0.10</td> <td style="padding: 2px;">0.09</td> <td style="padding: 2px;">0.10</td> </tr> <tr> <td style="padding: 2px;">- 0.24</td> <td style="padding: 2px;">→ - 0.24</td> <td style="padding: 2px;">→ - 0.24</td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr style="border-top: 1px solid black;"> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px; text-align: right;">0.76</td> </tr> </table> </div>	1.00	0.09	0.10	0.09	0.10	- 0.24	→ - 0.24	→ - 0.24							0.76
1.00	0.09	0.10	0.09	0.10														
- 0.24	→ - 0.24	→ - 0.24																
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<p>3. Estimation and inverse</p> <p>Estimate, round, approximate, inverse, opposite</p> <p>Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.</p>	<p>See Y5 addition for use of place value counters to check using inverse.</p>	<p>Inverse: Use bar models to show the relationship between the numbers in any calculation.</p> <table border="1" data-bbox="835 320 1312 389"> <tr> <td colspan="2">28913</td> </tr> <tr> <td>23517</td> <td>5396</td> </tr> </table> <p> $23517 + 5396 = 28913$ $5396 + 23517 = 28913$ $28913 - 23517 = 5396$ $28913 - 5396 = 23517$ </p> <p><i>Children should draw their own bars and understand that the placement of the dividing line between the bars is relative to the place value of the numbers. Each bar = 1 square deep in maths books.</i></p>	28913		23517	5396	<p>Inverse: see Y5 addition for using column addition to check calculations identified using the bar model.</p> <p>Estimation: throughout subtraction, children should be taught to estimate to predict/ check their answers.</p> <p>Eg. $23517 - 5396 = 18121$ Rounded to the nearest 1000s: $24000 - 5000 = 19000$</p> <p><i>Building on work in place value, discuss when to round to the nearest 1000/100/10.</i></p>
28913							
23517	5396						

Notes and guidance (non-statutory)

Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see [Mathematics Appendix 1](#)).

They practise mental calculations with increasingly large numbers to aid fluency (for example, $12\ 462 - 2300 = 10\ 162$).

NC appendix 1:

$8\ 7\ 4$	$8\ 12\ 1$
$- 5\ 2\ 3$	$- 4\ 5\ 7$
$3\ 5\ 1$	$4\ 7\ 5$



Boothferry Primary School Calculation Policy

Y5 MULTIPLICATION

Strategy & Key Vocabulary	Concrete	Pictorial	Abstract																																																																																		
<p>Mental multiplication</p> <p>multiplied by, times, product, thousands, hundreds, tens, ones, decimal point, tenths, hundredths, thousandths</p> <p>Multiply numbers mentally drawing upon known facts. Multiply whole numbers and those involving decimals by 10, 100 and 1000.</p>	<p>Multiplying by 10, 100 and 1000 using place value counters and place value charts to build on learning from Y4 about using known facts, eg. using $12 \times 1 = 12$ to work out $12 \times 1000 = 12000$.</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>12×10</td> <td>12×100</td> <td>12×1000</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>$12 \times 10 = 12 \times 1 \text{ ten} = 12 \text{ tens}$</td> <td>$12 \times 100 = 12 \times 1 \text{ hundred} = 12 \text{ hundreds}$</td> <td>$12 \times 1000 = 12 \times 1 \text{ thousand} = 12 \text{ thousands}$</td> </tr> </table>	12×10	12×100	12×1000				$12 \times 10 = 12 \times 1 \text{ ten} = 12 \text{ tens}$	$12 \times 100 = 12 \times 1 \text{ hundred} = 12 \text{ hundreds}$	$12 \times 1000 = 12 \times 1 \text{ thousand} = 12 \text{ thousands}$	<p>Children can draw their own place value charts to aid \times and \div 10, 100 and 1000:</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> <th>•t</th> <th>h</th> </tr> <tr> <td></td> <td>4</td> <td>5</td> <td>0</td> <td>•</td> <td></td> </tr> <tr> <td></td> <td></td> <td>4</td> <td>5</td> <td>•</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>4</td> <td>•</td> <td>5</td> </tr> </table> <p>$\leftarrow \times \qquad \qquad \qquad \div \rightarrow$</p>	Th	H	T	O	•t	h		4	5	0	•				4	5	•					4	•	5	<p>$5 \times \square = 5000$ $\square \times 100 = 2700$</p> <p>$12 \times 100 = \square$ $100 \times \square = 1000$</p> <p>One children have been taught decimal place value in spring term, extend their understanding of multiplying by 10, 100 and 1000:</p> <p>$0.63 \times 100 =$</p> <p>$1000 \times 3.45 =$</p> <p>$123.5 \times ? = 123500$</p>																																																	
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<p>Short multiplication (with and without regrouping)</p> <p>Partition, recombine</p> <p>Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method.</p>	<p>Partition numbers into place value columns then multiply using place value counters. Discuss with children when it is possible to do this mentally, dependant on the digits:</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>$1022 \times 4 = 4088$</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>						$1022 \times 4 = 4088$					<p>Children can draw their own place value counters to aid regrouping.</p>	<p>3-digit x 1-digit:</p> <p>342×7 becomes</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td> </td><td>3</td><td>4</td><td>2</td><td> </td></tr> <tr><td>×</td><td> </td><td> </td><td> </td><td>7</td></tr> <tr><td colspan="5"><hr/></td></tr> <tr><td>2</td><td>3</td><td>9</td><td>4</td><td> </td></tr> <tr><td colspan="5"><hr/></td></tr> <tr><td> </td><td>2</td><td> </td><td>1</td><td> </td></tr> </table> <p>4-digit x 1-digit:</p> <p>2741×6 becomes</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td> </td><td> </td><td>2</td><td>7</td><td>4</td><td>1</td><td> </td></tr> <tr><td>×</td><td> </td><td> </td><td> </td><td> </td><td> </td><td>6</td></tr> <tr><td colspan="7"><hr/></td></tr> <tr><td>1</td><td>6</td><td>4</td><td>4</td><td>6</td><td> </td><td> </td></tr> <tr><td colspan="7"><hr/></td></tr> <tr><td> </td><td>4</td><td>2</td><td> </td><td> </td><td> </td><td> </td></tr> </table> <p style="text-align: right; color: red;">underneath</p>		3	4	2		×				7	<hr/>					2	3	9	4		<hr/>						2		1				2	7	4	1		×						6	<hr/>							1	6	4	4	6			<hr/>								4	2				
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Long multiplication
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

Partitioning and recombining:

$13 \times 213 = \square$



$10 \times 213 = \square$

$3 \times 213 = \square$

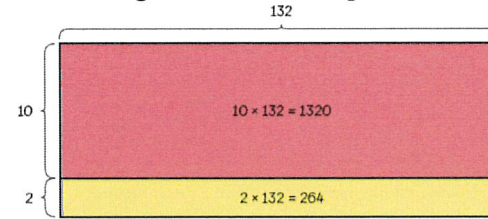


Let's estimate

$10 \times 210 \approx \square$

Remind children to estimate to check their answers are sensible.

Partitioning and recombining:



$12 \times 132 = 1320 + 264 = 1584$

$$\begin{array}{r} 132 \\ \times 12 \\ \hline \end{array}$$

$$\begin{array}{r} 264 \rightarrow \text{multiply by 2} \\ + 1320 \rightarrow \text{multiply by 10} \\ \hline \end{array}$$

$$\begin{array}{r} 1584 \\ \hline \end{array}$$

Partitioning and recombining:

$234 \times 26 = \square ?$

$234 \times 20 = 4680$

$234 \times 6 = 1404$

$234 \times 26 = 4680 + 1404 = \square$

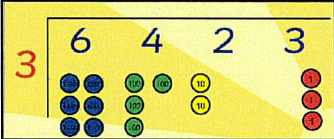
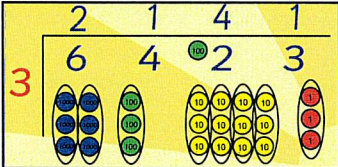
Formal method:

$$\begin{array}{r} \text{above (x)} \rightarrow \begin{array}{r} 1 \quad 2 \\ 234 \\ \times 26 \\ \hline 744 \\ + 2480 \\ \hline 3224 \\ \text{underneath (+)} \rightarrow \end{array} \\ 11 \end{array}$$

Y5 MULTIPLICATION



Boothferry Primary School Calculation Policy

Strategy Key Vocabulary NC objective	Concrete	Pictorial	Abstract																														
<p>1. Mental division Divided by, hundreds, tens, ones, tenths, hundredths Divide whole numbers and those involving decimals by 10, 100 and 1000.</p>	<p>Divide by 10, 100 and 1000 using dienes alongside place value charts and building on learning from Y4 about using known facts, eg. using $12 \div 3 = 4$ to work out $1200 \div 30 = 40$</p>	<p>Children can draw their own place value charts to aid \times and $\div 10$ and 100:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> <th>t</th> <th>h</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>5</td> <td>0</td> <td>0</td> <td></td> <td></td> </tr> <tr> <td></td> <td>4</td> <td>5</td> <td>0</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>4</td> <td>5</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>4</td> <td>5</td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">← \times \div →</p>	Th	H	T	O	t	h	4	5	0	0				4	5	0					4	5						4	5		<p>$3200 \div 80 =$ $270 \div \underline{\quad} = 2.7$</p> <p>A number divided by 1000 is 3.15. What is the number?</p>
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4	5	0	0																														
	4	5	0																														
		4	5																														
			4	5																													
<p>2. Short division Divide numbers up to 4 digits by a one-digit number using the formal written method of short division. Regroup, remainder</p>	<p>Children to use place value counters to practise regrouping. Eg. Regrouping 1 hundreds counter for 10 tens counters.</p> <div style="text-align: center;">  <p style="margin-left: 100px;">$6423 \div 3 =$</p>  </div>	<p>Children can draw their own place value counters alongside written 'bus stop' (short division) calculation methods.</p>	<p>First, practise divisions which only require regrouping in one column, before multiple columnsthen calculations with remainders:</p> $\begin{array}{r} 86r2 \\ 5 \overline{) 432} \end{array}$ <p>Word problems with remainders: Elliott wants to divide 1294 building blocks equally into 9 bags. How many blocks will be in each bag? How many are left over?</p>																														

Y5 DIVISION