

## KEY STAGE 1

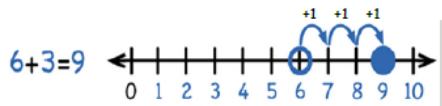
Children in Years 1 and 2 will be given a really solid foundation in the basic building blocks of mental and written arithmetic. Through being taught place value, children will develop an understanding of how numbers work, so that they are confident with 2-digit numbers and beginning to read and say numbers above 100.

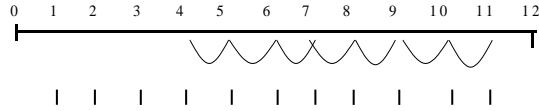
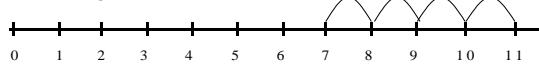
**Addition and Subtraction:** A focus on number bonds, first via practical hands-on experiences and subsequently using memorisation techniques, enables a good grounding in these crucial facts, and ensures that all children leave Year 2 knowing the pairs of numbers which make all the numbers up to 10 at least. Children will also have experienced and been taught pairs to 20. Children's knowledge of number facts enables them to add several 1-digit numbers, and to add/subtract a 1-digit number to/from a 2-digit number. Another important conceptual tool is the ability to add/subtract 1 or 10, and to understand which digit changes and why. This understanding is extended to enable children to add and subtract multiples of 10 to and from any 2-digit number. The most important application of this knowledge is the ability to add or subtract any pair of 2-digit numbers by counting on or back in 10s and 1s. Children may extend this to adding by partitioning numbers into 10s and 1s.

**Multiplication and Division:** Children will be taught to count in 2s, 3s, 5s and 10s, and will relate this skill to repeated addition. Children will meet and begin to learn the associated  $\times 2$ ,  $\times 3$ ,  $\times 5$  and  $\times 10$  tables. Engaging in a practical way with the concept of repeated addition and the use of arrays enables children to develop a preliminary understanding of multiplication, and asking them to consider how many groups of a given number make a total will introduce them to the idea of division. Children will also be taught to double and halve numbers, and will thus experience scaling up or down as a further aspect of multiplication and division.

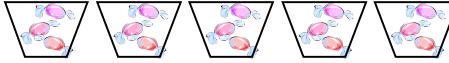
**Fractions:** Fractions will be introduced as numbers and as operators, specifically in relation to halves, quarters and thirds.

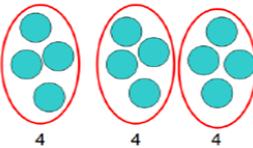
### Year 1

	Mental calculation	Recording calculations	Default for ALL children
<b>Y1</b> +	Number bonds ('story' of 5, 6, 7, 8, 9 and 10) Count on in 1s from a given 2-digit number Add two 1-digit numbers Add three 1-digit numbers, spotting doubles or pairs to 10 Count on in 10s from any given 2-digit number Add 10 to any given 2-digit number Use number facts to add 1-digit numbers to 2-digit numbers e.g. Use $4 + 3$ to work out $24 + 3$ , $34 + 3$ Add by putting the larger number first.	Use numbered number lines (prepared in books or using practical number lines) to add, by counting on in ones. Encourage children to start with the <b>larger</b> number and count on. Children will record calculations horizontally with one digit or symbol in each square of their maths book.    Some children may construct their own lines.	Pairs with a total of 10 Count in 1s Count in 10s Count on 1 from any given 2-digit number

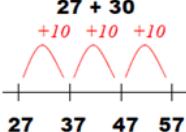
	<p>Use bead strings to illustrate bridging through 10 and counting on.</p> <p><b>8 + 5</b></p>  <p>Use counting objects to build on and revise combining groups from work completed in Early Years.</p>	<p>(Teacher model number lines with missing numbers)</p> <p>(Teachers model jottings appropriate for larger numbers)</p> <p><b>+ = signs and missing numbers</b></p> <p> <math>3 + 4 = \square</math>      <math>\square = 3 + 4</math>  <math>3 + \square = 7</math>      <math>7 = \square + 4</math>  <math>\square + 4 = 7</math>      <math>7 = 3 + \square</math>  <math>\square + \nabla = 7</math>      <math>7 = \square + \nabla</math> </p>	
	<p><b>Key Vocabulary</b></p>	<p>add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, tens, ones</p>	
<b>Y1</b> <hr/> <b>-</b>	<p>Number bonds ('story' of 5, 6, 7, 8, 9 and 10)  Count back in 1s from a given 2-digit number  Subtract one 1-digit number from another  Count back in 10s from any given 2-digit number  Subtract 10 from any given 2-digit number  Use number facts to subtract 1-digit numbers from 2-digit numbers  e.g. Use <math>7 - 2</math> to work out <math>27 - 2</math>, <math>37 - 2</math></p>	<p><b>Number lines (numbered)</b></p> <p>11 – 7 (Counting back)</p>  <p>The difference between 7 and 11  (Counting up)</p> 	<p>Pairs with a total of 10  Count back in 1s from 20 to 0  Count back in 10s from 100 to 0  Count back 1 from any given 2-digit number</p>

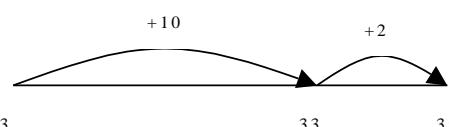
	<p><b>Recording by</b></p> <ul style="list-style-type: none"> <li>• drawing jumps on prepared lines</li> <li>• constructing own lines</li> <li>• writing calculations using the – and = signs with one digit or symbol in each square of their maths book.</li> </ul> <p><b>Pictures / marks</b></p> <p>Sam spent 4p. What was his change from 10p?</p> <p><b>- = signs and missing numbers</b></p> <table border="0"> <tbody> <tr> <td><math>7 - 3 = \square</math></td> <td><math>\square = 7 - 3</math></td> </tr> <tr> <td><math>7 - \square = 4</math></td> <td><math>4 = \square - 3</math></td> </tr> <tr> <td><math>\square - 3 = 4</math></td> <td><math>4 = 7 - \square</math></td> </tr> <tr> <td><math>\square - \nabla = 4</math></td> <td><math>4 = \square - \nabla</math></td> </tr> </tbody> </table> <p>(Teachers model jottings appropriate for larger numbers)</p>	$7 - 3 = \square$	$\square = 7 - 3$	$7 - \square = 4$	$4 = \square - 3$	$\square - 3 = 4$	$4 = 7 - \square$	$\square - \nabla = 4$	$4 = \square - \nabla$	
$7 - 3 = \square$	$\square = 7 - 3$									
$7 - \square = 4$	$4 = \square - 3$									
$\square - 3 = 4$	$4 = 7 - \square$									
$\square - \nabla = 4$	$4 = \square - \nabla$									
	<p>Key Vocabulary</p>	<p>equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? Tens, ones</p>								
<b>Y1</b> <b>x</b>	<p>Begin to count in 2s, 5s and 10s Begin to say what three 5s are by counting in 5s, or what four 2s are by counting in 2s, etc. Double numbers to 10</p>	<p><b>Pictures and symbols</b> There are 3 sweets in one bag. How many sweets are there in 5 bags?</p>	<p>Begin to count in 2s and 10s Double numbers to 5 using fingers</p>							

	 <p>(Recording on a number line modelled by the teacher when solving problems)</p> <p>Use of bead strings to model groups of.</p>  <p><b>There are 3 sweets in one bag.</b>  <b>How many sweets are in 5 bags altogether?</b></p>  <p>Children to write calculations as repeated addition as above. Record 1 digit or symbol in a box.</p>	<p>Give children experience of counting equal group of objects in 2s, 5s and 10s.</p> <p>Present practical problem solving activities involving counting equal sets or groups.</p>	
Key Vocabulary		groups of, lots of, times, array, altogether, multiply, count, repeated addition.	
<b>Y1</b> $\div$	<p>Begin to count in 2s, 5s and 10s          Find half of even numbers to 12 and know it is hard to halve odd numbers</p>	<p><b>Pictures / marks</b>          12 children get into teams of 4 to play a game. How many teams are there?</p>	<p>Begin to count in 2s and 10s          Find half of even numbers by sharing          Use lots of practical apparatus, arrays and picture representations</p>

	<p>Find half of even numbers by sharing</p>  <p><b>12 shared between 3 is 4</b></p> <p>Begin to use visual and concrete arrays or 'sets of' to find how many sets of a small number make a larger number.</p> <p><b>Grouping i.e.</b></p> <p><i>How many groups of 4 can be made with 12 stars? = 3</i></p> 		<p>Be taught to understand the difference between "grouping" objects (How many groups of 2 can you make?) and "sharing" (Share these sweets between 2 people).</p>
	<p><b>Key Vocabulary</b></p> <p>share, share equally, one each, two each..., group, groups of, lots of, array</p>		

## Year 2

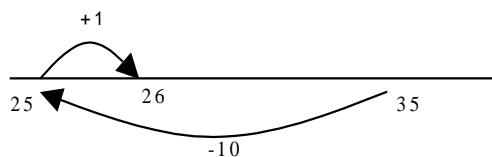
	Mental calculation	Recording calculations	Default for ALL children
<b>Y2 +</b>	<p>Number bonds – know all the pairs of numbers which make all the numbers to 12, and pairs with a total of 20</p> <p>Count on in 1s and 10s from any given 2-digit number</p> <p>Add two or three 1-digit numbers</p> <p>Add a 1-digit number to any 2-digit number using number facts, including bridging multiples of 10</p>	<p><b>Add tens to 2 digit numbers</b></p> <p><math>27 + 30</math>  <math>+10 \quad +10 \quad +10</math>  </p> <p><b>Add tens and ones to a number</b></p>	<p>Know pairs of numbers which make each total up to 10</p> <p>Add two 1-digit numbers</p> <p>Add a 1-digit number to a 2-digit number by counting on in 1s</p> <p>Add 10 and small multiples of 10 to a 2-digit number by counting on in 10s</p>

	<p>e.g. <math>45 + 4</math> e.g. <math>38 + 7</math> Add 10 and small multiples of 10 to any given 2-digit number Add any pair of 2-digit numbers</p>	<p>e.g. <math>23 + 12 = 35</math></p>  <p><b>Adding using partitioning</b></p> $\begin{array}{r} 23 + 12 \\ 20 + 3 \\ 10 + 2 \\ \hline 30 + 5 \\ \hline 35 \end{array}$ <p><b>Simple addition with no partitioning</b></p> $\begin{array}{r} 34 \\ + 35 \\ \hline 69 \end{array}$ <p><i>Progress to using 3 and 4 digit numbers as appropriate for the cohort.</i></p> <p>Children to write calculations in columns as above. Record 1 digit or symbol in a box.</p>
	Key vocabulary	add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, <b>partition, addition, column, tens boundary</b>

<p><b>Y2</b></p> <p>Number bonds – know all the pairs of numbers which make all the numbers to 12</p> <p>Count back in 1s and 10s from any given 2-digit number</p> <p>Subtract a 1-digit number from any 2-digit number using number facts, including bridging multiples of 10</p> <ul style="list-style-type: none"> <li>e.g. <math>56 - 3</math></li> <li>e.g. <math>53 - 5</math></li> </ul> <p>Subtract 10 and small multiples of 10 from any given 2-digit number</p> <p>Subtract any pair of 2-digit numbers by counting back in 10s and 1s or by counting up</p>	<p><b>Counting back along a number line.</b></p> <p>Start with the largest number, Partition the second number into smaller steps and use these as the jumps back.</p> <p>e.g. <math>47 - 23 = 24</math></p> <p>Progress to using more efficient jumps...</p> <p>e.g. <math>47 - 23 = 24</math></p> <p><b>- = signs and missing numbers</b></p> <p>Continue using a range of equations as in Year 1 but with appropriate numbers.</p> <p>Extend to <math>14 + 5 = 20 - \square</math></p> <p><b>Find a small difference by counting up</b></p> <p><math>42 - 39 = 3</math></p>	<p>Know pairs of numbers which make each total up to 10</p> <p>Subtract a 1-digit number from a 2-digit number by counting back in 1s</p> <p>Subtract 10 and small multiples of 10 from a 2-digit number by counting back in 10s</p>
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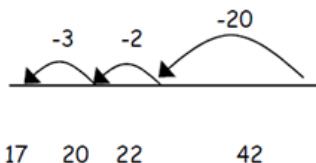
Subtract 9 or 11. Begin to add/subtract 19 or 21.

e.g.  $- 35 - 9 = 26$



#### **Bridging through 10**

e.g.  $42 - 25 = 17$

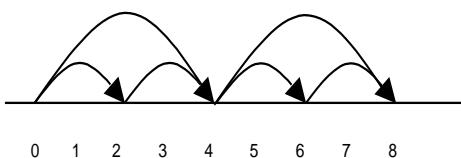


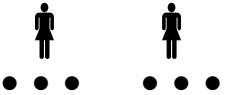
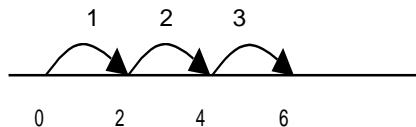
#### **Simple column subtraction (partitioning and not partitioning).**

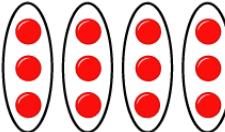
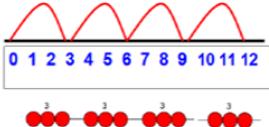
$$45 - 23 = 22$$

$$\begin{array}{r}
 40 + 5 \\
 -20 + 3 \\
 \hline
 20 + 2 \\
 \hline
 = 22
 \end{array}$$

		$  \begin{array}{r}  4\ 5 \\  -2\ 3 \\  \hline  2\ 2  \end{array}  $ <p><u>Progress to using 3 and 4 digit numbers as appropriate for the cohort.</u></p> <p>Children to write calculations in columns as above. Record 1 digit or symbol in a box.</p>									
	Key vocabulary	<p>equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? Tens, ones, difference, count on, strategy, partition.</p>									
<b>Y2</b> <b>×</b>	<p>Count in 2s, 5s and 10s          Begin to count in 3s          Begin to understand that multiplication is repeated addition and to use arrays              e.g. <math>3 \times 4</math> is three rows of 4 dots          Begin to learn the <math>\times 2</math>, <math>\times 3</math>, <math>\times 5</math> and <math>\times 10</math> tables, seeing these as 'lots of'              e.g. 5 lots of 2, 6 lots of 2, 7 lots of 2          Double numbers up to 20          Begin to double multiples of 5 to 100          Begin to double 2-digit numbers less than 50 with 1s digits of 1, 2, 3, 4 or 5</p>	<p><b>x = signs and missing numbers</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><math>7 \times 2 = \square</math></td> <td style="width: 50%;"><math>\square = 2 \times 7</math></td> </tr> <tr> <td><math>7 \times \square = 14</math></td> <td><math>14 = \square \times 7</math></td> </tr> <tr> <td><math>\square \times 2 = 14</math></td> <td><math>14 = 2 \times \square</math></td> </tr> <tr> <td><math>\square \times \nabla = 14</math></td> <td><math>14 = \square \times \nabla</math></td> </tr> </table> <p><b>Arrays and repeated addition</b></p> <p style="text-align: center;">  <math>4 \times 2</math> or <math>4 + 4</math>  <math>2 \times 4</math>          or repeated addition   <math>2 + 2 + 2 + 2</math> </p> <p>This can also be shown on a number line as below...</p>	$7 \times 2 = \square$	$\square = 2 \times 7$	$7 \times \square = 14$	$14 = \square \times 7$	$\square \times 2 = 14$	$14 = 2 \times \square$	$\square \times \nabla = 14$	$14 = \square \times \nabla$	<p>Count in 2s, 5s and 10s          Begin to use and understand simple arrays              e.g. <math>2 \times 4</math> is two lots of four          Double numbers up to 10          Double multiples of 10 to 50          Use bead strings, number lines, arrays, and repeated addition where necessary</p>
$7 \times 2 = \square$	$\square = 2 \times 7$										
$7 \times \square = 14$	$14 = \square \times 7$										
$\square \times 2 = 14$	$14 = 2 \times \square$										
$\square \times \nabla = 14$	$14 = \square \times \nabla$										

	 <p><b>Partitioning</b></p> <p><del>15 x 2</del></p> <p>20 + 10 = 30</p> <p><i>OR</i></p> $  \begin{array}{r}  \times \quad   \quad 1 \quad 0 \quad   \quad 5 \\  \hline  2 \quad   \quad 2 \quad 0 \quad   \quad 1 \quad 0 \\  \hline  \end{array}  $ <p><b>Columns for children who are ready</b></p> $  \begin{array}{r}  1 \quad 5 \\  \times \quad 2 \\  \hline  2 \quad 0 \\  1 \quad 0 \\  \hline  3 \quad 0  \end{array}  $	
Key vocabulary	groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, <b>column</b> , <b>row</b> , <b>commutative</b> , <b>sets of</b> , <b>equal groups</b> , <b>times as big as</b> , <b>once</b> , <b>twice</b> , <b>three times...</b>	

<p><b>Y2</b></p> <p><b>÷</b></p>	<p>Count in 2s, 5s and 10s Begin to count in 3s Using fingers, say where a given number is in the 2s, 5s or 10s count e.g. <i>8 is the fourth number when I count in 2s</i> Relate division to grouping e.g. <i>How many groups of 5 in 15?</i> Halve numbers to 20 Begin to halve numbers to 40 and multiples of 10 to 100 Find <math>\frac{1}{2}</math>, <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math> and <math>\frac{3}{4}</math> of a quantity of objects and of amounts (whole number answers)</p>	<p><b><u>÷ = signs and missing numbers</u></b></p> <p><math>6 \div 2 = \square</math>      <math>\square = 6 \div 2</math>  <math>6 \div \square = 3</math>      <math>3 = 6 \div \square</math>  <math>\square \div 2 = 3</math>      <math>3 = \square \div 2</math>  <math>\square \div \nabla = 3</math>      <math>3 = \square \div \nabla</math></p> <p><b><u>Understand division as sharing and grouping</u></b></p> <p>Sharing – 6 sweets are shared between 2 people. How many do they have each?</p>  <p><math>6 \div 2</math> can be modelled as:</p> <p><b><u>Grouping</u></b> – There are 6 sweets. How many people can have 2 each? (How many 2's make 6?)</p> 	<p>Count in 2s, 5s and 10s Say how many rows in a given array e.g. <i>How many rows of 5 are in an array of <math>3 \times 5</math>?</i> Halve numbers to 12 Find <math>\frac{1}{2}</math> of amounts</p>
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	<p><u>Arrays</u></p>  $\begin{array}{r} 12 \div 3 = 4 \\ \hline \end{array}$ <p>Use bead strings, objects or number lines to support division. Record horizontally using 1 digit or symbol in a box.</p>  <p><b>12 ÷ 3 = 4</b></p>	
Key vocabulary	share, share equally, one each, two each..., group, equal groups of, lots of, array, <b>divide, divided by, divided into, division, grouping, number line, left, left over</b> .	

## LOWER KEY STAGE 2

In Lower Key Stage 2, children build on the concrete and conceptual understandings they have gained in Key Stage 1 to develop a real mathematical understanding of the four operations, in particular developing arithmetical competence in relation to larger numbers.

<b>Addition and subtraction:</b> Children are taught to use place value and number facts to add and subtract numbers mentally and they will develop a range of strategies to enable them to discard the 'counting in 1s' or fingers-based methods of Key Stage 1. In particular, children will learn to add and subtract multiples and near multiples of 10, 100 and 1000, and will become fluent in complementary addition as an accurate means of achieving fast and accurate answers to 3-digit subtractions. Standard written methods for adding larger numbers are taught, learned and consolidated, and written column subtraction is also introduced.	<b>Multiplication and division:</b> This key stage is also the period during which all the multiplication and division facts are thoroughly memorised, including all facts up to $12 \times 12$ . Efficient written methods for multiplying or dividing a 2-digit or 3-digit number by a 1-digit number are taught, as are mental strategies for multiplication or division with large but 'friendly' numbers, e.g. when dividing by 5 or multiplying by 20.	<b>Fractions and decimals:</b> Children will develop their understanding of fractions, learning to reduce a fraction to its simplest form, as well as finding non-unit fractions of amounts and quantities. The concept of a decimal number is introduced and children consolidate a firm understanding of 1-place decimals, multiplying and dividing whole numbers by 10 and 100.
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## Year 3

	<b>Mental calculation</b>	<b>Written calculation</b>	<b>Default for ALL children</b>
<b>Y3</b> +	<p>Know pairs with each total to 20 e.g. <math>2 + 6 = 8</math>, <math>12 + 6 = 18</math>, <math>7 + 8 = 15</math></p> <p>Know pairs of multiples of 10 with a total of 100</p> <p>Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning</p> <p>Add multiples and near multiples of 10 and 100</p> <p>Perform place-value additions without a struggle e.g. <math>300 + 8 + 50 = 358</math></p> <p>Use place value and number facts to add a 1-digit or 2-digit number to a 3-digit number e.g. <math>104 + 56</math> is 160 since <math>104 + 50 = 154</math> and <math>6 + 4 = 10</math> <math>676 + 8</math> is 684 since <math>8 = 4 + 4</math> and <math>76 + 4 + 4 = 84</math></p> <p>Add pairs of 'friendly' 3-digit numbers</p>	<p>Use expanded column addition to add two or three 3-digit numbers or three 2-digit numbers</p> <p>Begin to use compact column addition to add numbers with 3 digits</p> <p>Begin to add like fractions e.g. <math>\frac{3}{8} + \frac{1}{8} + \frac{1}{8}</math></p> <p>Recognise fractions that add to 1 e.g. <math>\frac{1}{4} + \frac{3}{4}</math> e.g. <math>\frac{3}{5} + \frac{2}{5}</math></p>	<p>Know pairs of numbers which make each total up to 10, and which total 20</p> <p>Add two 2-digit numbers by counting on in 10s and 1s e.g. <math>56 + 35</math> is <math>56 + 30</math> and then add the 5</p> <p>Understand simple place-value additions e.g. <math>200 + 40 + 5 = 245</math></p> <p>Use place value to add multiples of 10 or 100</p>

	<p>e.g. <math>320 + 450</math>          Begin to add amounts of money using partitioning</p>	<p><b>Expanded column method</b>          Set out 1 digit in each square of maths book. Keep the + sign to the left of the calculation.</p> $  \begin{array}{r}  183 \\  +142 \\  \hline  5 \\  120 \\  200 \\  \hline  325  \end{array}  $ <p><b>Adding in columns</b></p> $  \begin{array}{r}  274 \\  +324 \\  \hline  598  \end{array}  $ <p><b>Adding in columns with carrying.</b>          Add the units first. The carried numbers are to go under the answer box! Set out 1 digit in each square of maths book. Keep the + sign to the left of the calculation.</p> $  \begin{array}{r}  389 \\  +322 \\  \hline  711 \\  \hline  11  \end{array}  $	
	Key vocabulary	add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, <b>hundreds boundary, increase, vertical, carry', expanded, compact</b>	

# Thornaby Church of England Primary School

# Calculation Policy

<p><b>Y3</b></p> <p>—</p> <p>Know pairs with each total to 20  e.g. <math>8 - 2 = 6</math>  e.g. <math>18 - 6 = 12</math>  e.g. <math>15 - 8 = 7</math></p> <p>Subtract any two 2-digit numbers</p> <p>Perform place-value subtractions without a struggle  e.g. <math>536 - 30 = 506</math></p> <p>Subtract 2-digit numbers from numbers &gt; 100 by counting up  e.g. <i>143 – 76 is done by starting at 76. Then add 4 (80), then add 20 (100), then add 43, making the difference a total of 67</i></p> <p>Subtract multiples and near multiples of 10 and 100</p> <p>Subtract, when appropriate, by counting back or taking away, using place value and number facts</p> <p>Find change from £1, £5 and £10</p>	<p>Use counting up as an informal written strategy for subtracting pairs of 3-digit numbers  e.g. <math>423 - 357</math></p> <p>Begin to subtract like fractions  e.g. <math>\frac{7}{8} - \frac{3}{8}</math></p> <p><b>Partitioning and recombining</b></p> <p>Set out 1 digit in each square of maths book. Keep the + sign to the left of the calculation.</p> <p><b>87 – 43</b></p> <p><b>80 + 7</b></p> <p><b>40 + 3</b></p> <hr/> <p><b>40 + 4</b></p> <hr/> <p><b>44</b></p> <p>Progress to columns without partitioning and using 3 digit and 4 digit numbers as quickly as possible.</p> <p><b>Subtracting in columns</b></p> <p><b>6 7 4</b></p> <p><b>- 3 2 3</b></p> <hr/> <p><b>3 5 1</b></p>	<p>Know pairs of numbers which make each total up to 10, and which total 20</p> <p>Count up to subtract 2-digit numbers  e.g. <math>72 - 47</math></p> <p>Subtract multiples of 5 from 100 by counting up  e.g. <math>100 - 35</math></p> <p>Subtract multiples of 10 and 100</p>
	<p><b>Key Vocabulary</b></p> <p>equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? difference, count on, strategy, partition, tens, units, <b>exchange, decrease, hundreds, value, digit</b></p>	

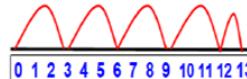
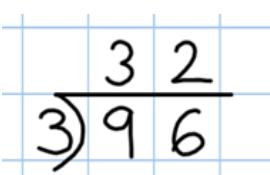
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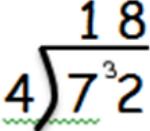
# Calculation Policy

<p><b>Y3</b></p> <p><b>×</b></p> <p>Know by heart all the multiplication facts in the <math>\times 2</math>, <math>\times 3</math>, <math>\times 4</math>, <math>\times 5</math>, <math>\times 8</math> and <math>\times 10</math> tables</p> <p>Multiply whole numbers by 10 and 100</p> <p>Recognise that multiplication is commutative</p> <p>Use place value and number facts in mental multiplication e.g. <math>30 \times 5</math> is <math>15 \times 10</math></p> <p>Partition teen numbers to multiply by a 1-digit number e.g. <math>3 \times 14</math> as <math>3 \times 10</math> and <math>3 \times 4</math></p> <p>Double numbers up to 50</p>	<p>Initially use partitioning (grid multiplication) to multiply in the Autumn term as familiarity for new chn. 2-digit and 3-digit numbers by 'friendly' 1-digit numbers.</p> <p>Eg. <math>23 \times 8 = 184</math></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr> <td>X</td> <td>20</td> <td>3</td> </tr> <tr> <td>8</td> <td>160</td> <td>24</td> </tr> </table> <p>More able chn should approximate first i.e. <math>20 \times 8</math>.</p> <p><b>Progress to teaching column multiplication.</b></p> <p style="text-align: center;"><b><math>123 \times 5</math></b></p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <tr> <td><b>1st Step</b></td> <td><b>2nd Step</b></td> <td><b>3rd Step</b></td> </tr> <tr> <td><b>123</b></td> <td><b>123</b></td> <td><b>123</b></td> </tr> <tr> <td><math>\times</math> <b>5</b></td> <td><math>\times</math> <b>5</b></td> <td><math>\times</math> <b>5</b></td> </tr> <tr> <td><b>5</b></td> <td><b>15</b></td> <td><b>615</b></td> </tr> <tr> <td><b>1</b></td> <td><b>11</b></td> <td><b>11</b></td> </tr> </table> <p>Again more able chn should approximate first.</p>	X	20	3	8	160	24	<b>1st Step</b>	<b>2nd Step</b>	<b>3rd Step</b>	<b>123</b>	<b>123</b>	<b>123</b>	$\times$ <b>5</b>	$\times$ <b>5</b>	$\times$ <b>5</b>	<b>5</b>	<b>15</b>	<b>615</b>	<b>1</b>	<b>11</b>	<b>11</b>	<p>Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.</p> <p>Double given tables facts to get others</p> <p>Double numbers up to 25 and multiples of 5 to 50</p>
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8	160	24																					
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<p>Key Vocabulary</p>	<p>groups of, lots of, times, array, altogether, multiply, count, multiplied by, column, row, commutative, sets of, equal groups, times, _times as big as, once, twice, three times..., <b>partition, grid method, column method, multiple, product, tens, units, value</b></p>																						

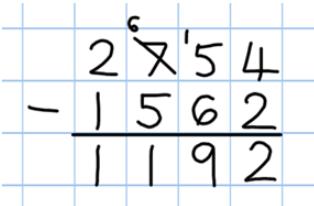
# Thornaby Church of England Primary School

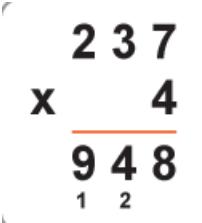
# Calculation Policy

<p><b>Y3</b></p> <p><b>÷</b></p> <p>Know by heart all the division facts derived from the <math>\times 2</math>, <math>\times 3</math>, <math>\times 4</math>, <math>\times 5</math>, <math>\times 8</math> and <math>\times 10</math> tables</p> <p>Divide whole numbers by 10 or 100 to give whole number answers</p> <p>Recognise that division is not commutative</p> <p>Use place value and number facts in mental division</p> <p>e.g. <math>84 \div 4</math> is half of 42</p> <p>Divide larger numbers mentally by subtracting the 10th multiple as appropriate, including those with remainders</p> <p>e.g. <math>57 \div 3</math> is <math>10 + 9</math> as <math>10 \times 3 = 30</math> and <math>9 \times 3 = 27</math></p> <p>Halve even numbers to 100, halve odd numbers to 20</p>	<p>Initially use counting along a number line (repeated addition) to divide in the Autumn term as familiarity for new chn. 2-digit and 3-digit numbers by 'friendly' 1-digit numbers.</p> <p>Perform divisions just above the 10th multiple using horizontal or vertical jottings and understanding how to give a remainder as a whole number.</p> <p><b>13 ÷ 3 =      4 r 1</b></p>  <p><b>Progress to simple bus stop method.</b></p>  <p>Remind children of correct place value, that 96 is equal to 90 and 6, but in short division, pose:</p> <ul style="list-style-type: none"> <li>- How many 3's in 9? = 3, and record it above the <b>9 tens</b>.</li> <li>- How many 3's in 6? = 2, and record it above the <b>6 units</b>.</li> </ul>	<p>Know by heart the division facts derived from the <math>\times 2</math>, <math>\times 3</math>, <math>\times 5</math> and <math>\times 10</math> tables</p> <p>Halve even numbers up to 50 and multiples of 10 to 100</p> <p>Perform divisions within the tables including those with remainders</p> <p>e.g. <math>38 \div 5</math></p>
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	<p>Progress to using remainders within the bus stop.</p> <p></p> <p>Once children demonstrate a full understanding of remainders, and also the short division method taught, they can be taught how to use the method when remainders occur within the calculation (e.g. 96÷4), and be taught to „carry” the remainder onto the next digit. <b>If needed, children should use the number line to work out individual division facts that occur which they are not yet able to recall mentally.</b></p> <p>Find unit fractions of quantities and begin to find non-unit fractions of quantities.</p>	
	<p>Key Vocabulary</p> <p>share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, <b>inverse, short division, „carry”, remainder, multiple, bus stop.</b></p>	

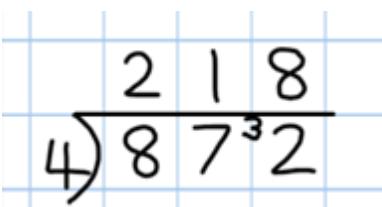
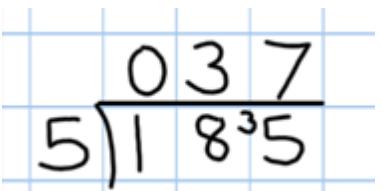
Year 4																																																																											
	Mental calculation	Written calculation	Default for ALL children																																																																								
Y4 +	<p>Add any two 2-digit numbers by partitioning or counting on</p> <p>Know by heart/quickly derive number bonds to 100 and to £1</p> <p>Add to the next 100, £1 and whole number</p> <p>e.g. <math>234 + 66 = 300</math></p> <p>e.g. <math>3 \cdot 4 + 0 \cdot 6 = 4</math></p> <p>Perform place-value additions without a struggle</p> <p>e.g. <math>300 + 8 + 50 + 4000 = 4358</math></p> <p>Add multiples and near multiples of 10, 100 and 1000</p> <p>Add £1, 10p, 1p to amounts of money</p> <p>Use place value and number facts to add 1-, 2-, 3- and 4-digit numbers where a mental calculation is appropriate</p> <p>e.g. 4004 + 156 by knowing that <math>6 + 4 = 10</math> and that <math>4004 + 150 = 4154</math> so the total is 4160</p>	<p>Column addition for 3-digit and 4-digit numbers</p> <p>e.g.</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: center;">5</td><td style="text-align: center;">3</td><td style="text-align: center;">4</td><td style="text-align: center;">7</td></tr> <tr><td style="text-align: center;">2</td><td style="text-align: center;">2</td><td style="text-align: center;">8</td><td style="text-align: center;">6</td></tr> <tr><td style="text-align: center;">+</td><td style="text-align: center;">1</td><td style="text-align: center;">4</td><td style="text-align: center;">9</td></tr> <tr><td></td><td style="text-align: center;">2</td><td style="text-align: center;">1</td><td></td></tr> <tr><td></td><td style="text-align: center;">9</td><td style="text-align: center;">1</td><td style="text-align: center;">2</td></tr> <tr><td></td><td></td><td></td><td style="text-align: center;">8</td></tr> </table> <p>Move away from expanded forms altogether to a more compact method <b>adding units first</b>, and „carrying“ numbers <b>underneath</b> the calculation. Also include money and measures calculations.</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: right; padding-right: 10px;">3</td><td style="text-align: right; padding-right: 10px;">5</td><td style="text-align: right; padding-right: 10px;">1</td><td style="text-align: right; padding-right: 10px;">7</td></tr> <tr><td style="text-align: right; padding-right: 10px;">+</td><td style="text-align: right; padding-right: 10px;">3</td><td style="text-align: right; padding-right: 10px;">9</td><td style="text-align: right; padding-right: 10px;">6</td></tr> <tr><td colspan="4" style="border-top: 1px solid black; border-bottom: 1px solid black; text-align: center; padding-top: 5px; padding-bottom: 5px;">3</td></tr> <tr><td colspan="4" style="text-align: center; padding-top: 5px; padding-bottom: 5px;">9</td></tr> <tr><td colspan="4" style="text-align: center; padding-top: 5px; padding-bottom: 5px;">1</td></tr> <tr><td colspan="4" style="text-align: center; padding-top: 5px; padding-bottom: 5px;">1</td></tr> </table> <p><b>Extend to decimals in the context of money (vertically)</b></p> <p>£ 2.50 + £ 1.75 = £ 4.25</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td style="text-align: right; padding-right: 10px;">£</td><td style="text-align: right; padding-right: 10px;">2</td><td style="text-align: right; padding-right: 10px;">5</td><td style="text-align: right; padding-right: 10px;">0</td></tr> <tr><td style="text-align: right; padding-right: 10px;">+</td><td style="text-align: right; padding-right: 10px;">£</td><td style="text-align: right; padding-right: 10px;">1</td><td style="text-align: right; padding-right: 10px;">7</td></tr> <tr><td colspan="4" style="border-top: 1px solid black; border-bottom: 1px solid black; text-align: center; padding-top: 5px; padding-bottom: 5px;">£</td></tr> <tr><td colspan="4" style="text-align: center; padding-top: 5px; padding-bottom: 5px;">4</td></tr> <tr><td colspan="4" style="text-align: center; padding-top: 5px; padding-bottom: 5px;">2</td></tr> <tr><td colspan="4" style="text-align: center; padding-top: 5px; padding-bottom: 5px;">5</td></tr> </table>	5	3	4	7	2	2	8	6	+	1	4	9		2	1			9	1	2				8	3	5	1	7	+	3	9	6	3				9				1				1				£	2	5	0	+	£	1	7	£				4				2				5				<p>Add any 2-digit numbers by partitioning or counting on</p> <p>Number bonds to 20</p> <p>Know pairs of multiples of 10 with a total of 100</p> <p>Add ‘friendly’ larger numbers using knowledge of place value and number facts</p> <p>Use expanded column addition to add 3 and 4-digit numbers.</p>
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		<p>Add like fractions e.g. <math>\frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5}</math> Be confident with fractions that add to 1 and fraction complements to 1 e.g. <math>\frac{2}{3} + \underline{\quad} = 1</math></p>	
	Key Vocabulary	add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, „carry”, expanded, compact, <b>thousands, hundreds, digits, inverse.</b>	
<b>Y4</b> -	Subtract any two 2-digit numbers Know by heart/quickly derive number bonds to 100 Perform place-value subtractions without a struggle e.g. $4736 - 706 = 4030$ Subtract multiples and near multiples of 10, 100, 1000, £1 and 10p Subtract multiples of 0·1 Subtract by counting up e.g. $503 - 368$ is done by adding $368 + 2 + 30 + 100 + 3$ (so we added 135) Subtract, when appropriate, by counting back or taking away, using place value and number facts Subtract £1, 10p, 1p from amounts of money Find change from £10, £20 and £50	Use expanded column subtraction for 3- and 4-digit numbers Use complementary addition to subtract amounts of money, and for subtractions where the larger number is a near multiple of 1000 or 100 e.g. $2002 - 1865$ <b>Introduce compact column subtraction</b>  Chn should be taught to use the inverse calculation to check answers. Subtract like fractions e.g. $\frac{4}{5} - \frac{3}{5} = \frac{1}{5}$	Use counting up with confidence to solve most subtractions, including finding complements to multiples of 100 e.g. $512 - 287$ e.g. $67 + \underline{\quad} = 100$

		Use fractions that add to 1 to find fraction complements to 1 e.g. $1 - \frac{2}{3} = \frac{1}{3}$	
	Key Vocabulary	equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, <b>inverse</b>	
Y4 x	<p>Know by heart all the multiplication facts up to <math>12 \times 12</math></p> <p>Recognise factors up to 12 of 2-digit numbers</p> <p>Multiply whole numbers and 1-place decimals by 10, 100, 1000</p> <p>Multiply multiples of 10, 100 and 1000 by 1-digit numbers</p> <p>e.g. <math>300 \times 6</math> e.g. <math>4000 \times 8</math></p> <p>Use understanding of place value and number facts in mental multiplication</p> <p>e.g. <math>36 \times 5</math> is half of <math>36 \times 10</math> e.g. <math>50 \times 60 = 3000</math></p> <p>Partition 2-digit numbers to multiply by a 1-digit number mentally</p> <p>e.g. <math>4 \times 24</math> as <math>4 \times 20</math> and <math>4 \times 4</math></p> <p>Multiply near multiples by rounding</p> <p>e.g. <math>33 \times 19</math> as <math>(33 \times 20) - 33</math></p> <p>Find doubles to double 100 and beyond using partitioning</p> <p>Begin to double amounts of money</p> <p>e.g. £35.60 doubled is £71.20</p>	<p>Most children to use a vertical written method to multiply a 1-digit number by a 3-digit number e.g.</p>  <p>Some children may still require using partitioning.</p> <p><u>Partition</u></p> <p><math>123 \times 4 = 92</math></p> <p><math>123 \times 4 = (100 \times 4) + (20 \times 4) + (3 \times 4)</math>  <math>= (400) + (80) + (12)</math>  <math>= 492</math></p>	<p>Know by heart multiplication tables up to <math>10 \times 10</math></p> <p>Multiply whole numbers by 10 and 100</p> <p>Use the grid method to multiply a 2-digit or a 3-digit number by a number <math>\leq 6</math></p>
	Key Vocabulary	groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, _times as big as, once, twice, three times..., partition, grid method, total, multiple, product, inverse, <b>square, factor, integer, decimal, short/long multiplication, carry'</b>	

# Thornaby Church of England Primary School

# Calculation Policy

<p><b>Y4</b></p> <p><b>÷</b></p> <p>Know by heart all the division facts up to <math>144 \div 12</math>      Divide whole numbers by 10, 100, to give whole number answers or answers with 1 decimal place      Divide multiples of 100 by 1-digit numbers using division facts          e.g. <math>3200 \div 8 = 400</math>      Use place value and number facts in mental division          e.g. <math>245 \div 20</math> is half of <math>245 \div 10</math>      Divide larger numbers mentally by subtracting the 10th or 20th multiple as appropriate          e.g. <math>156 \div 6</math> is <math>20 + 6</math> as <math>20 \times 6 = 120</math> and <math>6 \times 6 = 36</math>      Find halves of even numbers to 200 and beyond using partitioning      Begin to halve amounts of money          e.g. half of £52·40 is £26·20</p>	<p>Use a written method to divide a 2-digit or a 3-digit number by a 1-digit number ()</p>   <p>When the answer for the <b>first column</b> is zero (1 ÷ 5, as in example), children could initially write a zero above to acknowledge its place, and must always carry the number (1) over to the next digit as a remainder.</p> <p>Give remainders as whole numbers.      Begin to reduce fractions to their simplest forms.      Find unit and non-unit fractions of larger amounts.</p>	<p>Know by heart all the division facts up to <math>100 \div 10</math>      Divide whole numbers by 10 and 100 to give whole number answers or answers with 1 decimal place      Perform divisions just above the 10th multiple using the written layout and understanding how to give a remainder as a whole number      Find unit fractions of amounts</p>
<p>Key Vocabulary</p>	<p>share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, <b>inverse, short division, carry, remainder, multiple, bus stop.</b></p>	

## UPPER KEY STAGE 2

Children move on from dealing mainly with whole numbers to performing arithmetic operations with both decimals and fractions.

**Addition and subtraction:** Children will consolidate their use of written procedures in adding and subtracting whole numbers with up to 6 digits and also decimal numbers with up to 2 decimal places. Mental strategies for adding and subtracting increasingly large numbers will also be taught. These will draw upon children's robust understanding of place value and knowledge of number facts. Negative numbers will be added and subtracted.

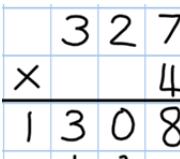
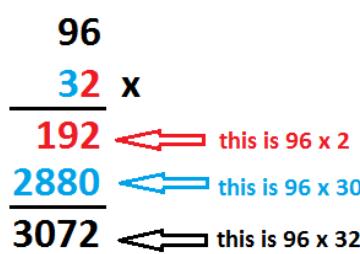
**Multiplication and division:** Efficient and flexible strategies for mental multiplication and division are taught and practised, so that children can perform appropriate calculations even when the numbers are large, such as  $40\ 000 \times 6$  or  $40\ 000 \div 8$ . In addition, it is in Years 5 and 6 that children extend their knowledge and confidence in using written algorithms for multiplication and division.

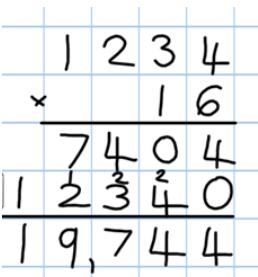
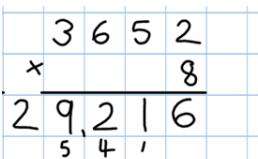
**Fractions, decimals, percentages and ratio:** Fractions and decimals are also added, subtracted, divided and multiplied, within the bounds of children's understanding of these more complicated numbers. Children will also calculate simple percentages and ratios.

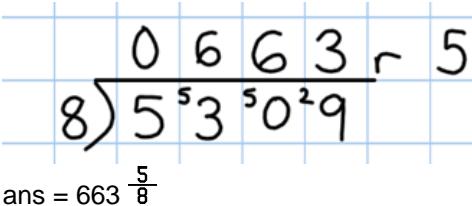
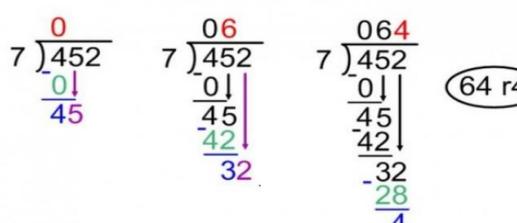
## Year 5

	Mental calculation	Written calculation	Default for ALL children
Y5 +	<p>Know number bonds to 1 and to the next whole number</p> <p>Add to the next 10 from a decimal number e.g. <math>13.6 + 6.4 = 20</math></p> <p>Add numbers with 2 significant digits only, using mental strategies e.g. <math>3.4 + 4.8</math> e.g. <math>23\ 000 + 47\ 000</math></p> <p>Add 1- or 2-digit multiples of 10, 100, 1000, 10 000 and 100 000 e.g. <math>8000 + 7000</math> e.g. <math>600\ 000 + 700\ 000</math></p> <p>Add near multiples of 10, 100, 1000, 10 000 and 100 000 to other numbers e.g. <math>82\ 472 + 30\ 004</math></p> <p>Add decimal numbers which are near multiples of 1 or 10, including money</p>	<p>Use column addition to add two or three whole numbers with up to 5 digits. e.g.  <math display="block">  \begin{array}{r}  1\ 3, 5\ 8\ 7 \\  + 2\ 2, 6\ 7\ 5 \\  \hline  3\ 6\ 2\ 6\ 2  \end{array}  </math> </p> <p>Use column addition to add any pair of 2-place decimal numbers, including amounts of money. e.g.  <math display="block">  \begin{array}{r}  £ 1\ 2 . 4\ 5 \\  + £ 3\ 9 . 2\ 0 \\  \hline  £ 5\ 1 . 6\ 5  \end{array}  </math> </p>	<p>Add numbers with only 2 digits which are not zeros e.g. <math>3.4 + 5.8</math></p> <p>Derive swiftly and without any difficulty number bonds to 100</p> <p>Add 'friendly' large numbers using knowledge of place value and number facts</p> <p>Use expanded column addition to add pairs of 4- and 5-digit numbers</p>

	<p>e.g. <math>6.34 + 1.99</math>  e.g. £34.59 + £19.95</p> <p>Use place value and number facts to add two or more 'friendly' numbers, including money and decimals</p> <p>e.g. <math>3 + 8 + 6 + 4 + 7</math>  e.g. <math>0.6 + 0.7 + 0.4</math>  e.g. <math>2056 + 44</math></p>	<p>Begin to add related fractions using equivalences  e.g. <math>\frac{1}{2} + \frac{1}{6} = \frac{3}{6} + \frac{1}{6}</math></p> <p>Choose the most efficient method in any given situation</p>	
	<p><b>Key Vocabulary</b></p>	add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, „carry“, expanded, compact, vertical, thousands, hundreds, digits, inverse & <b>decimal places, decimal point, tenths, hundredths, thousandths</b>	
<b>Y5</b> —	<p>Subtract numbers with 2 significant digits only, using mental strategies</p> <p>e.g. <math>6.2 - 4.5</math>  e.g. <math>72\ 000 - 47\ 000</math></p> <p>Subtract 1- or 2-digit multiples of 10, 100, 1000, 10 000 and 100 000</p> <p>e.g. <math>8000 - 3000</math>  e.g. <math>60\ 000 - 200\ 000</math></p> <p>Subtract 1- or 2-digit near multiples of 10, 100, 1000, 10 000 and 100 000 from other numbers</p> <p>e.g. <math>82\ 472 - 30\ 004</math></p> <p>Subtract decimal numbers which are near multiples of 1 or 10, including money</p> <p>e.g. <math>6.34 - 1.99</math>  e.g. £34.59 – £19.95</p> <p>Use counting up subtraction, with knowledge of number bonds to 10, 100 or £1, as a strategy to perform mental subtraction</p> <p>e.g. £10 – £3.45  e.g. <math>1000 - 782</math></p>	<p>Use compact or expanded column subtraction to subtract numbers with up to 5 digits.</p> <p>Use complementary addition for subtractions where the larger number is a multiple or near multiple of 1000.</p> <p>Use complementary addition for subtractions of decimal numbers with up to 2 places, including amounts of money.</p> <p>Begin to subtract related fractions using equivalences  e.g. <math>\frac{1}{2} - \frac{1}{6} = \frac{2}{6}</math></p> <p>Choose the most efficient method in any given situation</p>	Derive swiftly and without difficulty number bonds to 100 Use counting up with confidence to solve most subtractions, including finding complements to multiples of 1000 e.g. $3000 - 2387$

	<p>Recognise fraction complements to 1 and to the next whole number e.g. <math>1\frac{2}{5} + \frac{3}{5} = 2</math></p>		
	<p>Key Vocabulary</p>	<p>equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is _? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse, <b>tenths, hundredths, decimal point, decimal</b></p>	
<b>Y5</b> <b>x</b>	<p>Know by heart all the multiplication facts up to <math>12 \times 12</math> Multiply whole numbers and 1- and 2-place decimals by 10, 100, 1000, 10 000 Use knowledge of factors and multiples in multiplication e.g. <math>43 \times 6</math> is double <math>43 \times 3</math> e.g. <math>28 \times 50</math> is <math>\frac{1}{2}</math> of <math>28 \times 100 = 1400</math> Use knowledge of place value and rounding in mental multiplication e.g. <math>67 \times 199</math> as <math>67 \times 200 - 67</math> Use doubling and halving as a strategy in mental multiplication e.g. <math>58 \times 5</math> is half of <math>58 \times 10</math> e.g. <math>34 \times 4</math> is <math>34</math> doubled twice Partition 2-digit numbers, including decimals, to multiply by a 1-digit number mentally e.g. <math>6 \times 27</math> as <math>6 \times 20</math> (120) plus <math>6 \times 7</math> (42) e.g. <math>6.3 \times 7</math> as <math>6 \times 7</math> (42) plus <math>0.3 \times 7</math> (2.1) Double amounts of money by partitioning e.g. £37.45 doubled is £37 doubled (£74) plus 45p doubled (90p) giving a total of £74.90</p>	<p>Use short multiplication to multiply a 1-digit number by a number with up to 4 digits Use long multiplication to multiply 3-digit and 4-digit numbers by a number between 11 and 20. Examples...</p> <p></p> <p></p> <p>Move towards more complicated numbers for children who are ready. Examples...</p>	<p>Know multiplication tables to <math>11 \times 11</math> Multiply whole numbers and 1-place decimals by 10, 100 and 1000 Use knowledge of factors as aids to mental multiplication e.g. <math>13 \times 6</math> is double <math>13 \times 3</math> e.g. <math>23 \times 5</math> is <math>\frac{1}{2}</math> of <math>23 \times 10</math></p> <p>Children need to be taught to approximate first, e.g. for <b>72 x 38</b>, they will use rounding: <b>72 x 38</b> is approximately <math>70 \times 40 = 2800</math>, and use the approximation to check the reasonableness of their answer against.</p>

	 <p>(1234 x 6) (1234 x 10)</p> 	
Key Vocabulary	<p>Choose the most efficient method in any given situation</p> <p>Find simple percentages of amounts e.g. 10%, 5%, 20%, 15% and 50%</p> <p>Begin to multiply fractions and mixed numbers by whole numbers <math>\leq 10</math> e.g. <math>4 \times \frac{2}{3} = \frac{8}{3} = 2\frac{2}{3}</math></p>	

<p><b>Y5</b></p> <p><b>÷</b></p> <p>Know by heart all the division facts up to <math>144 \div 12</math>      Divide whole numbers by 10, 100, 1000, 10 000 to give whole number answers or answers with 1, 2 or 3 decimal places      Use doubling and halving as mental division strategies          e.g. <math>34 \div 5</math> is <math>(34 \div 10) \times 2</math>      Use knowledge of multiples and factors, as well as tests for divisibility, in mental division          e.g. <math>246 \div 6</math> is <math>123 \div 3</math>          e.g. We know that 525 divides by 25 and by 3      Halve amounts of money by partitioning          e.g. <math>\frac{1}{2}</math> of £75.40 = <math>\frac{1}{2}</math> of £75 (£37.50) plus half of 40p (20p) which is £37.70      Divide larger numbers mentally by subtracting the 10th or 100th multiple as appropriate          e.g. <math>96 \div 6</math> is <math>10 + 6</math>, as <math>10 \times 6 = 60</math> and <math>6 \times 6 = 36</math>          e.g. <math>312 \div 3</math> is <math>100 + 4</math> as <math>100 \times 3 = 300</math> and <math>4 \times 3 = 12</math>      Know tests for divisibility by 2, 3, 4, 5, 6, 9 and 25      Know square numbers and cube numbers      Reduce fractions to their simplest form</p>	<p>Use short division to divide a number with up to 4 digits by a number <math>\leq 12</math>.      Give remainders as whole numbers or as fractions.</p> <p></p> <p>ans = <math>663 \frac{5}{8}</math></p> <p>Find non-unit fractions of large amounts      Turn improper fractions into mixed numbers and vice versa      Choose the most efficient method in any given situation.      Use long division to divide 3-digit and 4-digit numbers by 'friendly' 2-digit numbers.</p> <p></p> <p><b>Step 1: Divide</b>  <b>Step 2: Multiply</b>  <b>Step 3: Subtract</b>  <b>Step 4: Bring down</b>      (Repeat steps for each number, left to right)</p>	<p>Know by heart division facts up to <math>121 \div 11</math>      Divide whole numbers by 10, 100 or 1000 to give answers with up to 1 decimal place      Use doubling and halving as mental division strategies      Use an efficient written method to divide numbers <math>\leq 1000</math> by 1-digit numbers      Find unit fractions of 2- and 3-digit numbers</p>
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		<p>Give remainders as whole numbers or as fractions or as decimals.</p> <p>Divide a 1-place or a 2-place decimal number by a number <math>\leq 12</math> using multiples of the divisors.</p> <p>Divide proper fractions by whole numbers.</p>	
	Key Vocabulary	<p><b>Key Vocabulary:</b> share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, „carry”, remainder, multiple, divisible by, factor, inverse, <b>quotient, prime number, prime factors, composite number (non-prime).</b></p>	
<b>Year 6</b>			
	<b>Mental calculation</b>	<b>Written calculation</b>	<b>Default for ALL children</b>
<b>Y6</b> +	<p>Know by heart number bonds to 100 and use these to derive related facts  e.g. <math>3\cdot46 + 0\cdot54</math></p> <p>Derive, quickly and without difficulty, number bonds to 1000</p> <p>Add small and large whole numbers where the use of place value or number facts makes the calculation do-able mentally  e.g. <math>34\ 000 + 8000</math></p> <p>Add multiples of powers of 10 and near multiples of the same  e.g. <math>6345 + 199</math></p> <p>Add negative numbers in a context such as temperature where the numbers make sense</p> <p>Add two 1-place decimal numbers or two</p>	<p>Use column addition to add numbers with up to 5 digits</p> <p>Use column addition to add decimal numbers with up to 3 decimal places</p> <p>Add mixed numbers and fractions with different denominators</p>	<p>Derive, swiftly and without difficulty, number bonds to 100</p> <p>Use place value and number facts to add ‘friendly’ large or decimal numbers  e.g. <math>3\cdot4 + 6\cdot6</math>  e.g. <math>26\ 000 + 54\ 000</math></p> <p>Use column addition to add numbers with up to 4-digits</p> <p>Use column addition to add pairs of 2-place decimal numbers</p>

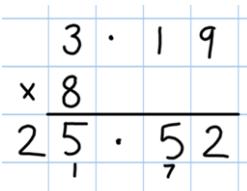
# Thornaby Church of England Primary School

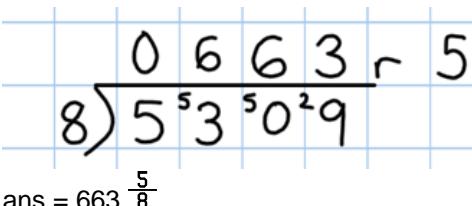
# Calculation Policy

	<p>2-place decimal numbers less than 1  e.g. <math>4.5 + 6.3</math>  e.g. <math>0.74 + 0.33</math></p> <p>Add positive numbers to negative numbers  e.g. <i>Calculate a rise in temperature or continue a sequence beginning with a negative number</i></p>		
	Key Vocabulary	As Y5	
<b>Y6</b> —	<p>Use number bonds to 100 to perform mental subtraction of any pair of integers by complementary addition  e.g. <math>1000 - 654</math> as <math>46 + 300</math> in our heads</p> <p>Use number bonds to 1 and 10 to perform mental subtraction of any pair of 1-place or 2-place decimal numbers using complementary addition and including money  e.g. <math>10 - 3.65</math> as <math>0.35 + 6</math>  e.g. <math>\text{£}50 - \text{£}34.29</math> as <math>71p + \text{£}15</math></p> <p>Use number facts and place value to perform mental subtraction of large numbers or decimal numbers with up to 2 places  e.g. <math>467\,900 - 3005</math>  e.g. <math>4.63 - 1.02</math></p> <p>Subtract multiples of powers of 10 and near multiples of the same</p> <p>Subtract negative numbers in a context such as temperature where the numbers make sense</p>	<p>Use column subtraction to subtract numbers with up to 6 digits</p> <p>Use complementary addition for subtractions where the larger number is a multiple or near multiple of 1000 or 10 000</p> <p>Use complementary addition for subtractions of decimal numbers with up to 3 places, including money</p> <p>Subtract mixed numbers and fractions with different denominators</p>	<p>Use number bonds to 100 to perform mental subtraction of numbers up to 1000 by complementary addition  e.g. <math>1000 - 654</math> as <math>46 + 300</math> in our heads</p> <p>Use complementary addition for subtraction of integers up to 10 000  e.g. <math>2504 - 1878</math></p> <p>Use complementary addition for subtractions of 1-place decimal numbers and amounts of money  e.g. <math>\text{£}7.30 - \text{£}3.55</math></p>
	Key Vocabulary	As Y5.	

# Thornaby Church of England Primary School

# Calculation Policy

<p><b>Y6</b></p> <p>Know by heart all the multiplication facts up to <math>12 \times 12</math></p> <p>Multiply whole numbers and decimals with up to 3 places by 10, 100 or 1000</p> <p>e.g. <math>234 \times 1000 = 234\,000</math> e.g. <math>0.23 \times 1000 = 230</math></p> <p>Identify common factors, common multiples and prime numbers and use factors in mental multiplication</p> <p>e.g. <math>326 \times 6</math> is <math>652 \times 3</math> which is 1956</p> <p>Use place value and number facts in mental multiplication</p> <p>e.g. <math>4000 \times 6 = 24\,000</math> e.g. <math>0.03 \times 6 = 0.18</math></p> <p>Use doubling and halving as mental multiplication strategies, including to multiply by 2, 4, 8, 5, 20, 50 and 25</p> <p>e.g. <math>28 \times 25</math> is a quarter of <math>28 \times 100 = 700</math></p> <p>Use rounding in mental multiplication</p> <p>e.g. <math>34 \times 19</math> as <math>(34 \times 20) - 34</math></p> <p>Multiply 1- and 2-place decimals by numbers up to and including 10 using place value and partitioning</p> <p>e.g. <math>3.6 \times 4</math> is <math>12 + 2.4</math> e.g. <math>2.53 \times 3</math> is <math>6 + 1.5 + 0.09</math></p> <p>Double decimal numbers with up to 2 places using partitioning</p> <p>e.g. <math>36.73</math> doubled is double 36 (72) plus double <math>0.73</math> (<math>1.46</math>)</p>	<p>Use short and long multiplication as Y5...</p> <p style="text-align: center;"> <math display="block">  \begin{array}{r}  96 \\  \times 32 \\  \hline  192 \quad \leftarrow \text{this is } 96 \times 2 \\  2880 \quad \leftarrow \text{this is } 96 \times 30 \\  \hline  3072 \quad \leftarrow \text{this is } 96 \times 32  \end{array}  </math> </p> <p>Extend to using short multiplication to multiply a 1-digit number by a number with 1 or 2 decimal places, including amounts of money...</p> <p style="text-align: center;">  </p> <ul style="list-style-type: none"> <li>• Line up the decimal points in the question and the answer.</li> <li>• Remind children that the single digit belongs in the units column.</li> </ul>	<p>Know by heart all the multiplication facts up to <math>12 \times 12</math></p> <p>Multiply whole numbers and 1- and 2-place decimals by 10, 100 and 1000</p> <p>Use an efficient written method to multiply a 1-digit or a teen number by a number with up to 4 digits by partitioning (grid method)</p> <p>Multiply a 1-place decimal number up to 10 by a number <math>\leq 100</math> using the grid method</p>
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		Multiply fractions and mixed numbers by whole numbers Multiply fractions by proper fractions. Use percentages for comparison and calculate simple percentages	
	Key Vocabulary	<b>Key vocabulary:</b> groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times... partition, grid method, total, multiple, product, inverse, square, factor, integer, decimal, short / long multiplication, carry, <b>tenths, hundredths, decimal.</b>	
<b>Y6</b> <b>÷</b>	<p>Know by heart all the division facts up to <math>144 \div 12</math></p> <p>Divide whole numbers by powers of 10 to give whole number answers or answers with up to 3 decimal places</p> <p>Identify common factors, common multiples and prime numbers and use factors in mental division</p> <p>e.g. <math>438 \div 6</math> is <math>219 \div 3</math> which is 73</p> <p>Use tests for divisibility to aid mental calculation</p> <p>Use doubling and halving as mental division strategies, for example to divide by 2, 4, 8, 5, 20 and 25</p> <p>e.g. <math>628 \div 8</math> is halved three times: 314, 157, 78.5</p> <p>Divide 1- and 2-place decimals by numbers up to and including 10 using place value</p> <p>e.g. <math>2.4 \div 6 = 0.4</math> e.g. <math>0.65 \div 5 = 0.13</math> e.g. <math>\text{£}6.33 \div 3 = \text{£}2.11</math></p> <p>Halve decimal numbers with up to 2 places using partitioning</p>	<p>Use short division to divide a number with up to 4 digits by a 1-digit or a 2-digit number.</p>  <p>ans = 663 <math>\frac{5}{8}</math></p> <p>Use long division to divide 3-digit and 4-digit numbers by 'friendly' 2-digit numbers.</p>	<p>Know by heart all the division facts up to <math>144 \div 12</math></p> <p>Divide whole numbers by 10, 100, 1000 to give whole number answers or answers with up to 2 decimal places</p> <p>Use an efficient written method, involving subtracting powers of 10 times the divisor, to divide any number of up to 1000 by a number <math>\leq 12</math></p> <p>e.g. <math>836 \div 11</math> as <math>836 - 770 (70 \times 11)</math> leaving 66 which is <math>6 \times 11</math>, giving the answer 76</p> <p>Divide a 1-place decimal by a number <math>\leq 10</math> using place value and knowledge of division facts</p>

	<p>e.g. Half of 36·86 is half of 36 (18) plus half of 0·86 (0·43)</p> <p>Know and use equivalence between simple fractions, decimals and percentages, including in different contexts</p> <p>Recognise a given ratio and reduce a given ratio to its lowest terms</p>	<p style="text-align: center;"><b>4</b></p> <p><b>Step 1: Divide</b></p> <p><b>Step 2: Multiply</b></p> <p><b>Step 3: Subtract</b></p> <p><b>Step 4: Bring down</b></p> <p>(Repeat steps for each number, left to right)</p> <p>Give remainders as whole numbers or as fractions or as decimals.</p> <p>Divide a 1-place or a 2-place decimal number by a number <math>\leq 12</math> using multiples of the divisors.</p> <p>Divide proper fractions by whole numbers.</p>	
	Key Vocabulary	As Y5	

### Maths Assessment

- Assessment should be a combination of all maths. This may include tests, observations and work in books.
- Assessments **should not** be made based on the one test every half term.
- During assessment week pupils should complete an Assertive Mentoring test.
- Pupils should be given the test at their current level. Eg 4R, 4E, 4D, 4S should all be given the stage 4 test.
- Even if a pupil does not answer a question correctly in a test, does not mean they do not know it. Look back over previous work and make a teacher judgment on the objective.
- Pupils **should not** be given an Abacus test. These should be used for teaching rather than testing. For example a question from the tests could be used in a plenary or to extend children who have finished work during a lesson.
- Assertive Mentoring basic skill tests do not need to be completed weekly. These tests should be used as a teaching tool to show the children how to complete the questions rather than just a test – one may be completed during assessment week to inform teacher judgements.
- Year 6/Year 2 may complete extra SAT's paper throughout the year although these must be used for teaching. Children should work in a small group with T or TA after the test to go through strategies to answer the questions.

#### Changes for 2016.2017 Academic Year

- Maths Mastery to be implemented in Reception and Year 1
- Maths Meetings will take place in all year groups and a specific time of the day.
- All maths lessons must include some sort of chanting/song during transitions.
- Chn should be encouraged to use CPA approach. As discussed during PD at the beginning of the year.
- Year 2 and above are still able to use Abacus as a starting point for planning.

Updated September 2016 by Mark Dipple