

Pyrford Church of England Primary School



LKS2 Calculation Policy 2022

Number and Place Value

Year 3

Statutory requirements

Pupils should be taught to:

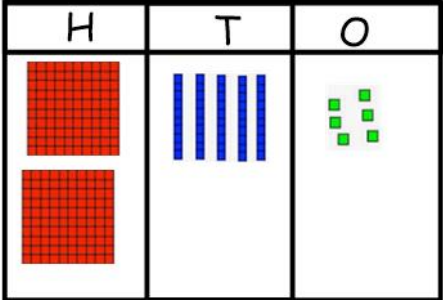

- count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- read and write numbers up to 1000 in numerals and in words
- solve number problems and practical problems involving these ideas.

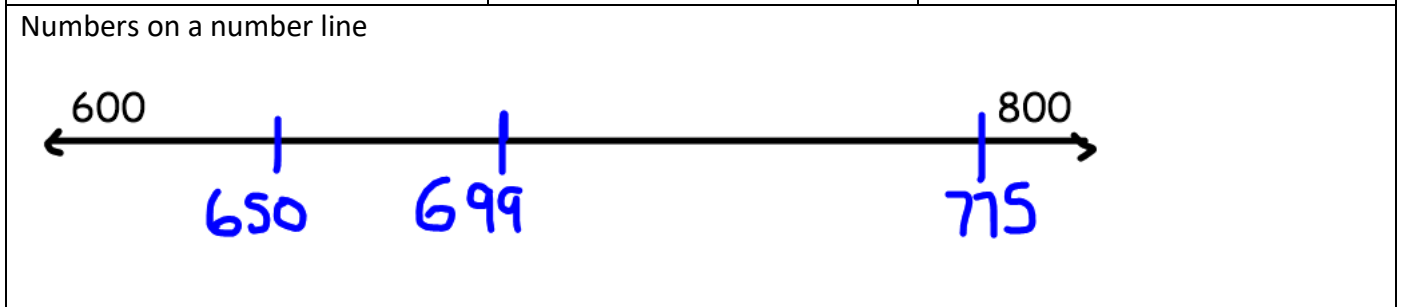
Year 4

Statutory requirements

Pupils should be taught to

- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.

Concrete	Pictorial	Abstract
<p>Use base 10 apparatus to represent numbers to 1,000 on a Place Value Chart</p>  <p>The Place Value Chart has three columns: H (Hundreds), T (Tens), and O (Ones). The H column contains two red 10x10 grids. The T column contains three blue vertical bars. The O column contains six green small squares.</p>	 <p>Two squares, three vertical bars, and six dots arranged in two columns of three.</p>	$200 + 30 + 6 = 236$



Addition and Subtraction

Year 3

Statutory requirements

Pupils should be taught to:

- add and subtract numbers mentally, including:
 - a three-digit number and ones
 - a three-digit number and tens
 - a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Year 4

Statutory requirements







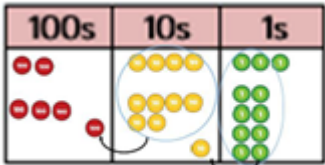






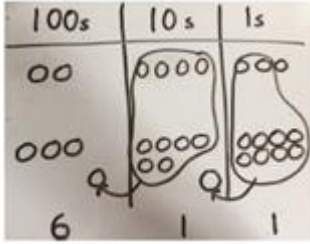
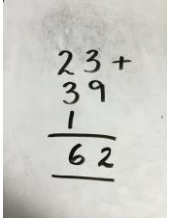






Pupils should be taught to:

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Notes and guidance (non-statutory)

Pupils continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency (see [Mathematics Appendix 1](#)).

Addition

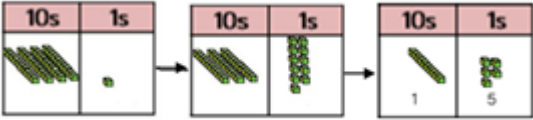
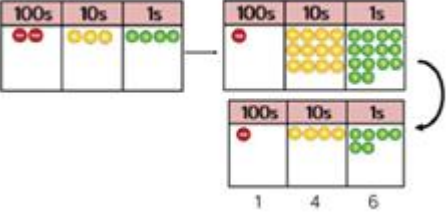
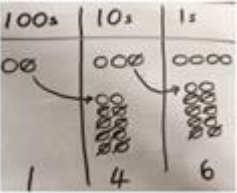
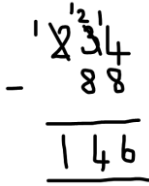
Concrete	Pictorial	Abstract									
<p>Y3 – these representations and methods are introduced in Y3 and are built on, used and applied in Y4, 5 and 6 as appropriate.</p> <p>Represent with base 10 as in Y2</p> <table border="1" data-bbox="156 389 429 577"> <thead> <tr> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Year 4 continue with base 10 to help children visualise the 'size' of numbers. Introduce place value counters Summer</p>  <p>2.</p>	H	T	O								 $\begin{array}{r} 368 \\ + 239 \\ \hline 607 \end{array}$ <p>Column addition showing exchange</p>
H	T	O									
											
											

NB: *when drawing base 10*, we draw a stick for a 10 and a circle for a 1 e.g. 31 = 

With columnar addition we leave space beneath the final addend in the equation to allow room to regroup ten ones for one ten so that the ten is not 'forgotten'.

$$\begin{array}{r} 368 \\ + 239 \\ \hline 607 \end{array}$$

Subtraction

Concrete	Pictorial	Abstract
<p>Y3 continue with base 10</p>  <p>with exchange – move the subtrahend to outside the place value chart.</p> <p>Year 4 continue with base 10 to help children visualise the ‘size’ of numbers.</p> <p>Introduce place value counters Summer 2.</p> 	 <p>Represent pictorially, remembering to show what has been exchanged.</p>	 <p>Formal column method. Must be able to explain why digits have been ‘crossed out’.</p>

NB: **when drawing base 10**, we draw a stick for a 10 and a circle for a 1 e.g. $31 = \begin{array}{|l} | \\ | \\ | \\ \bullet \end{array}$

With columnar subtraction, we leave space beneath the final number in the equation as we have set this up in columnar addition.

$$\begin{array}{r} ^3 4^1 1 \\ - 26 \\ \hline 15 \end{array}$$

Multiplication and Division

Year 3

Statutory requirements

Pupils should be taught to:

- recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Year 4

Statutory requirements

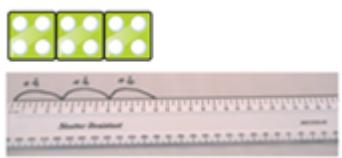


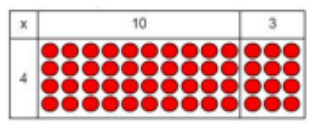
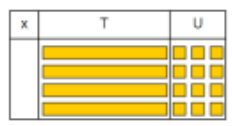
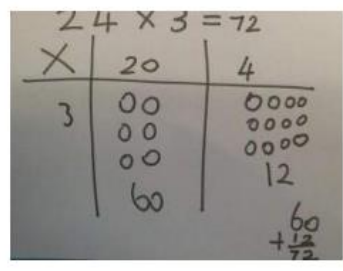
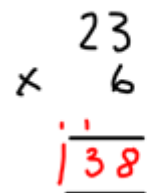
Pupils should be taught to:

- recall multiplication and division facts for multiplication tables up to 12×12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.


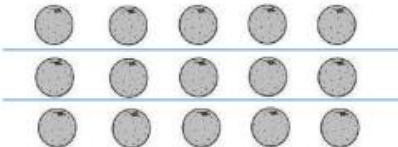
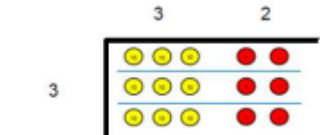
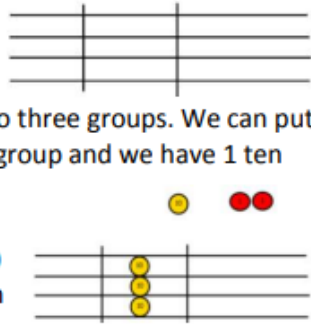

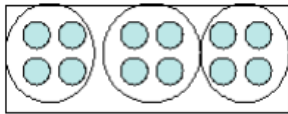
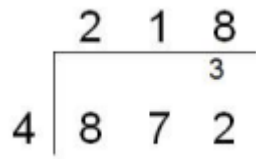
Notes and guidance (non-statutory)

Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers (see [Mathematics Appendix 1](#)).

Multiplication

Concrete	Pictorial	Abstract															
<p>Number lines to show repeated groups- 3 x 4</p>  <p>Base 10 used also as repeated groups.</p>																	
<p>Using coloured counters. Show the link with arrays to first introduce the grid method.</p>  <p>4 rows of 10 4 rows of 3</p> <p>Move on to using Base 10 to move towards a more compact method.</p>  <p>4 rows of 13</p>	<p>Children can represent the work they have done with place value counters in a way that they understand.</p> <p>They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.</p> 	<p>Start with multiplying by one digit numbers and showing the clear addition alongside the grid.</p> <table border="1" data-bbox="1093 571 1372 660"> <tr> <td>x</td> <td>30</td> <td>5</td> </tr> <tr> <td>7</td> <td>210</td> <td>35</td> </tr> </table> <p>$210 + 35 = 245$</p> <p>Moving forward, multiply by a 2 digit number showing the different rows within the grid method.</p> <table border="1" data-bbox="1165 862 1428 1030"> <tr> <td></td> <td>10</td> <td>8</td> </tr> <tr> <td>10</td> <td>100</td> <td>80</td> </tr> <tr> <td>3</td> <td>30</td> <td>24</td> </tr> </table>	x	30	5	7	210	35		10	8	10	100	80	3	30	24
x	30	5															
7	210	35															
	10	8															
10	100	80															
3	30	24															
<p>Use base 10 to show the multiplication.</p> <p>Base 10 helps children visualise the 'size' of the number.</p> <p>Move onto place value counters when appropriate.</p>	<p>Draw the grid method.</p> <table border="1" data-bbox="654 1075 965 1187"> <tr> <td>x</td> <td>20</td> <td>3</td> </tr> <tr> <td>6</td> <td>120</td> <td>18</td> </tr> </table> <p>=138</p>	x	20	3	6	120	18	<p>Demonstrate columnar method when appropriate. Begin with no bridging 10 (regrouping)</p> <p>$6 \times 23 =$</p> 									
x	20	3															
6	120	18															

Division

Concrete	Pictorial	Abstract
<p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p>  <p>Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$</p>	 <p>Draw an array and use lines to split the array into groups to make multiplication and division sentences.</p>	<p>Find the inverse of multiplication and division sentences by creating four linking number sentences.</p> <p>$5 \times 3 = 15$ $3 \times 5 = 15$ $15 \div 5 = 3$ $15 \div 3 = 5$</p>
<p>Use place value counters to divide using the short division method alongside.</p> <p>$96 \div 3$</p>  <p>$42 \div 3$</p> <p>Start with the biggest place value. We are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over. We exchange this ten for 10 ones and then share the ones equally among the groups.</p>  <p>We look at how many are in each group.</p> 	<p>Children can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.</p>  <p>Encourage them to move towards counting in multiples to divide more efficiently.</p>	<p>Begin with divisions that divide equally with no remainder.</p> 

Mathematics Appendix 1: Examples of formal written methods for addition, subtraction, multiplication and division

This appendix sets out some examples of formal written methods for all four operations to illustrate the range of methods that could be taught. It is not intended to be an exhaustive list, nor is it intended to show progression in formal written methods. For example, the exact position of intermediate calculations (superscript and subscript digits) will vary depending on the method and format used.

For multiplication, some pupils may include an addition symbol when adding partial products. For division, some pupils may include a subtraction symbol when subtracting multiples of the divisor.

Addition and subtraction

789 + 642 becomes

$$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \hline 1 \quad 1 \end{array}$$

Answer: 1431

874 - 523 becomes

$$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \end{array}$$

Answer: 351

932 - 457 becomes

$$\begin{array}{r} ^8 ^{12} ^1 \\ 932 \\ - 457 \\ \hline 475 \end{array}$$

Answer: 475

932 - 457 becomes

$$\begin{array}{r} ^1 ^1 \\ 932 \\ - 457 \\ \hline 475 \end{array}$$

Answer: 475

Short multiplication

24 × 6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ \hline 2 \end{array}$$

Answer: 144