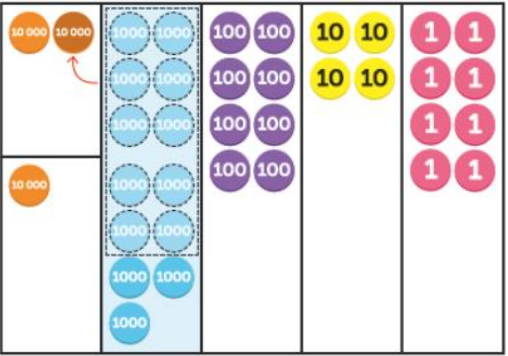
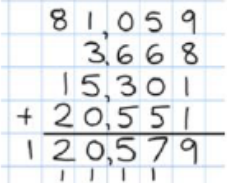
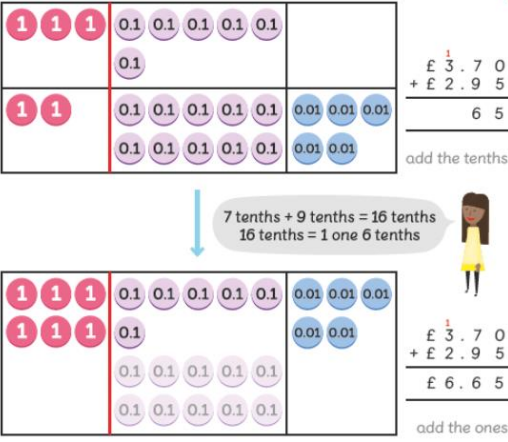
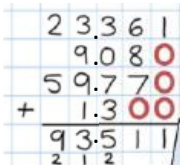




## Boothferry Primary School Calculation Policy



# Y5-6 ADDITION

NC Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
<p>1. Column addition with numbers with more than 4 digits.  <b>Hundred thousands, ten thousands, thousands, hundreds, tens, ones, add, plus, addends, total, sum</b>  <b>Add whole numbers with more than 4 digits, including using a formal written method (columnar addition).</b></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&amp;4.</p> $\begin{array}{r} 16603 \\ + 17245 \\ \hline 33848 \end{array}$ <p>Extend this with numbers which have up to 6 or 7 digits, exchanging in 1 column before multiple columns.</p>  <p>Then add several numbers of increasing complexity.</p>
<p>2. Column addition with numbers with decimal places.  <b>Decimal point, tenths, hundredths, thousandths</b>  <b>Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation.</b></p>	<p>Once children are confident adding decimal numbers, apply learning to the context of measures inc. money.</p>  <p>7 tenths + 9 tenths = 16 tenths          16 tenths = 1 one 6 tenths</p>	<p>Children can draw their own place value chart and circles to represent counters.</p>	<p>Decimal points do <b>not</b> need a place value column and carries should still be placed <b>underneath</b> where the total is being calculated.</p> $\begin{array}{r} 2.66 \\ + 2.58 \\ \hline 5.24 \end{array}$ <p>When adding numbers with different numbers of place value columns, <b>align the decimal points</b> then add zeros as place holders.</p> 



## Boothferry Primary School Calculation Policy

<p>3. Estimation and inverse</p> <p><b>Estimate, round, approximate, inverse, opposite</b></p> <p><b>Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.</b></p>	<p><i>See Y5 subtraction for use of place value counters to check using inverse.</i></p>	<p><b>Inverse:</b> Use bar models to show the relationship between the numbers in any calculation.</p> <div style="text-align: center; border: 1px solid black; margin: 5px 0;"> <table style="margin: auto; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 10px;">28913</td> <td style="border: 1px solid black; padding: 2px 10px;">5396</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px 10px;">23517</td> <td style="border: 1px solid black; padding: 2px 10px;">5396</td> </tr> </table> </div> <p> <math>23517 + 5396 = 28913</math>      <math>5396 + 23517 = 28913</math>  <math>28913 - 23517 = 5396</math>      <math>28913 - 5396 = 23517</math> </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	5396	23517	5396	<p><b>Inverse:</b> see Y5 subtraction for using column subtraction to check calculations identified using the bar model.</p> <p><b>Estimation:</b> throughout addition, children should be taught to estimate to predict/ check their answers.</p> <p>Eg. <math>23517 + 5396 = 28913</math></p> <p>Rounded to the nearest 1000s:  <math>24000 + 5000 = 29000</math></p> <p><i>Building on work in place value, discuss when to round to the nearest 1000/100/10.</i></p>
28913	5396						
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:

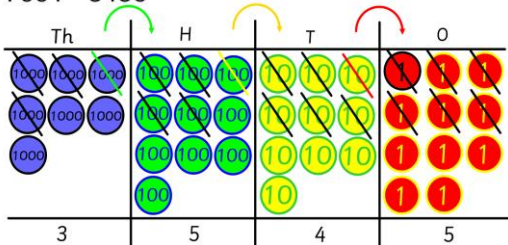
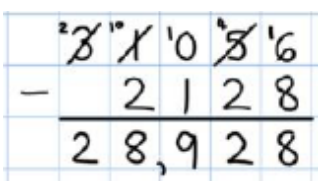
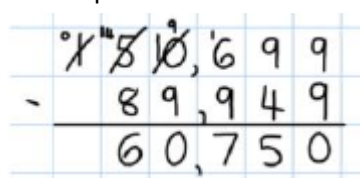
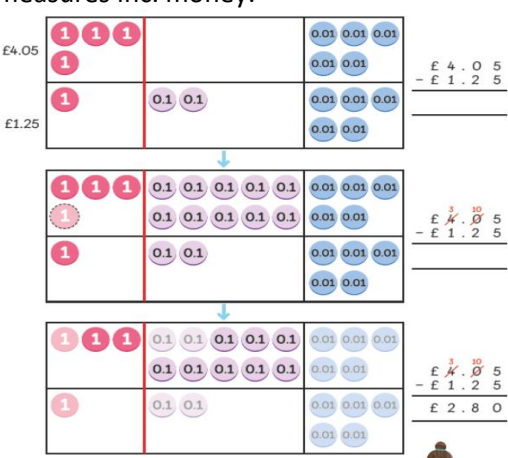

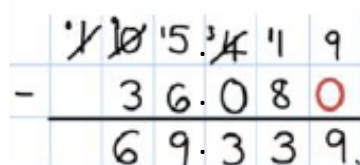
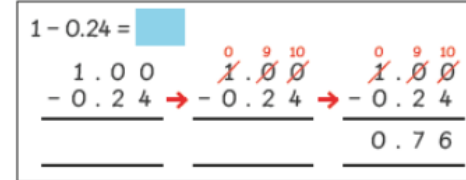
$$\begin{array}{r}
 7\ 8\ 9 \\
 +\ 6\ 4\ 2 \\
 \hline
 1\ 4\ 3\ 1 \\
 \hline
 1\ \quad 1
 \end{array}$$



# Boothferry Primary School Calculation Policy



# Y5-6 SUBTRACTION

NC Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
<p>1.Column subtraction with numbers with more than 4 digits.  <b>Hundred thousands, ten thousands, thousands, hundreds, tens, ones, add, plus, addends, total, sum</b>  <b>Subtract whole numbers with more than 4 digits, including using a formal written method (columnar subtraction).</b></p>	<p>As Y4, with further columns following the same process:  <math>7001 - 3456 =</math></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. <math>11 - 6, 9 - 5, 9 - 4, 6 - 3</math></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&amp;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.  <b>Decimal point, tenths, hundredths, thousandths</b>  <b>Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation.</b></p>	<p>Once children are confident adding decimal numbers, apply learning to the context of measures inc. money.</p>  <p>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 <b>not</b> need a place value column. When subtracting numbers with different numbers of place value columns, <b>align the decimal points</b> then add zeros as place holders.</p>  



## Boothferry Primary School Calculation Policy

<p>3. Estimation and inverse</p> <p><b>Estimate, round, approximate, inverse, opposite</b></p> <p><b>Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.</b></p>	<p><i>See Y5 addition for use of place value counters to check using inverse.</i></p>	<p><b>Inverse:</b> Use bar models to show the relationship between the numbers in any calculation.</p> <div style="text-align: center; border: 1px solid black; margin: 5px 0;"> <table style="margin: auto; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px 10px;">28913</td> <td style="border: 1px solid black; padding: 2px 10px;">5396</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px 10px;">23517</td> <td style="border: 1px solid black; padding: 2px 10px;">5396</td> </tr> </table> </div> <p> <math>23517 + 5396 = 28913</math>      <math>5396 + 23517 = 28913</math>  <math>28913 - 23517 = 5396</math>      <math>28913 - 5396 = 23517</math> </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	5396	23517	5396	<p><b>Inverse:</b> see Y5 addition for using column addition to check calculations identified using the bar model.</p> <p><b>Estimation:</b> throughout subtraction, children should be taught to estimate to predict/ check their answers.</p> <p>Eg. <math>23517 - 5396 = 18121</math></p> <p>Rounded to the nearest 1000s:  <math>24000 - 5000 = 19000</math></p> <p><i>Building on work in place value, discuss when to round to the nearest 1000/100/10.</i></p>
28913	5396						
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:

$\begin{array}{r} 8\ 7\ 4 \\ - 5\ 2\ 3 \\ \hline 3\ 5\ 1 \end{array}$	$\begin{array}{r} 8\ 12\ 1 \\ \begin{array}{r} 9\ 3\ 2 \\ - 4\ 5\ 7 \\ \hline 4\ 7\ 5 \end{array} \end{array}$
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## Boothferry Primary School Calculation Policy



# Y6 MULTIPLICATION

Strategy & Key Vocabulary	Concrete	Pictorial	Abstract																																																																										
<p><b>Mental multiplication</b>  <i>multiplied by, times, product, thousands, hundreds, tens, ones, decimal point, tenths, hundredths, thousandths</i></p> <p><b>Multiply numbers mentally drawing upon known facts.</b></p> <p><b>Multiply whole numbers and those involving decimals by 10, 100 and 1000.</b></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 <math>12 \times 1 = 12</math> to work out <math>12 \times 1000 = 12000</math>.</p> <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr> <td style="padding: 2px;"><math>12 \times 10</math></td> <td style="padding: 2px;"><math>12 \times 100</math></td> <td style="padding: 2px;"><math>12 \times 1000</math></td> </tr> <tr> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> <td style="padding: 2px;"> </td> </tr> <tr> <td style="padding: 2px; font-size: 8px;"> <math>12 \times 10 = 12 \times 1 \text{ ten} = 12 \text{ tens}</math> </td> <td style="padding: 2px; font-size: 8px;"> <math>12 \times 100 = 12 \times 1 \text{ hundred} = 12 \text{ hundreds}</math> </td> <td style="padding: 2px; font-size: 8px;"> <math>12 \times 1000 = 12 \times 1 \text{ thousand} = 12 \text{ thousands}</math> </td> </tr> </table>	$12 \times 10$	$12 \times 100$	$12 \times 1000$				$12 \times 10 = 12 \times 1 \text{ ten} = 12 \text{ tens}$	$12 \times 100 = 12 \times 1 \text{ hundred} = 12 \text{ hundreds}$	$12 \times 1000 = 12 \times 1 \text{ thousand} = 12 \text{ thousands}$	<p>Children can draw their own place value charts to aid <math>\times</math> and <math>\div</math> 10, 100 and 1000:</p> <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr> <th style="padding: 2px;">Th</th> <th style="padding: 2px;">H</th> <th style="padding: 2px;">T</th> <th style="padding: 2px;">O</th> <th style="padding: 2px;">•t</th> <th style="padding: 2px;">h</th> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;">4</td> <td style="padding: 2px;">5</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">•</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;">4</td> <td style="padding: 2px;">5</td> <td style="padding: 2px;">•</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;">4</td> <td style="padding: 2px;">•</td> <td style="padding: 2px;">5</td> </tr> </table> <p style="text-align: center;"> <span style="color: red; font-size: 1.2em;">←</span> <math>\times</math> <span style="margin-left: 100px;"><math>\div</math> <span style="color: red; font-size: 1.2em;">→</span></span> </p>	Th	H	T	O	•t	h		4	5	0	•				4	5	•					4	•	5	<p> <math>5 \times \square = 5000</math>    <math>\square \times 100 = 2700</math>  <math>12 \times 100 = \square</math>    <math>100 \times \square = 1000</math> </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 style="text-align: center;"> <math>0.63 \times 100 =</math>  <math>1000 \times 3.45 =</math>  <math>123.5 \times ? = 123500</math> </p>																																									
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<p><b>Long multiplication</b></p> <p><b>Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.</b></p>	<p><math>114 \times 24 =</math> <span style="background-color: #ADD8E6; display: inline-block; width: 80px; height: 15px;"></span></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"></td> <td style="padding-left: 20px;"><math>100 \times 24 = 2400</math></td> </tr> <tr> <td style="text-align: center;"></td> <td style="padding-left: 20px;"><math>10 \times 24 = 240</math></td> </tr> <tr> <td style="text-align: center;"></td> <td style="padding-left: 20px;"><math>4 \times 24 = 96</math></td> </tr> <tr> <td style="text-align: center;"></td> <td style="padding-left: 20px;"><math>114 \times 24 = 2736</math></td> </tr> </table> <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>		$100 \times 24 = 2400$		$10 \times 24 = 240$		$4 \times 24 = 96$		$114 \times 24 = 2736$	<p><b>Estimating:</b></p> <p>Remind children to estimate to check their answers are sensible, using rounding and mental multiplication using known facts.</p> <p><math>2568 \times 24</math>          Estimate: <math>2500 \times 24 = 60,000</math>  <math>2500 \times 20 = 50,000</math>  <math>2500 \times 4 = 10,000</math></p>	<p><b>Formal method:</b></p> <p style="color: red;">above          (x tens digit)          (x ones digit)</p> <p><span style="border: 1px solid yellow; padding: 2px;">  </span> place holder for x by tens digit</p> <p style="color: red;">underneath (+)</p> <table style="margin-left: auto; margin-right: auto; text-align: right;"> <tr><td style="padding-right: 5px;">1</td><td style="padding-right: 5px;">1</td><td style="padding-right: 5px;">1</td><td></td><td></td><td></td></tr> <tr><td style="padding-right: 5px;">2</td><td style="padding-right: 5px;">2</td><td style="padding-right: 5px;">3</td><td></td><td></td><td></td></tr> <tr><td style="padding-right: 5px;">2</td><td style="padding-right: 5px;">5</td><td style="padding-right: 5px;">6</td><td style="padding-right: 5px;">8</td><td></td><td></td></tr> <tr><td style="padding-right: 5px;">x</td><td></td><td></td><td style="padding-right: 5px;">2</td><td style="padding-right: 5px;">4</td><td></td></tr> <tr><td colspan="6"><hr style="border: 0.5px solid black;"/></td></tr> <tr><td style="padding-right: 5px;">1</td><td style="padding-right: 5px;">0</td><td style="padding-right: 5px;">2</td><td style="padding-right: 5px;">7</td><td style="padding-right: 5px;">2</td><td></td></tr> <tr><td style="padding-right: 5px;">+</td><td style="padding-right: 5px;">5</td><td style="padding-right: 5px;">1</td><td style="padding-right: 5px;">3</td><td style="padding-right: 5px;">6</td><td style="padding-right: 5px;"><span style="border: 1px solid yellow; padding: 2px;">0</span></td></tr> <tr><td colspan="6"><hr style="border: 0.5px solid black;"/></td></tr> <tr><td style="padding-right: 5px;">6</td><td style="padding-right: 5px;">1</td><td style="padding-right: 5px;">6</td><td style="padding-right: 5px;">3</td><td style="padding-right: 5px;">2</td><td></td></tr> <tr><td colspan="6"><hr style="border: 0.5px solid black;"/></td></tr> <tr><td></td><td></td><td></td><td style="padding-right: 5px;">1</td><td></td><td></td></tr> </table>	1	1	1				2	2	3				2	5	6	8			x			2	4		<hr style="border: 0.5px solid black;"/>						1	0	2	7	2		+	5	1	3	6	<span style="border: 1px solid yellow; padding: 2px;">0</span>	<hr style="border: 0.5px solid black;"/>						6	1	6	3	2		<hr style="border: 0.5px solid black;"/>									1		
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# Boothferry Primary School Calculation Policy

Multiplying decimals  
**Ones, decimal point, tenths, hundredths**  
 Multiply one-digit numbers with up to two decimal places by whole numbers.

$4.25 \times 3 =$

4.25

4.25

Multiply the hundredths.

15 hundredths = 1 tenth + 5 hundredths

4.25

4.25

Children can draw their own place value counters if necessary.

Remind children that the **single digit** belongs in the ones column and that the decimal points **must** be aligned.

above →

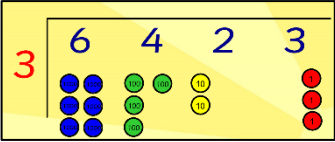
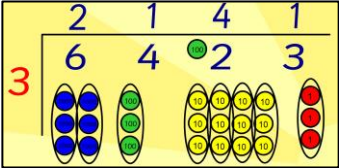
$$\begin{array}{r} 2 \quad 2 \quad 3 \\ \times 0.23 \\ \hline 2.07 \end{array}$$

# Y6 MULTIPLICATION





## Boothferry Primary School Calculation Policy

Strategy <b>Key Vocabulary</b> <b>NC objective</b>	Concrete	Pictorial	Abstract																														
<p>1. Mental division <b>Divided by, hundreds, tens, ones, tenths, hundredths</b></p>	<p>Divide by 10, 100 and 1000 using dienes alongside place value charts and building on learning from Y5 about using known facts, eg. using <math>144 \div 12 = 12</math> to work out <math>1400 \div 12 = 120</math></p>	<p>Children can draw their own place value charts to aid <math>\times</math> and <math>\div</math> 10 and 100:</p> <table border="1" style="margin: 10px auto; text-align: center;"> <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;">← <math>\times</math>     <math>\div</math> →</p>	Th	H	T	O	t	h	4	5	0	0				4	5	0					4	5						4	5		<p><math>3200 \div 80 =</math> <math>270 \div \underline{\quad} = 2.7</math></p> <p>A number divided by 1000 is 3.15. What is the number?</p>
Th	H	T	O	t	h																												
4	5	0	0																														
	4	5	0																														
		4	5																														
			4	5																													
<p>2. Short division <b>Divide numbers up to 4 digits by a two-digit number using the formal written method of short division.</b> <b>Regroup, remainder</b></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: 20px;"><math>6423 \div 3 =</math></p> </div> <div style="text-align: center; margin-top: 20px;">  </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 columns .... ...then calculations with remainders:</p> <div style="text-align: center; margin: 10px 0;"> <math display="block">\begin{array}{r} 8 \ 6 \ r2 \\ 5 \overline{) 4 \ 3 \ 2} \end{array}</math> </div> <p>Word problems with remainders: Amira packs 1456 beads into small bags of 14 beads each. How many bags of beads does she get?</p>																														

# Y6 DIVISION



# Boothferry Primary School Calculation Policy



3. Long division  
**Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division.**

Children may need to present remainders as decimals or fractions dependent on the context of the problem. Decimal remainders are common in measurement, inc. money, problems.

Divisions with remainders:

$$\begin{array}{r}
 28 \text{ r } 12 \\
 15 \overline{) 432} \\
 \underline{30} \phantom{0} \\
 132 \\
 \underline{120} \\
 12
 \end{array}$$

Divisions with remainders as decimals:

$$\begin{array}{r}
 28.8 \\
 15 \overline{) 432.0} \\
 \underline{30} \phantom{0} \downarrow \\
 132 \phantom{0} \phantom{0} \downarrow \\
 \underline{120} \phantom{0} \phantom{0} \downarrow \\
 120 \phantom{0} \phantom{0} \phantom{0} \downarrow \\
 \underline{120} \phantom{0} \phantom{0} \phantom{0} \\
 0
 \end{array}$$

# Y6 DIVISION