
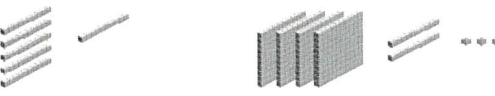

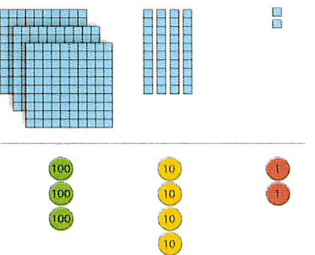
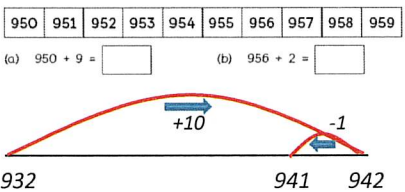
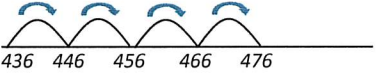




## Boothferry Primary School Calculation Policy

NC Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
<p>1. Mental addition</p> <p><b>Add numbers mentally, including:</b></p> <ul style="list-style-type: none"> <li>- a 3-digit number and ones</li> <li>- a 3-digit number and tens</li> <li>- a 3-digit number and hundreds</li> </ul>	<p>3-digit number and ones: Add 123 and 4.</p>  <p>3-digit number and tens: Add 60 and 423.</p>  <p>3-digit number and hundreds: Add 425 and 500.</p>  <p>Children should start to use place value counters alongside dienes in preparation for calculating with larger numbers.</p> 	<p><i>Number lines/number tracks could be used and mental strategies, such as adjusting should be explored. Eg. to add 9, add 10 then -1.</i></p>  <p><math>932 + 40 = 476</math></p> 	<p>3-digit number and ones: <math>334 + 5 = \square</math></p> <p>3-digit number and tens: <math>733 + 60 = \square</math></p> <p>3-digit number and hundreds: <math>300 + 456 = \square</math></p> <p>Discuss which place value column is affected:</p> <p><math>542 + 4 = \square</math></p> <p><math>542 + 40 = \square</math></p> <p><math>542 + 400 = \square</math></p>

# Y3 ADDITION

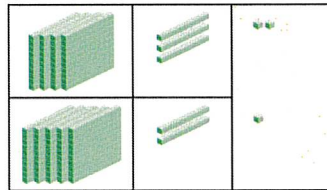


## Boothferry Primary School Calculation Policy

**2. Column addition (no regrouping) with numbers with up to 3 digits.**  
**Hundreds, tens, ones, columns**  
**Add numbers with up to three digits, using the formal written method of columnar addition.**  
 Estimation and inverse.  
**Estimate, round, approximate, inverse, opposite**  
**Estimate the answer to a calculation and use inverse operations to check answers.**

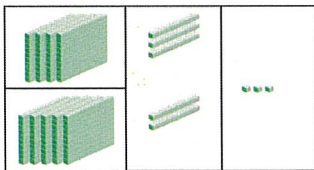
Use dienes to make the numbers:

Step 1 Add the ones.  
 2 ones + 1 one = 3 ones



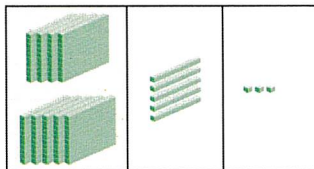
	h	t	o
	4	3	2
+	5	2	1
			3

Step 2 Add the tens.  
 3 tens + 2 tens = 5 tens



	h	t	o
	4	3	2
+	5	2	1
		5	3

Step 3 Add the hundreds.  
 4 hundreds + 5 hundreds = 9 hundreds



	h	t	o
	4	3	2
+	5	2	1
	9	5	3

$432 + 521 = 953$

Children can draw their own dienes when representing the concrete resources.



In maths books:

1 square

1 line

1 dot

Formal written method of column addition:

	h	t	o
	3	4	6
+	6	5	2

Throughout addition, children should be taught to estimate to predict/ check their answers.

Eg.  $346 + 652 =$

Rounded to the nearest 10:  $350 + 650$

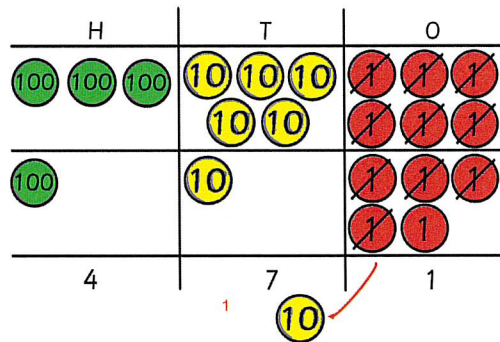
$300 + 600 = 900$

$50 + 50 = 100$

$900 + 100 = 1000$

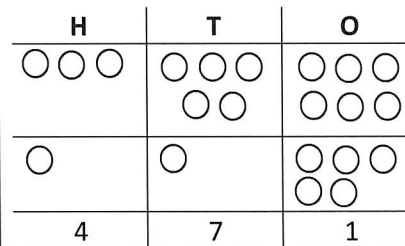
**3. Column addition (with regrouping) with numbers with up to 3 digits.**  
**Regrouping, renaming**  
**Add numbers with up to three digits, using the formal written method of columnar addition.**

Progress to using place value counters to represent the numbers (these should be used alongside dienes initially):  
 $356 + 115 = 471$



Children can draw their own place value chart and circles when representing the counters.

$356 + 135$  (10 ones renamed – swapped – for 1 ten)



underneath  $\uparrow$  10

Begin with a 3-digit number + ones:

	h	t	o
	5	4	6
+			9

Before progressing to 3-digit + 2-digit then adding two 3-digit numbers:

	h	t	o		7	8	9
	2	3	4	+	6	4	2
+	1	3	7				
					1	4	3
						1	1


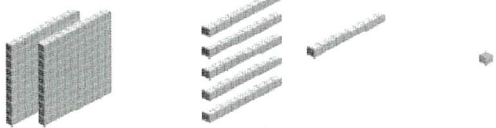
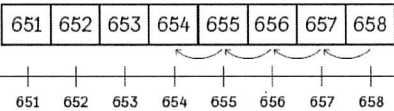
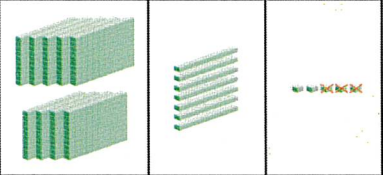
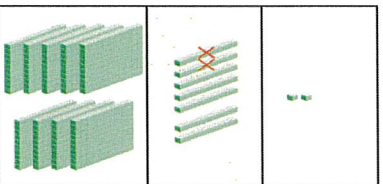
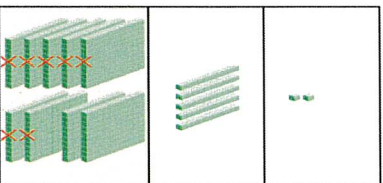

NB. Only 1 column should be renamed at initially, until children are secure, then 2 columns can be renamed within a single calculation. Conceptual variation needs to be considered carefully in this learning process.

# Y3 ADDITION



## Boothferry Primary School Calculation Policy

# Y3 SUBTRACTION

NC Objective, Strategy & Key Vocabulary	Concrete	Pictorial	Abstract															
<p>1. Mental subtraction</p> <p><b>Subtract numbers mentally, including:</b></p> <ul style="list-style-type: none"> <li>- a 3-digit number and ones</li> <li>- a 3-digit number and tens</li> <li>- a 3-digit number and hundreds</li> </ul>	<p>3-digit number and ones: Subtract 3 from 248.</p>  <p>3-digit number and tens: Subtract 50 from 261.</p>  <p>3-digit number and hundreds: Use dienes, as above.</p>	<p>Number lines/number tracks could be used and mental strategies, such as adjusting should be explored. Eg. to subtract 19, subtract 20 then +1.</p> <p>Counting back:</p>  <p>Children could also draw dienes.</p>	<p>Discuss which place value column is affected:</p> <p><math>794 - 3 =</math> <span style="background-color: #00AEEF; color: white; padding: 2px 10px;"> </span></p> <p><math>794 - 30 =</math> <span style="background-color: #00AEEF; color: white; padding: 2px 10px;"> </span></p> <p><math>794 - 300 =</math> <span style="background-color: #00AEEF; color: white; padding: 2px 10px;"> </span></p>															
<p>2. Column subtraction (no regrouping) with numbers with up to 3 digits.</p> <p><b>Hundreds, tens, ones, columns</b></p> <p><b>Subtract numbers with up to three digits, using the formal written method of columnar subtraction.</b></p> <p>Estimation and inverse.</p> <p><b>Estimate, round, approximate, inverse, opposite</b></p> <p>Estimate the answer to a calculation and use inverse operations to check answers.</p>	<p>Subtract the ones. 5 ones - 3 ones = 2 ones</p>  <p>Subtract the tens. 7 tens - 2 tens = 5 tens</p>  <p>Subtract the hundreds. 9 hundreds - 7 hundreds = 2 hundreds</p> 	<p>Children can draw their own dienes when representing the concrete resources.</p>  <p><i>In maths books:</i> 1 square      1 line      a dot</p>	<p>Formal written method of column subtraction:</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr><td style="padding: 0 10px;">h</td><td style="padding: 0 10px;">t</td><td style="padding: 0 10px;">o</td></tr> <tr><td style="padding: 0 10px;">9</td><td style="padding: 0 10px;">7</td><td style="padding: 0 10px;">5</td></tr> <tr><td style="padding: 0 10px;">-</td><td style="padding: 0 10px;">7</td><td style="padding: 0 10px;">2</td></tr> <tr><td colspan="3" style="border-top: 1px solid black; padding-top: 2px;"></td></tr> <tr><td style="padding: 0 10px;">2</td><td style="padding: 0 10px;">5</td><td style="padding: 0 10px;">2</td></tr> </table> <p>Throughout addition, children should be taught to estimate to predict/ check their answers. Eg. <math>975 - 723 =</math></p> <p>Rounded to the nearest 10: <math>980 - 720</math>  <math>900 - 700 = 200</math>  <math>80 - 20 = 60</math>  <math>200 + 60 = 260</math></p>	h	t	o	9	7	5	-	7	2				2	5	2
h	t	o																
9	7	5																
-	7	2																
2	5	2																

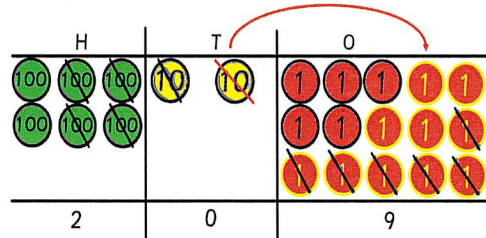


## Boothferry Primary School Calculation Policy

3. Column subtraction (with regrouping) with numbers with up to 3 digits.  
**Regrouping, renaming**  
**Subtract numbers with up to three digits, using the formal written method of columnar subtraction.**

Progress to using place value counters to represent the numbers (these should be used alongside dienes initially):

$$625 - 416 =$$



Children can draw their own place value chart and circles when representing the counters.

$$\begin{array}{r} \text{h} \quad \text{t} \quad \text{o} \\ 5 \quad 5 \quad 4 \\ - 3 \quad 2 \quad 6 \\ \hline \end{array}$$

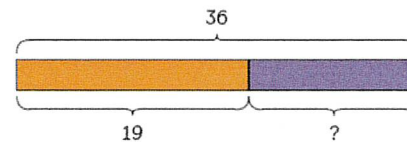
*NB. Only 1 column should be renamed at initially, until children are secure, then 2 columns can be renamed within a single calculation. Conceptual variation needs to be considered carefully in this learning process and should include the digit 0 in different positions in the larger of the two numbers.*

$$\begin{array}{r} \text{h} \quad \text{t} \quad \text{o} \\ 9 \quad 0 \quad 7 \\ - 8 \quad 1 \quad 9 \\ \hline \end{array}$$

4. Using bar models

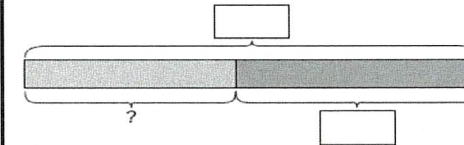
Children need to understand what each number represents to enable them to draw a model to show the information that is known and add '?' where the missing information (the answer) is.

There are 36 children in the school band.  
 19 of them are boys.  
 How many girls are there?



Simple subtraction problems:

There are 96 marbles in a box.  
 68 of them are green and the rest are blue.  
 How many blue marbles are there?

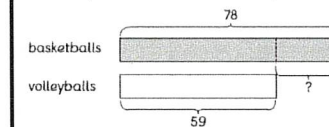


$$\square \ominus \square = \square$$

There are  blue marbles.

More complex problems:

There are 78 basketballs and 59 volleyballs in the sports equipment room.  
 How many more basketballs than volleyballs are there?



$$\square \ominus \square = \square$$

There are  more basketballs than volleyballs.



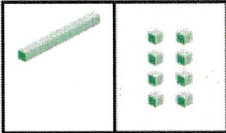
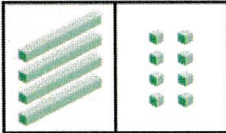
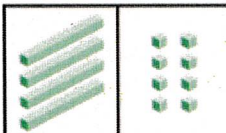
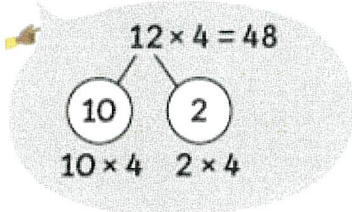
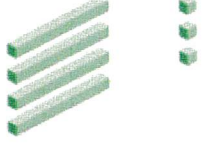
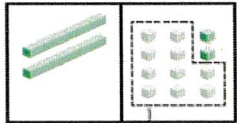
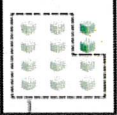

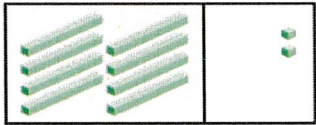
## Boothferry Primary School Calculation Policy

# Y3 MULTIPLICATION

Strategy & Key Vocabulary	Concrete	Pictorial	Abstract
<p>Times tables: 3s, 4s, 8s (recap 2s, 10s, 5s) <b>multiplied by,</b> <b>groups of, times,</b> <b>product</b> <b>Recall and use</b> <b>multiplication and</b> <b>division facts for</b> <b>the 3, 4 and 8</b> <b>multiplication</b> <b>tables</b></p>	<p>Look at patterns and make connections between calculations in the 3s, 4s and 8s and between the 4 and 8 times tables:</p> <p> <math>1 \times 4 = 4</math>  <math>2 \times 4 = 8</math>  <math>3 \times 4 = 12</math>  <math>4 \times 4 = 16</math>  <math>5 \times 4 = 20</math>  <math>6 \times 4 = 24</math>  <math>7 \times 4 = 28</math>  <math>8 \times 4 = 32</math>  <math>9 \times 4 = 36</math>  <math>10 \times 4 = 40</math> </p>	<p>Encourage children to use known facts to calculate other questions more fluently and efficiently.</p> <p>Find the product of 3 and 8:</p> <p><i>Use arrays to build on children's learning from Y2 re multiplication being commutative.</i></p>	<p>Sequences (increasing and decreasing, with some consecutive missing numbers):</p> <p>8, 16, 24, <input type="text"/>, <input type="text"/>, 48</p> <p>56, <input type="text"/>, 40, 32, <input type="text"/></p> <p>Number sentences:  <math>9 \times 3 =</math>  <math>40 = \_\_ \times 8</math></p> <p>Word problems:          Amira puts 8 roses in a vase.          How many roses are there altogether if there are 9 vases?</p> <p><input type="text"/> <math>\times</math> <input type="text"/> = <input type="text"/></p> <p>There are <input type="text"/> roses altogether in 9 vases.</p>
<p>Multiplying using known facts <b>lots of, times,</b> <b>multiplied by, tens</b> Write and calculate mathematical statements for <math>\times</math> and <math>\div</math> using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods.</p>	<p>Use dienes to show the difference between the known fact, eg. <math>3 \times 4</math>, and the associated fact, eg. <math>3 \times 40</math>.</p> <p><math>3 \times 4</math> tens</p>	<p>Children can draw their own dienes when representing the concrete resources.</p> <p><i>In maths books:</i>          1 square      1 line      a dot</p>	<p><math>3 \times 4 =</math> <input style="background-color: #4682B4; width: 40px; height: 20px;" type="text"/></p> <p><math>3 \times 40 =</math> <input style="background-color: #4682B4; width: 40px; height: 20px;" type="text"/></p> <p>What about <math>3 \times 400</math>?</p>



# Boothferry Primary School Calculation Policy

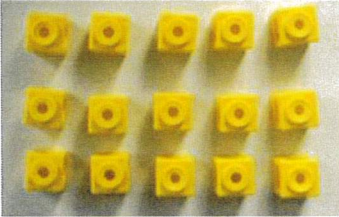

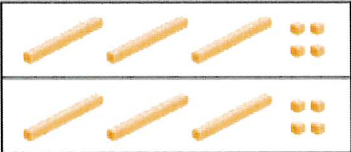
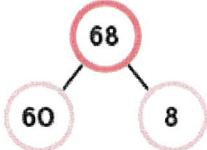
<p>Multiplying (no regrouping) Tens, ones, times, multiply, groups/ lots of, partition</p>	<p><math>12 \times 4 =</math> <span style="background-color: #00AEEF; color: white; padding: 2px 5px;">  </span></p> <p>Multiply 12 by 4.</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px;">  <p>2 ones <math>\times 4 = 8</math> ones</p> </div> <div style="border: 1px solid black; padding: 5px;">  <p>1 ten <math>\times 4 = 4</math> tens</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px;">  <p>2 ones <math>\times 4 = 8</math> 1 ten <math>\times 4 = 40</math> <math>12 \times 4 = 8 + 40 = 48</math></p> </div> </div>	<p>Partitioning (mental strategy and precursor to short multiplication)</p> <div style="text-align: center;">  <p><math>12 \times 4 = 48</math></p> <p>10    2</p> <p><math>10 \times 4</math>    <math>2 \times 4</math></p> <p><math>40 + 8 = 48</math></p> </div>	<p><math>43 \times 2 =</math> <span style="background-color: #00AEEF; color: white; padding: 2px 5px;">  </span></p> <div style="display: flex; justify-content: space-around; align-items: center;">  </div> <p>40    3</p> <p><math>40 \times 2</math> (use known fact) = 80 <math>3 \times 2 = 6</math> <math>80 + 6 = 86</math></p> <p>Children should use manipulatives alongside the short multiplication method initially to reinforce the place value of the tens digit.</p> <div style="text-align: center;"> <table style="border-collapse: collapse; margin: auto;"> <tr><td style="padding: 0 10px;">T</td><td style="padding: 0 10px;">O</td><td></td></tr> <tr><td style="padding: 0 10px;">4</td><td style="padding: 0 10px;">3</td><td style="padding: 0 10px;">4 tens <math>\times 2</math> (<b>not</b> <math>4 \times 2</math>)</td></tr> <tr><td style="padding: 0 10px;"><u>x</u></td><td style="padding: 0 10px;"><u>2</u></td><td></td></tr> <tr><td style="padding: 0 10px;">8</td><td style="padding: 0 10px;">6</td><td></td></tr> </table> </div>	T	O		4	3	4 tens $\times 2$ ( <b>not</b> $4 \times 2$ )	<u>x</u>	<u>2</u>		8	6	
T	O														
4	3	4 tens $\times 2$ ( <b>not</b> $4 \times 2$ )													
<u>x</u>	<u>2</u>														
8	6														
<p>Multiplying (with regrouping) Hundreds, tens, ones, times, multiply, groups/ lots of, partition, product</p>	<p><math>23 \times 4 =</math></p> <p>Ones first:</p> <div style="display: flex; align-items: center; justify-content: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;">  </div> <div style="border: 1px dashed black; padding: 5px; margin-right: 10px;">  </div>  </div> <div style="text-align: center; margin: 10px 0;"> <p><math>3 \text{ ones} \times 4 = 12 \text{ ones}</math> <math>12 \text{ ones} = 1 \text{ ten } 2 \text{ ones}</math></p> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;">  </div> <div style="text-align: center; margin-top: 10px;"> <p><math>2 \text{ tens} \times 4 = 8 \text{ tens}</math></p> </div>	<p>Children can draw their own dienes when representing the concrete resources.</p>	<p><math>24 \times 6</math> becomes</p> <div style="text-align: center; margin: 10px 0;"> <table style="border-collapse: collapse; margin: auto;"> <tr><td style="padding: 0 10px;">2</td><td style="padding: 0 10px;">4</td><td></td></tr> <tr><td style="padding: 0 10px;">x</td><td style="padding: 0 10px;">6</td><td></td></tr> <tr><td style="padding: 0 10px;">1</td><td style="padding: 0 10px;">4</td><td style="padding: 0 10px;">4</td></tr> <tr><td style="padding: 0 10px;">2</td><td style="padding: 0 10px;"> </td><td style="padding: 0 10px;"> </td></tr> </table> <p style="text-align: right; margin-top: 5px;">← underneath</p> </div> <p>Find the product of 27 and 8</p> <p>When children are confident with 2-digit <math>\times</math> 1-digit, they should progress to 3-digit <math>\times</math> 1-digit (regrouping ones as tens first, followed by regrouping tens as hundreds then combining them and regrouping in both columns).</p>	2	4		x	6		1	4	4	2		
2	4														
x	6														
1	4	4													
2															



# Boothferry Primary School Calculation Policy



# Y3 DIVISION

Strategy <b>Key Vocabulary</b> NC objective	Concrete	Pictorial	Abstract
1. Arrays <b>Rectangle, square, divisor, multiply, divide, 'is equal to'</b> <b>Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.</b>	Use counters/ cubes to create arrays (must make a square/ rectangle). 	Using squares in books, draw arrays and write related division and multiplication facts. Ensure children know which number should be the divisor for different representations. $15 \div 5 = 3$ $15 \div 3 = 5$ 	Simple fact family for a single array: $5 \times 3 = 15$ $3 \times 5 = 15$ $15 \div 5 = 3$ $15 \div 3 = 5$ Extended fact family (4 additional calculations) reiterating that = means 'is equal to' (not the answer). $15 = 5 \times 3$ $15 = 3 \times 5$ $3 = 15 \div 5$ $5 = 15 \div 3$
2. Division (without regrouping) <b>Equal, same, group, divisor, groups of, divide</b> <b>Write and calculate mathematical statements for division using the multiplication tables that they know, using mental methods.</b>	Use dienes/place value counters to aid understanding. $68 \div 2 = 34$ $6 \text{ tens} \div 2 = 3 \text{ tens}$ $8 \text{ ones} \div 2 = 4 \text{ ones}$ $3 \text{ tens} + 4 \text{ ones}$ 	Use the part-part-whole model to partition numbers into their place value components.  $6 \text{ tens} \div 2$ $8 \text{ ones} \div 2$	$84 \div 4 = \boxed{20} + \boxed{1}$ $= \boxed{21}$ Children will come to use this partitioning method as a mental division strategy (particularly for numbers which have digits that are divisible by the divisor exactly).



# Boothferry Primary School Calculation Policy



3.Division with regrouping  
**Regroup, partition, tens, ones**  
 Write and calculate mathematical statements for division using the multiplication tables that they know, progressing to formal written methods.

$52 \div 4 =$

Regroup the fifth ten into 10 ones then divide 12 ones by 4

Use the part-part-whole model to partition numbers in a way that are easily divisible by their divisor by using known facts.

$52 \div 4 =$

$40 \div 4 = 10$      $12 \div 4 = 3$   
 $10 + 3 = 13$

Introduction of formal written method should be done alongside dienes/part-part-whole model which children are familiar with.

$96 \div 8 =$

1 ten + 2 ones = 12  $\longleftrightarrow$  12

8	9	6
	-	8
		0
	1	6
	-	1
		6
		0

$96 \div 8 = 12$

# Y3 DIVISION