

# Nene Valley Primary School

## Calculation Guidance

### - Mental and Written Calculations

This guidance outlines both the **mental** and **written** methods that should be taught from Year 1 to Year 6.

The guidance has been written according to the National Curriculum 2014 and the written calculations for all four operations are as outlined on the appendices of the Programme of Study.

The document builds on the interconnectedness of mathematics and outlines the progression for addition, subtraction, multiplication and division. At Nene Valley Primary School, it is our intention that addition and subtraction should be taught at the same time to ensure children are able to see the clear links between the operations and the inverse nature of them, along with multiplication and division.

Children should **secure mental strategies**. They are taught the strategy of counting forwards and backwards in ones and tens first and then 'Special Strategies' are introduced. Children are taught to look carefully at the calculation and decide which strategy they should use. Children should explain and reason as to why they have chosen a strategy and whether it is the most efficient.

The formal written methods should be introduced with caution. Calculations that require a written method should be presented to the children and models and images, such as dienes apparatus, place value counters, etc. should be used to ensure children have a conceptual understanding of the written method and that it is not a process that the children use for every type of calculation regardless of whether it can be completed mentally or mentally with jotting i.e. the number line.

The guidance outlines the **mental strategies** that children should be encouraged to use:

- A mental strategy that they can always rely on E.g. counting in tens and ones, forwards and backwards E.g.  $56 - 25$  (count back in 10s 56, 46, 36 and back in ones 36, 35, 34, 33, 32, 31)
- A special strategy they can select from a small range of strategies if they can see something special about the numbers they are being asked to calculate with E.g.  $46 - 24$  (I can use near doubles to support my calculation E.g.  $46 - 23 - 1$ )

The guidance outlines the **written methods** as suggested on the appendices of the National Curriculum 2014 and suggests that children:

- Look at a calculation and decide whether it can be done mentally, mentally with a jotting or whether it needs a written method.
- Should always be shown written methods with place value apparatus to ensure children are clear about the value of the numbers that they are calculating with and the numbers do not just become digits.
- Estimate, calculate and check to ensure that the answer they generate has some meaning.

For the purpose of developing understanding there may be occasions when examples that can be completed mentally may be shown as a written method purely to develop understanding of the method. This needs to be made very clear to children and when they are practising the methods, appropriate calculations should be used.

## **Contents**

### **Section 1 – Addition and Subtraction**

Page

3	Key representations to support the conceptual understanding of addition and subtraction
4	Year 1
5	Year 2
6	Year 2 continued, Year 3
7	Year 3 continued
8	Year 4
9	Year 5
10	Year 6

### **Section 2 – Multiplication and Division**

Page

11	Key representations to support the conceptual understanding of multiplication and division
12	Year 1
13	Year 2
14-15	Year 3
16-17	Year 4
18-21	Year 5
22-23	Year 6

### **Section 3 – Fractions**

Page

24	Years 1
25	Year 2
26-27	Year 3
28	Years 4
29	Years 5
30	Years 6

# Key representations to support the conceptual understanding of addition and

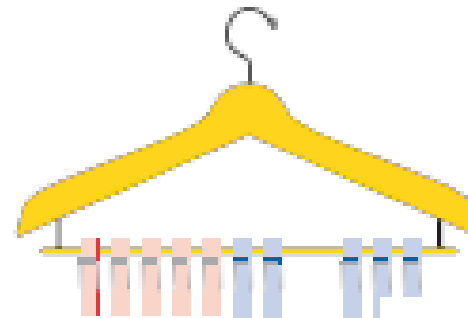
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11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

36...46,  
56,66

76...86,  
56,46

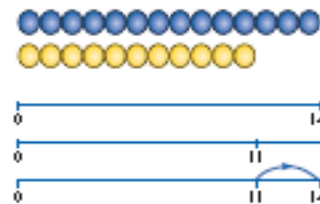
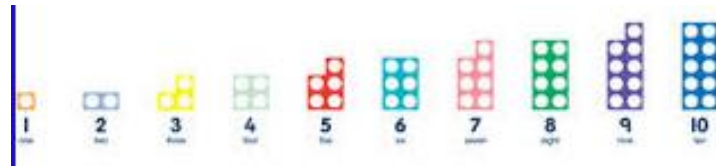
6 + 10 = 16  
16 + 10 = 26  
26 + 10 = 36  
36 + 10 = 46  
36 + 20 = 56

96 - 10 = 86  
86 - 10 = 76  
76 - 10 = 66  
etc.  
76 - 30 = 46



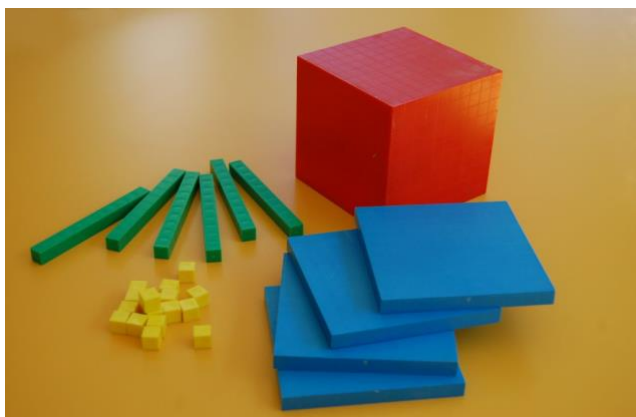
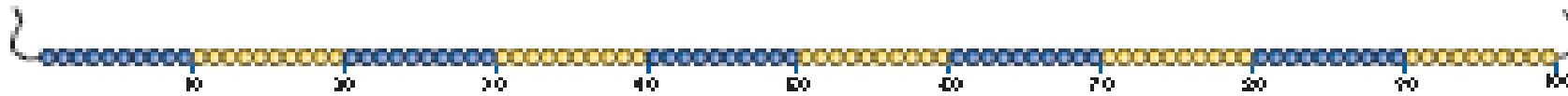
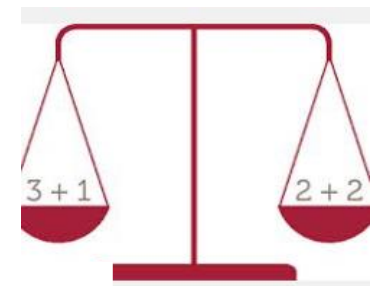
8 + ? = 10

15 + 5 = 20



10 = 7 + 3

The difference  
between 11  
and 14 is 3.  
14 - 11 = 3  
11 + □ = 14



# DEVELOPING UNDERSTANDING OF ADDITION AND SUBTRACTION

Year 1	
Objectives	Recall of Facts
Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs	$\blacksquare = \blacksquare + \blacksquare$ $4 + 6 = 7 + 3$ If we know $4 + 5 = 9$ We also know: $5 + 4 = 9$ $9 - 5 = 4$ $9 - 4 = 5$ $14 + 5 = 19$ $19 - 14 = 5$ , etc
Represent and use number bonds and related subtraction facts within 20	$5 + 4 = 9$ $9 - 5 = 4$ $9 - 4 = 5$ $14 + 5 = 19$ $19 - 14 = 5$ , etc
Add and subtract one-digit and two-digit numbers to 20, including zero	Work with all numbers up to 20. $18 = 11 + 7$ $18 = \blacksquare + 7$

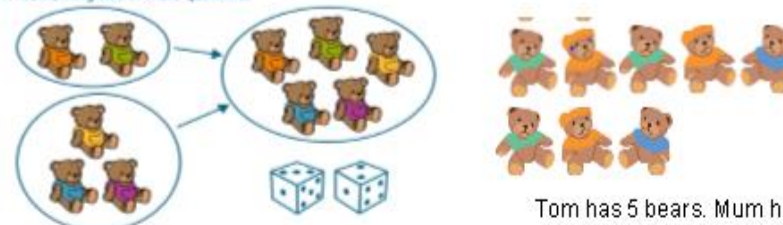
Children

need to be secure with using and applying these skills in unfamiliar contexts before moving into the Year 2 objectives.

## Mental Jottings with representations

Immerse children in practical opportunities to develop understanding of addition and subtraction. Link practical representations on a number track on a bead string to recording on a number line. By the end of Year 1 children should be able to recall and use facts within and to 20.

1. Combining two or more quantities



2 bears and 3 bears is 5 bears altogether  $2 + 3 = 5$

Tom has 5 bears. Mum has 3 bears. How many more does Tom have?

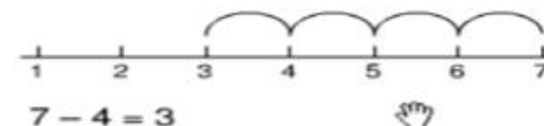
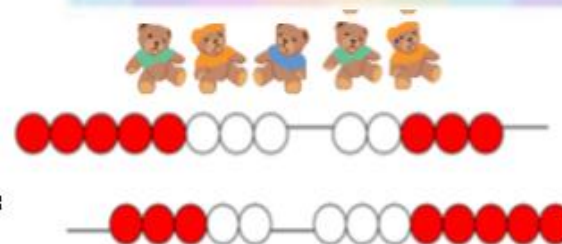


$$8 + 5 = 13$$

$$13 - 5 = 8$$

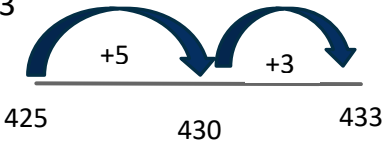






























$$5 + 8 = 13$$

$$13 - 8 = 5$$



Year 2																				
Objectives:	Mental Recall/Jottings:	Written Methods with representations																		
<p>Show that addition of two numbers can be done in any order and subtraction cannot.</p> <p>Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100.</p> <p>Add and subtract numbers using concrete objects, pictorial presentations and mentally including:</p> <p>2 digit number and ones 2 digit number and tens Two 2 digit numbers</p> <p>Add three 1 digit numbers</p> <p>Solve problems with addition and subtraction:</p> <ul style="list-style-type: none"><li>using concrete objects and pictorial representations, including those involving numbers, quantities and measures</li></ul>	<p><b>Using known facts</b></p> <p>If I know: <math>2 + 3 = 5</math></p> <p>I also know: <math>3 + 2 = 5</math> <math>20 + 30 = 50</math> <math>30 + 20 = 50</math> <math>50 - 30 = 20</math> <math>50 - 20 = 30</math></p> <p><b>Bridge through 10 <u>addition</u> and <u>subtraction</u></b></p> <p><math>26 + 7 = 26 + 4 + 3</math> <math>26 + 4 = 30</math> <math>30 + 3 = 33</math></p> <p><b>Counting on/back in 10s</b></p> <p><math>26 + 20 =</math> <math>67 - 20 =</math></p> <p><b>Partitioning</b></p> <p><math>23 + 34 = 20 + 30 + 3 + 4</math></p> <p><b>Special Strategy</b></p> <p><b>Rounding and adjusting</b></p> <p><math>+ 9</math> or <math>- 9 \rightarrow</math> Add on or subtract 10 and adjust by 1. <math>+ 11</math> or <math>- 11 \rightarrow</math> Add on or subtract 10 and adjust by 1</p> <p><b>Bonds to 10</b></p> <p><math>2 + 7 + 8 = 8 + 2 + 7</math></p> <p><b>Finding the difference between two numbers. <math>71 - 37</math>:</b></p> <p><math>71 - 37 = 34</math></p>	<p>Recording addition and subtraction in columns supports place value and prepares for formal written methods.</p> <table><tr><th>Tens</th><th>Ones</th></tr><tr><td>10</td><td>1</td></tr><tr><td>10</td><td>1</td></tr><tr><td>10</td><td>1</td></tr><tr><td>10</td><td>1</td></tr><tr><td>10</td><td>1</td></tr></table> <div><p><math>20 + 3</math> <math>+ 30 + 4</math> <hr/><math>50 + 7</math> <math>= 57</math></p></div> <div><p><math>40 + 7</math> <math>30 + 5</math> <hr/><math>70 + 12 = 82</math></p></div> <table><tr><th>Tens</th><th>Ones</th></tr><tr><td><math>40 + 2</math> 10 10 10 10</td><td>1 1</td></tr><tr><td><math>30 + 12</math> 10 10 10</td><td>10 1 1</td></tr></table> <p>Encourage children to recognise this can be completed mentally:</p>	Tens	Ones	10	1	10	1	10	1	10	1	10	1	Tens	Ones	$40 + 2$ 10 10 10 10	1 1	$30 + 12$ 10 10 10	10 1 1
Tens	Ones																			
10	1																			
10	1																			
10	1																			
10	1																			
10	1																			
Tens	Ones																			
$40 + 2$ 10 10 10 10	1 1																			
$30 + 12$ 10 10 10	10 1 1																			

<ul style="list-style-type: none"> <li>applying their increasing knowledge of mental and written methods</li> </ul>	<p><b><u>Partitioning numbers in different ways in preparation for subtracting using decomposition:</u></b></p> <p>90 + 2  80 + 12 (I have subtracted a ten and added it onto the ones)  Continue to record mental jottings as outlined in Year 2 with increasingly larger numbers.  Use suitable resources as required (See models and images page).</p> <p>Children who have not achieved the age related expectations for Year 2 should not move onto formal written methods until they are secure with mental recall, jottings and a range of mental strategies.</p>	$  \begin{array}{rclcl}  42 & \longrightarrow & 40 + 2 & \longrightarrow & 30 + 12 & \longrightarrow & 42 - 15 = 27 \\  -15 & & -10 + 5 & & -\underline{10 + 5} & & \\  & & & & \underline{20 + 7} & &   \end{array}  $
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Year 3																				
Objectives:	Mental Recall/Jottings:	Written Methods with representations																		
<p>Add and subtract numbers mentally:</p> <ul style="list-style-type: none"> <li>A 3 digit number and 1s</li> <li>A 3 digit number and 10s</li> <li>A 3 digit number and 100s</li> </ul> <p>Add and subtract</p>	<p><b>Bridging to 10</b></p> $  \begin{aligned}  425 + 8 &= 425 + 5 + 3 \\  &= 430 + 3 \\  &= 433  \end{aligned}  $  <p><b>Rounding and Adjusting</b></p> $  \begin{aligned}  425 + 90 &= 425 + 100 - 10 \\  &= 525 - 10  \end{aligned}  $	<p>Pupils use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent.</p> <table border="1" data-bbox="1209 1189 1579 1524"> <thead> <tr> <th>Hundreds</th><th>Tens</th><th>Ones</th></tr> </thead> <tbody> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td></td><td></td></tr> </tbody> </table> $  \begin{array}{r}  200 + 30 + 6 \\  + \quad 70 + 3 \\  \hline  200 + 100 + 9  \end{array}  $	Hundreds	Tens	Ones															
Hundreds	Tens	Ones																		
																				
																				
																				
																				
																				

numbers with up to 3 digits using formal written methods of columnar addition and subtraction.

$$= 515$$

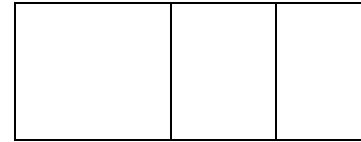
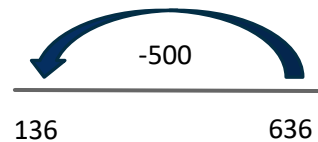
$$\begin{aligned} 146 - 9 &= 146 - 10 + 1 \\ &= 136 + 1 \\ &= 137 \end{aligned}$$

### Rounding and Adjusting (cont.)

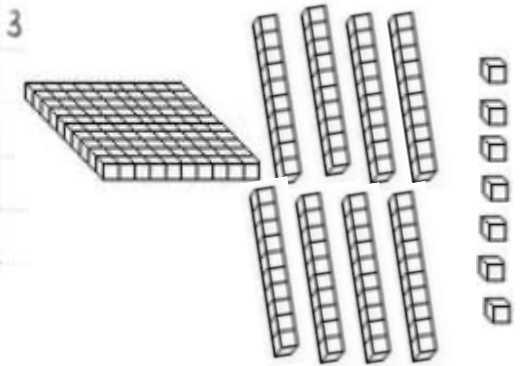
$$\begin{aligned} 146 - 50 &= 146 - 40 - 10 \\ &= 106 - 10 \\ &= 96 \end{aligned}$$

### Counting forwards or backwards in 100s

$$636 - 500 = 136$$



$$\begin{array}{r} 187 - 64 = 123 \\ 100 + 80 + 7 \\ - \quad \quad 60 + 4 \\ \hline 100 + 20 + 3 \end{array}$$



Using my knowledge of partitioning in different ways. This needs to be taught separately first, before applying to expanded column method below.

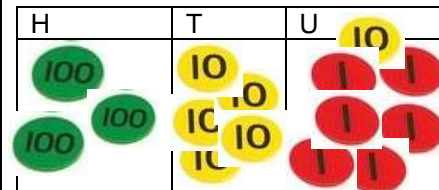
$$376 = 360 + 16.$$

$$376 = 350 + 26$$

$$376 = 340 + 36$$

$$376 = 330 + 46$$

$$376 - 168 =$$






		<p>This is a good model which will help with the introduction of formal methods.</p>	$  \begin{array}{r}  376 - 168 \\  360 + 16 \\  - \quad 160 + 8 \\  \hline  200 + 8  \end{array}  $
<b>Year 4</b>			
<b>Objectives:</b>	<b>Mental Recall/Jottings:</b>	<b>Written Methods:</b>	
<p>Continue to secure and extend mental methods from previous year groups.</p> <p>To select whether a calculation can be done mentally, with a jotting or using a formal written method.</p> <p>Add and subtract numbers with up to 4 digits using formal written methods of column addition and subtraction where</p>	<p>Develop confidence at calculating mentally with larger numbers. Using the full range of strategies:</p> <ul style="list-style-type: none"> <li>• <b>Counting in 1s/10s</b></li> <li>• <b>Bridging through multiples of 10</b></li> <li>• <b>Partitioning</b></li> <li>• <b>Rounding and Adjusting</b></li> <li>• <b>Reordering</b></li> <li>• <b>Near Doubles</b></li> <li>• <b>Bridging through 60 when calculating with time.</b></li> </ul> <p><b>Can I do it mentally?</b>  <b>Should I use a jotting?</b>  <b>Should I use a written method?</b></p>	<p>Add and subtract numbers up to four digits.</p> <p><b>Estimate:</b></p> <p><math>4000 - 1500 = 2500</math></p> <p><math>2000 + 4000 = 6000</math></p> <p>Or. <math>1800 + 4400 = 6200</math></p> <p><b>Check:</b></p> <p>Is your estimate close to the answer you have calculated?</p> <p>Use the written method with decimals in the context of money  <math>\pounds 32.50 + \pounds 21.75 = \pounds 54.25</math></p> <p><b>Estimate:</b></p> <p><math>\pounds 33 + \pounds 22 = \pounds 55</math></p>	

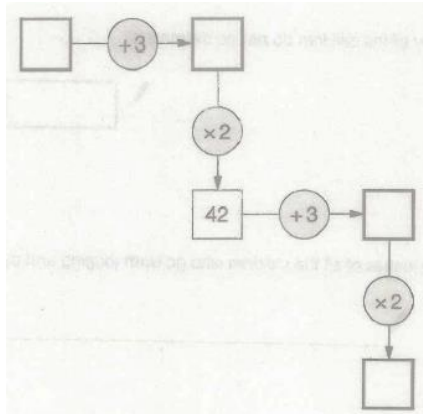
$$\begin{array}{r}
 \pounds 32.50 \\
 + \pounds 21.75 \\
 \hline
 \pounds 54.25 \\
 1
 \end{array}$$



appropriate.		<p>£ 42.50 - £ 13.35 = £ 29.15</p> <p><b>Estimate:</b>                      £ <sup>3</sup>4<sup>1</sup>2.<sup>4</sup>5<sup>1</sup>0    /    /</p> <p>   - £ 13.35</p> <p>£43.00 - £13.00 = £30.00    <u>£ 29.15</u></p> <p><i>Revert to expanded methods if the children experience any difficulty, using numbers that will ensure the children understand the process (i.e. no bridging/exchanging), before quickly moving into numbers that <u>do</u> require a written method.</i></p>
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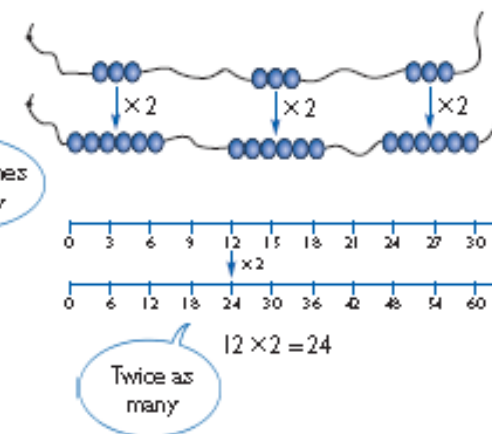
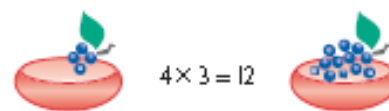
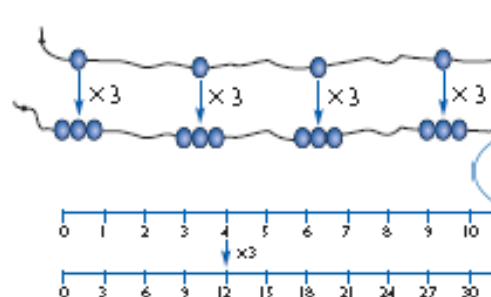
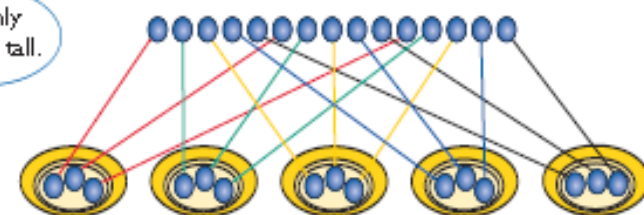
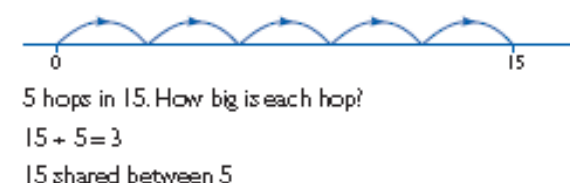
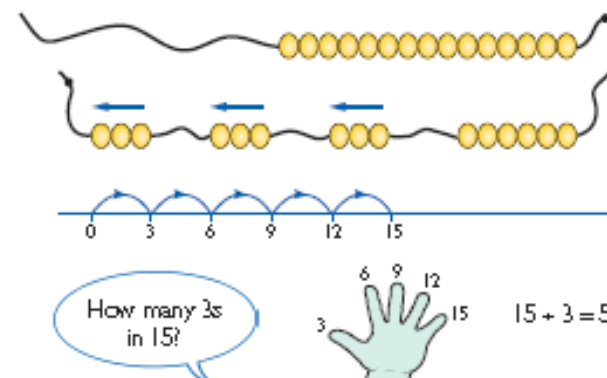
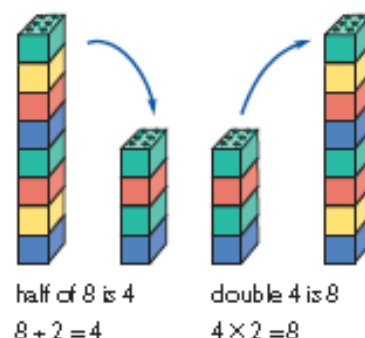
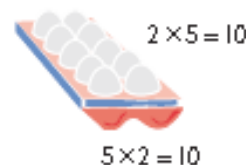
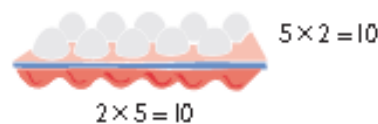
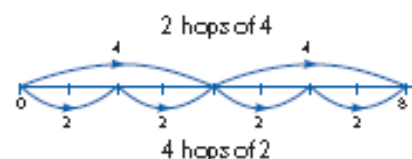
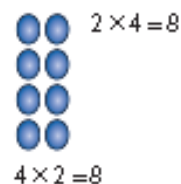
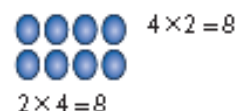
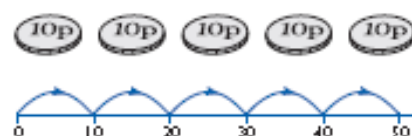
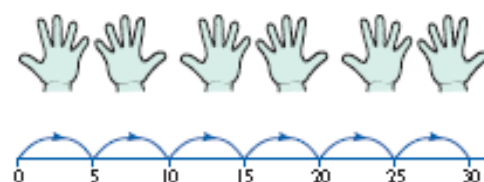
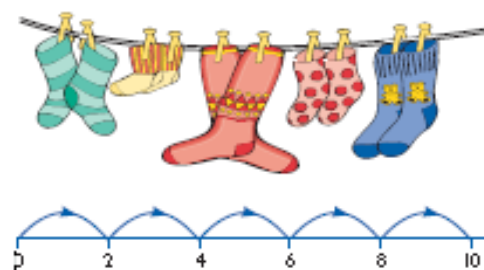
Year 5																																															
Objectives:	Mental Recall/Jottings:	Written Methods:																																													
<p>Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).</p> <p>Add and subtract numbers mentally with increasingly large numbers.</p> <p>Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.</p>	<p>Use knowledge of place value to calculate mentally with increasingly larger numbers.</p> <p>12 462 – 2300</p> <p>Employ a range of special strategies to develop confidence in calculating mentally (as used in previous years):</p> <p>2364 + 1999 = 2364 + 2000 - 1 = 4364 - 1 = 4363</p> <p>13 484 + 2400 = 15884 13 000 + 2000 = 15000 484 + 400 = 884 15000 + 884 = 15884</p> <p>4 = 2001—1997</p>  <p>1997                  2000    2001</p> <p>13486 - 5000 13486 - 3000 = 10486 10486 - 2000 = 8486</p>	<p><b>Estimate:</b></p> <p>800 + 640 = 1440      900 – 500 = 400      900 – 500 = 400</p> <p>789 + 642 becomes      874 – 523 becomes      932 – 457 becomes</p> <table><tr><td>7</td><td>8</td><td>9</td></tr><tr><td>+</td><td>6</td><td>4</td></tr><tr><td>1</td><td>4</td><td>3</td></tr><tr><td>1</td><td>1</td><td></td></tr></table> <p>Answer: 1431</p> <table><tr><td>8</td><td>7</td><td>4</td></tr><tr><td>-</td><td>5</td><td>2</td></tr><tr><td>3</td><td>5</td><td>1</td></tr></table> <p>Answer: 351</p> <table><tr><td>8</td><td>12</td><td>1</td></tr><tr><td>9</td><td>3</td><td>2</td></tr><tr><td>-</td><td>4</td><td>5</td></tr><tr><td>4</td><td>7</td><td>5</td></tr></table> <p>Answer: 475</p> <p><b>Check:</b> Is your estimate close to the answer you have calculated?</p> <p>25.356 + 346.28                      9.076 – 3.142</p> <p><b>Estimate:</b>                                      <b>Estimate:</b></p> <p>25 + 350 = 375                                      9 – 3 = 6</p> <table><tr><td>25.356</td></tr><tr><td>+346.28</td></tr><tr><td>371.636</td></tr><tr><td>1    1</td></tr></table> <table><tr><td>8</td><td>1</td></tr><tr><td>9</td><td>076</td></tr><tr><td>-</td><td>3.142</td></tr><tr><td>5</td><td>934</td></tr></table>	7	8	9	+	6	4	1	4	3	1	1		8	7	4	-	5	2	3	5	1	8	12	1	9	3	2	-	4	5	4	7	5	25.356	+346.28	371.636	1    1	8	1	9	076	-	3.142	5	934
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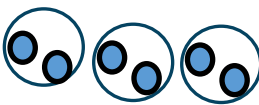


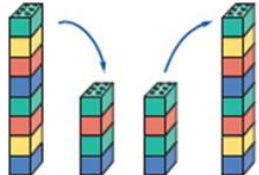




Year 6															
Objectives:		Mental Recall/Jottings:		Written Methods:											
<p>Perform mental calculations, including with mixed operations and large numbers.</p> <p>Use their knowledge of the order of operations to carry out calculations involving the four operations.</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why?</p>		<p><b>Ensure children use a wide range of mental strategies when calculating including decimals and increasingly larger numbers.</b></p> <p>What is 2 minus 0.005?</p> <p>What is 5.7 added to 8.3?</p> <div></div>		<table border="1"><tr><td>Tth</td><td>Th</td><td>H</td><td>T</td><td>U</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>		Tth	Th	H	T	U					
				Tth	Th	H	T	U							
				<p>12 462 + 8456</p> <p><b>Estimate:</b></p> <p>21 000 = 12 500 + 8 500</p>		<p>12 462</p> <p>+ 8 456</p> <p><u>20 918</u></p> <p>1 1</p>									
				<p>3906 = 12 462 – 8556</p> <p><b>Estimate:</b></p> <p>4000 = 12 500 – 8 500</p>		<p><math>1^{11}2^{14}6^{12}</math></p> <p>- <u>8 5 5 6</u></p> <p><u>3 9 0 6</u></p>									
<p>Add and subtract numbers with a different number of decimal places.</p> <p>12.4 – 3.56 =</p>		<p><math>11\cancel{2}^{13}\cancel{4}^{10}</math> ← Add in the second decimal place</p> <p>- <u>3.5 6</u></p> <p><u>8.8 4</u></p>													
<p>57 + <input type="text"/> = 125</p> <p>911 – 47 = <input type="text"/></p> <p>149 + 137 + 158 = <input type="text"/></p> <p>( <input type="text"/> + <input type="text"/> ) x <input type="text"/> = 10</p>															



# Key representations to support conceptual understanding of multiplication and division


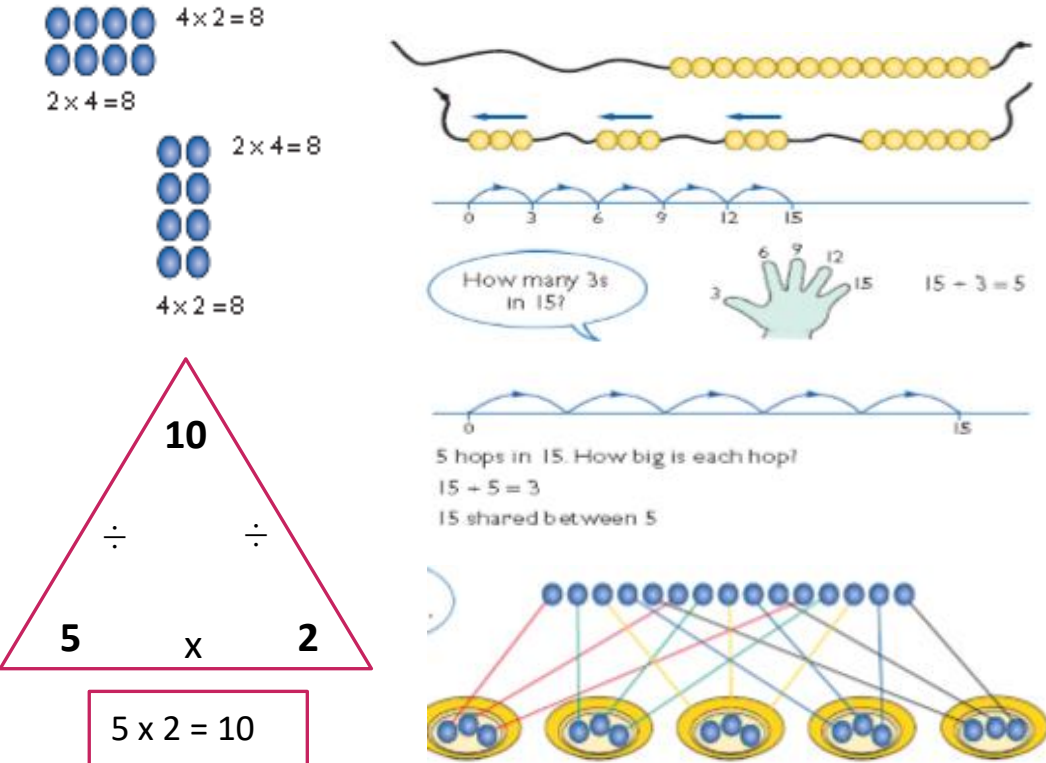


# DEVELOPING UNDERSTANDING OF MULTIPLICATION AND DIVISION

Year 1		
Objective	Examples	Representations
<p>Count, read and write numbers to 100 in numerals.</p> <p>Count in multiples of twos, fives and tens.</p> <p>Double numbers to 20.</p>	<p>Use of visual models to support counting in 2s, 5s and 10s.</p> <p>Ensure children begin to see the patterns when counting in 2s, 5s and 10s.</p> <p>Double/halve numbers up to 20:</p> $10 + 10 = 10 \times 2$ $20 - 10 = 20 \div 2$ <p><i>Children do not need to record number sentences using the symbols.</i></p> <p><i>Develop their vocabulary by encouraging children to explain what they are doing.</i></p>	<p>Grouping and sharing</p>   <p>How many legs will 3 teddies</p>   <p>half of 8 is 4 <math>8 \div 2 = 4</math></p> <p>double 4 is 8 <math>4 \times 2 = 8</math></p>  <p>Arrays –</p> <p>Use Numicon resources to support the teaching of arrays</p>  $3 \times 2 = 6$ <p>Three, two times equals six</p> $2 \times 3 = 6$ <p>Two, three times equals six</p>  




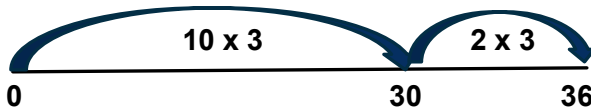

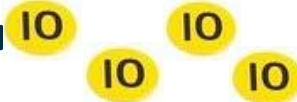



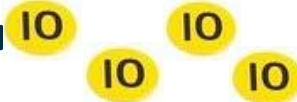



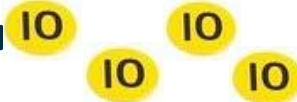



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Year 2		
Objective	Examples	Models and Images
<p>Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward (copied from Number and Place Value)</p> <p>Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.</p> <p>Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.</p>	<p><math>6 \times 5 = 30</math>  <math>30 \div 5 = 6</math></p>  <p>See Models and Images →</p> <p> <math>1 \times 2 = 2</math>      <math>1 \times 5 = 5</math>  <math>2 \times 2 = 4</math>      <math>2 \times 5 = 10</math>  <math>3 \times 2 = 6 \text{ etc.}</math>    <math>3 \times 5 = 15 \text{ etc.}</math> </p> <p><i>What do you notice?</i>  <i>What's the same?</i>  <i>What's different?</i></p> <p>Use knowledge of doubling and halving:</p> <p> <math>2 \times 10 = 20</math>  <math>10 \times 2 = 20</math>  <math>20 \div 2 = 10</math>  <math>20 \div 10 = 2</math> </p>	<p><b>Use a Hundred Square and a Multiplication Grid to explore patterns for</b></p>  <p> <math>4 \times 2 = 8</math>  <math>2 \times 4 = 8</math>  <math>4 \times 2 = 8</math> </p> <p> <math>5 \times 2 = 10</math>  <math>2 \times 5 = 10</math>  <math>10 \div 5 = 2</math>  <math>10 \div 2 = 5</math> </p> <p> <math>3 \times 5 = 15</math>  <math>15 \div 5 = 3</math> </p>


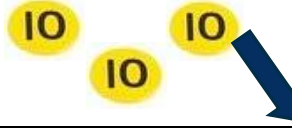
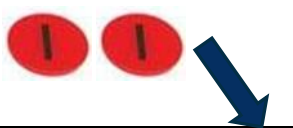




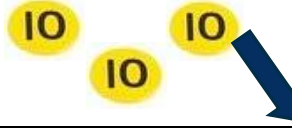
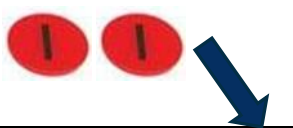




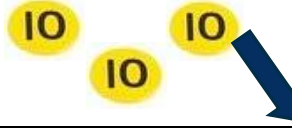
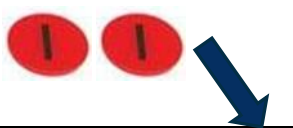



<b>Written:</b> Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals (=) signs	$5 \times 2 = 2 \times 5$ $10 \div 5 = 2$ $10 \div 2 = 5$	
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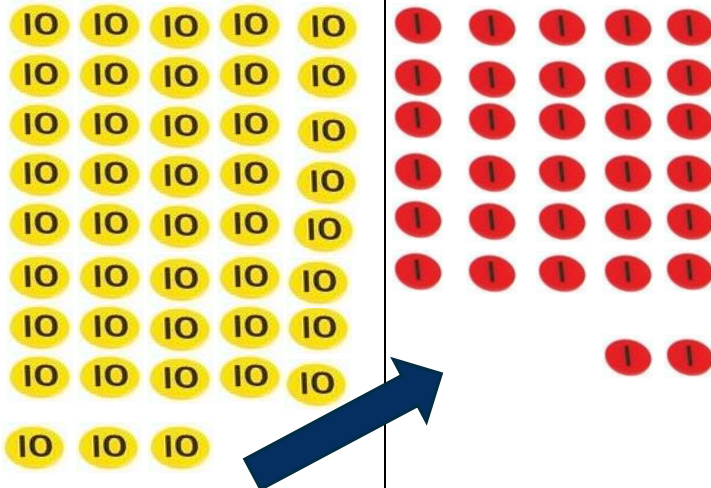
<b>Year 3</b>
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Objective	Mental Recall Examples	Progressing from Mental/Jottings to Written Methods with representations
Count from 0 in multiples of 4, 8, 50 and 100 (copied from Number and Place Value).  Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.  Write and calculate mathematical statements	If the children know 2, 5 and 10 times table facts they now need to learn:  $3 \times 3$ $4 \times 4$ $6 \times 8$ $4 \times 3$ $6 \times 4$ $7 \times 8$ $6 \times 3$ $7 \times 4$ $8 \times 8$ $7 \times 3$ $8 \times 4$ $9 \times 8$ $8 \times 3$ $9 \times 4$ $11 \times 8$ $9 \times 3$ $11 \times 4$ $12 \times 8$ $11 \times 3$ $12 \times 4$	<div style="display: flex; align-items: center; justify-content: space-around;"> <div style="text-align: center;"> <math display="block">  \begin{array}{r l}  \times &amp; 10 &amp; 5 \\  \hline  5 &amp; 50 &amp; 25  \end{array}  </math> </div> <div style="font-size: 2em;">➡</div> <div style="border: 1px solid black; padding: 5px;"> </div> </div> <div style="display: flex; align-items: center; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <math display="block">  \begin{array}{r}  15 \\  \times 5 \\  \hline  25 \\  50 \\  \hline  75  \end{array}  </math> </div> <div style="font-size: 2em;">➡</div> <div style="border: 1px solid black; padding: 5px;"> </div> </div> <p style="text-align: right; margin-top: 20px;">See Y3 and Y4 Numicon Teachers' Resources</p>

<p>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 (appears also in Written Methods).</p>	<p>12 x 3</p> <p>With corresponding division facts. Recall facts along with counting in steps sizes.</p> <p></p> <p>4 x 3 = 3 x 4</p> <p>12 ÷ 3 = 4</p> <p>12 ÷ 4 = 3</p> <p>To make 6 fairy cakes you need...</p> <p>50g of sugar</p> <p>50g of flour</p> <p>50g of butter</p> <p>1 egg</p> <p>1 tsp of vanilla essence</p> <p>How much will you need to make 12 fairy cakes?</p>	<p>36 ÷ 3 =</p> <p></p> <p>45 ÷ 3 = 15</p> <p></p> <table data-bbox="1187 339 2089 622"><tr><th>40</th><th>5</th></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table> <p>Short multiplication and division rely on mental recall.</p> <p>By the end of Year 4 children should be able to answers short multiplication and division questions involving recall of 2, 3, 4, 5, 6 and 10 times tables facts.</p>	40	5				
40	5							
								
								

Year 4		
Objective	Mental Methods	Written Methods with representations
Count in multiples of 6, 7, 9, 25 and 1000 (copied from Number and Place Value)  Recall multiplication and division facts for multiplication tables up to $12 \times 12$ .	<p>If the children know multiplication and division facts for: 2, 5, 10, 3, 4 and 8 times tables they now need to learn.</p> <p> <math>6 \times 6</math>   <math>7 \times 7</math>   <math>9 \times 9</math>   <math>11 \times 11</math>  <math>7 \times 6</math>   <math>9 \times 7</math>   <math>11 \times 9</math>   <math>12 \times 11</math>  <math>9 \times 6</math>   <math>11 \times 7</math>   <math>12 \times 9</math>   <math>12 \times 12</math>  <math>11 \times 6</math>   <math>12 \times 7</math> </p>	<p><b>Measuring and scaling</b></p> <p>E.g. How many times longer is the longer ribbon?</p> <div>  </div>

<p>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.</p> <p>Recognise and use factor pairs and commutativity in mental calculations (appears also in Properties of Numbers).</p> <p>Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.</p>	<p><math>12 \times 6</math></p> <p>Explore what happens when we divide by 1.</p> <p>E.g. <math>54 \div 1 = 54</math>  <math>6 \times 0 = 0</math>  <math>12 \times 1 = 12</math></p> <p>To solve <math>24 \times 3</math> use knowledge of factor pairs:  <math>8 \times 3 \times 3 = 8 \times 9 = 72</math>  <b>Or</b>, <math>6 \times 4 \times 3 = 6 \times 12 = 72</math></p> <p>In measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).</p>	<p><b>Short multiplication</b></p> <p><math>24 \times 6 =</math></p> <p><b>Estimate:</b>  <math>25 \times 6 = 150</math>  <b>Or</b>, <math>20 \times 6 = 120</math></p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <math display="block">\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ 2 \end{array}</math> </div> <div> <math>24 \times 6 = 144</math> </div> </div> <p>The example below shows how place value counters could be used to support conceptual understanding of short division beyond the example shown in Year 3. However, please note place value counters may not be appropriate for examples that include a large three digit number.</p> <p><b>Short division</b> (Also see the Y4 Numicon Teachers' Resources for a similar model/image)</p> <p><math>432 \div 5 =</math></p> <p><b>Estimate:</b>  <math>400 \div 5 = 80</math></p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <math display="block">\begin{array}{r} \text{H T U} \\ 86\text{ r }2 \\ 5 \overline{) 432} \end{array}</math> </div> <div> <math>432 \div 5 = 86 \text{ r } 2</math> </div> </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 33%;">400</th><th style="width: 33%;">30</th><th style="width: 33%;">2</th></tr> <tr> <td style="text-align: center;">  </td><td style="text-align: center;">  </td><td style="text-align: center;">  </td></tr> <tr> <td style="text-align: center;">  </td><td style="text-align: center;">  </td><td style="text-align: center;">  </td></tr> <tr> <td></td><td style="text-align: center;">4 hundreds and 3 tens become 43 tens</td><td style="text-align: center;">3 tens remaining and 2 ones become 32 ones</td></tr> </table>	400	30	2								4 hundreds and 3 tens become 43 tens	3 tens remaining and 2 ones become 32 ones
400	30	2												
														
														
	4 hundreds and 3 tens become 43 tens	3 tens remaining and 2 ones become 32 ones												

		<p>How many groups of 5 hundreds can we make?</p> <p>0</p> <p>So we exchange...</p>		
			<p>How many groups of 5 tens can we make?</p> <p><b>8 with 3 left over</b></p> <p>We exchange the 3 tens that are left</p>	<p>How many groups of 5 ones can we make?</p> <p><b>6 with 2 left over</b></p> <p>The 2 left over are our remainder</p>
Year 5				
Objective	Mental Methods			

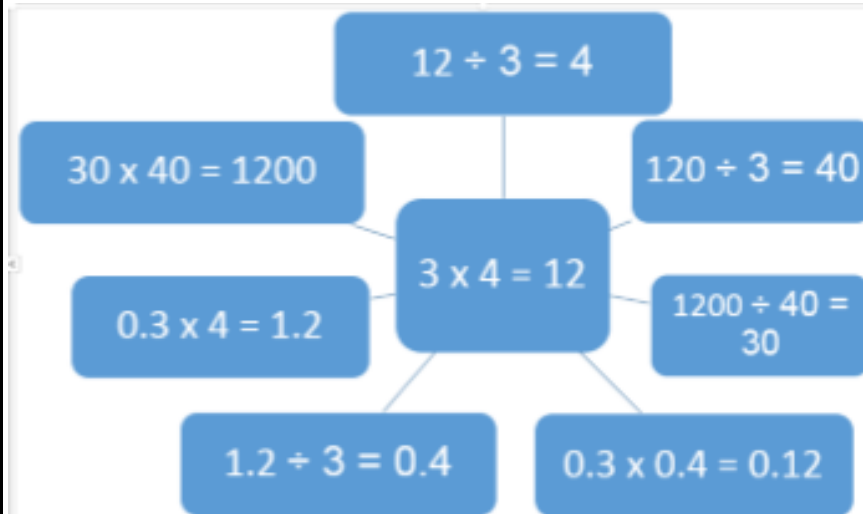
Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000.

Multiply and divide numbers mentally drawing upon known facts.

Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.

Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.

Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.



**Multiplying and dividing whole numbers and decimals by 10, 100 and 1000.**

Thousands	Hundreds	Tens	Ones	/10 (tenths)	/100 (Hundredths)
Th	H	T	U	t	h

Please note lower case letters are used on the place value grid for the columns to the right of the decimal place.

Children will need to know how to identify prime numbers, through tests of divisibility as



Establish whether a number up to 100 is prime and recall prime numbers up to 19.

well as through the recall of their multiplication facts, and be able to recall prime numbers to 19, to enable them to tackle questions such as:

Circle the **two** prime numbers: 29 39 49 59 69

Write the **three prime numbers** which multiply to **231**

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Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3).

This objective can be linked to the Year 5 measures objectives:

- *Estimate volume (e.g. using  $1\text{ cm}^3$  blocks to build cuboids (including cubes)) and capacity (e.g. using water)*
- *Solve problems involving volume*

$$1 \times 1 \bullet \quad 1 \times 1 = 1^2$$

$$2 \times 2 \begin{array}{c} \bullet \bullet \\ \bullet \bullet \end{array} \quad 2 \times 2 = 2^2$$

$$3 \times 3 = 3^2$$

$$1 \times 1 \times 1 = 1^3$$



$$2 \times 2 \times 2 = 2^3$$



$$3 \times 3 \times 3$$

Year 5 Continued.		
Objective	Written Methods	
<p><b>Written:</b></p> <p>Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers</p> <p>Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.</p>	<p><b><u>Multiplication</u></b></p> <p>2307 x 8 =</p> <p><b>Estimate:</b> 2000 x 8 = 16000</p> <p>Calculate(<b>Short multiplication</b>):</p> $\begin{array}{r} 2307 \\ \times 8 \\ \hline 18456 \end{array}$ <p>2307 x 8 = 18456</p> <p>1431 x 23 =</p> <p><b>Estimate:</b> 1400 x 20 = 28000 or 1431 x 20 = 28620</p> <p>Calculate: (<b>Long multiplication</b>)</p> $\begin{array}{r} 1431 \\ \times 23 \\ \hline 4293 \quad (1431 \times 3) \\ 28620 \quad (1431 \times 20) \\ \hline 32913 \end{array}$ <p>1 1</p> <p>This method should build on the children's knowledge of arrays:</p>	<p><b><u>Division</u></b></p> <p>432 ÷ 5 =</p> <p><b>Estimate:</b> 400 ÷ 5 = 80</p> <p>Calculate (<b>Short division</b>):</p> <p>(See this example in Y4)</p> $\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \phantom{0} \\ 32 \phantom{0} \\ \underline{30} \phantom{0} \\ 2 \phantom{0} \end{array}$ <p>Answer: 86 remainder 2</p> <p>372 ÷ 12 = 31</p> <p><b>Estimate:</b> 370 ÷ 12 = 30 r 10</p> <p>Calculate (<b>Long division</b>):</p> <p>Ensure children are able to express remainders either as a remainder, a fraction or a decimal.</p> <p>For example, remainder 12 or 12/15 (4/5) or 0.8</p> $\begin{array}{r} 31 \\ 12 \overline{) 372} \\ \underline{36} \phantom{0} \\ 12 \phantom{0} \\ \underline{12} \phantom{0} \\ 0 \end{array}$ <p>This method can still be explained using the terminology in the Y4 example for</p>

$$31 \times 23$$



30	3
30	3

partial products

$$\begin{array}{r} 23 \\ \times 31 \\ \hline 3 \\ 20 \\ 90 \\ \hline 600 \\ 713 \\ \hline 1 \end{array}$$



$$\begin{array}{r} 23 \\ \times 31 \\ \hline 3 \\ 690 \\ 713 \\ \hline 1 \end{array}$$

$$\begin{array}{r} 1431 \\ \times 23 \\ \hline 4293 \\ 28620 \\ \hline 32913 \end{array}$$

**Example with decimals:**

$$4.65 \times 9 =$$

$$\begin{array}{r} 4.65 \\ \times 9 \\ \hline 41.85 \\ 54 \end{array}$$

**Examples with decimals:**

$$37.2 \div 8 =$$

$$\begin{array}{r} 4.6 \text{ r } 4 \\ 8 \overline{) 37.2} \\ \underline{32} \phantom{0} \\ 5.2 \\ \underline{4.8} \\ 0.4 \end{array}$$

432 ÷ 15 becomes



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




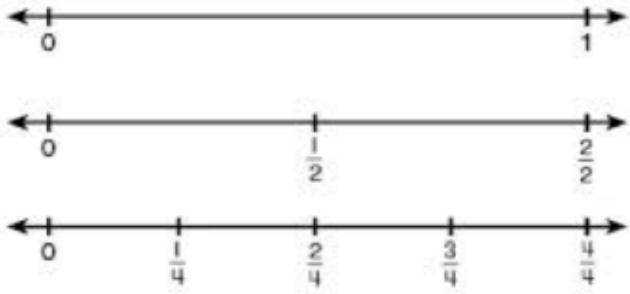
Year 6	
Objective	Mental Methods
Perform mental calculations, including with mixed operations and large numbers	They undertake mental calculations with increasingly large numbers and more complex calculations.
Identify common factors, common multiples and prime numbers	Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
Use their knowledge of the order of operations to carry out calculations involving the four operations	Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
	Pupils explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$ .
	Common factors can be related to finding equivalent fractions.
	Calculate $900 \div (45 \times 4) = 900 \div 180 = 5$
	A bag of four oranges costs thirty seven pence. How much do twelve oranges cost?

Year 6 Continued	
Objective	Written Methods
<p>Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</p> <p>Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context</p> <p>Divide numbers up to 4 digits by a two-digit whole number using the formal written method of short division <u>where</u></p>	<p><b>Short division</b></p> <div> <math>98 \div 7</math> becomes <math display="block">\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \phantom{0} \\ 20 \\ \underline{14} \\ 6 \end{array}</math>           Answer: 14 </div> <div> <math>432 \div 5</math> becomes <math display="block">\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \phantom{0} \\ 32 \\ \underline{30} \\ 2 \end{array}</math>           Answer: 86 remainder 2 </div> <div> <math>496 \div 11</math> becomes <math display="block">\begin{array}{r} 45 \text{ r } 1 \\ 11 \overline{) 496} \\ \underline{44} \phantom{0} \\ 56 \\ \underline{55} \\ 1 \end{array}</math>           Answer: <math>45 \frac{1}{11}</math> </div> <p><b>Long division</b></p> <div> <math>432 \div 15 =</math> <math display="block">\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \\ \underline{30} \phantom{0} \\ 132 \\ \underline{120} \\ 12 \end{array}</math> </div> <div> <math>432 \div 15 =</math> <math display="block">\begin{array}{r} 28.8 \\ 15 \overline{) 432.0} \\ \underline{30} \phantom{0} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}</math> <p>Or, <math>432 \div 15 = 28.8</math></p> </div>


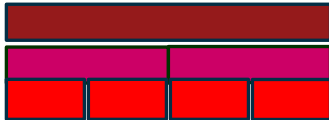
appropriate,  
interpreting remainders  
according to the  
context

## DEVELOPING UNDERSTANDING OF FRACTIONS, DECIMALS AND PERCENTAGES

Year	Objectives	Examples	Models and Images
Year 1	<ul style="list-style-type: none"> <li>Recognise, find and name a half as one of two equal parts of an object, shape or quantity</li> <li>Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity</li> </ul>	<p>Children use their knowledge of fractions of shape to find fractions of quantities.</p> <p>Children should be give practical apparatus to find halves and quarters of quantities within 20.</p> <p>Record work pictorially.</p>	 <p>Numicon shapes and Number rods are also useful models (see Numicon Teachers' resources Yr1)</p> 

Year	Objectives	Examples	Models and Images
Year 2	<ul style="list-style-type: none"> <li>Recognise, find, name and write fractions <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{2}{4}</math> and <math>\frac{3}{4}</math> of a length, shape, set of objects or quantity</li> <li>Write simple fractions for example, <math>\frac{1}{2}</math> of 6 = 3 and recognise the equivalence of <math>\frac{2}{4}</math> and <math>\frac{1}{2}</math>.</li> </ul>	<p>Children use their knowledge of unit and non-unit fractions of shapes to find fractions of quantities. They relate this to find fractions of a length e.g. <math>\frac{2}{4}</math> of 1m =</p> <p>Children need to relate finding a quarter to halving and halving again.</p> <p><i>Pupils should count in fractions up to 10, starting from any number and using the <math>\frac{1}{2}</math> and <math>\frac{2}{4}</math> equivalence on the number line (Non Statutory Guidance)</i></p>	<p>If I can see <math>\frac{1}{4}</math> how many quarters can you see?</p>  <p>If I can see <math>\frac{2}{3}</math> how many thirds can you see?</p>    <p>Numicon shapes and number rods are useful models (see Numicon Teachers' resources Y2)</p> <p>E.g. <math>12 \div 3 = 4</math>  <math>\frac{1}{3}</math> of 12 = 4  <math>4 = \frac{1}{3}</math> of 12</p>



																											
Year	Objectives	Examples	Models and Images																								
Year 3	<ul style="list-style-type: none"><li>Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one digit numbers or quantities by 10</li><li>Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators</li><li>Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators</li></ul>	<p>Encourage children to count up and down in tenths.</p> $1 \div 10 = \frac{1}{10}$ $2 \div 10 = \frac{2}{10}$ $3 \div 10 = \frac{3}{10}$ <p>Continue the pattern. What do you notice? What's the same? What's different?</p> <p>Children can use fractions as an operator E.g. <math>\frac{1}{4}</math> of 12 = <math>12 \div 4 = 3</math></p> <p>Children can relate fractions to the division of integers <math>1 \div 4 = \frac{1}{4}</math> <math>4 \times \frac{1}{4} = 1</math> <math>3 \div 4 = \frac{3}{4}</math> <math>\frac{3}{4} \times 4 = 3</math> (12/4 or <math>\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4}</math>)</p>	<p><math>1 \div 10 = \frac{1}{10}</math></p> <table border="1"><tr><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td><td><math>\frac{1}{10}</math></td></tr></table> <p>0<span style="float: right;">1</span></p> <p><math>2 \div 10 = \frac{2}{10}</math></p> <table border="1"><tr><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td><td><math>\frac{2}{10}</math></td></tr></table> <p>0<span style="float: right;">2</span></p> <p>0<span style="margin-left: 100px;">3</span><span style="margin-left: 100px;">6</span><span style="margin-left: 100px;">9</span><span style="margin-left: 100px;">12</span></p> <table border="1"><tr><td>3</td><td>3</td><td>3</td><td>3</td></tr></table> <p>0<span style="margin-left: 100px;"><math>\frac{1}{4}</math></span><span style="margin-left: 100px;"><math>\frac{1}{2}</math></span><span style="margin-left: 100px;"><math>\frac{3}{4}</math></span><span style="margin-left: 100px;"><math>\frac{4}{4}</math></span></p> <p>For finding fractions of discrete sets of objects, use counters, etc.</p> <p>Use Number rods to develop vocabulary of equivalence.</p> 	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	3	3	3	3
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$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{2}{10}$																		
3	3	3	3																								

- Recognise and show, using diagrams, equivalent fractions with small denominators

Children need to relate and reason about why their diagrams are equivalent to a half – make connections between the numerator and the denominator  
E.g.  $\frac{1}{2} = \frac{4}{8}$

The numerator will be half of the denominator.  
Children should be encouraged to make the connection between their multiplication tables and equivalents

E.g.  $\frac{1}{3} = \frac{3}{9}$  because  $3 \times 3 = 9$ .

$$\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$$

- Add and subtract fractions with the same denominator within one whole
- Compare and order unit fractions, and fractions with the same denominators

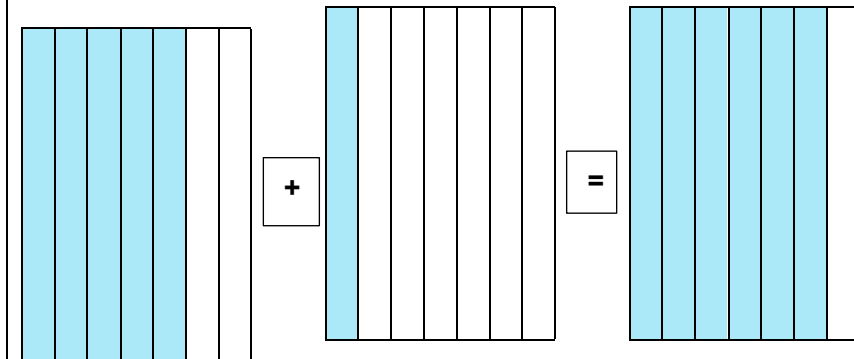
Children need to use practical resources/visual representations to support the comparison of fractions





E.g.  $\frac{1}{3} > \frac{1}{4}$

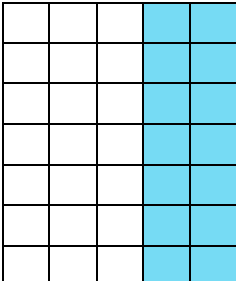
Children should also be taught how to order fractions on a number line.

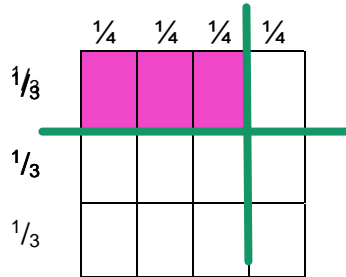
E.g. Make the brown rod with the pink rods. Two of these make a brown rod. Therefore each of them is one half of the brown rod. Continue with the red and the white rods.

(See Numicon Teachers' resources Y3 for additional models and images)



Year	Objectives	Examples	Models and Images																								
Year 4	<ul style="list-style-type: none"><li>Recognise and show using diagrams, families of common equivalent fractions</li><li>Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by tenths</li><li>Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</li><li>Add and subtract fractions with the same denominator</li><li>Find the effect of dividing a one- or two-</li></ul>	$1 \div 100 = \frac{1}{100}$ $2 \div 100 = \frac{2}{100}$  $\frac{3}{7}$ of 56 = 24 $\frac{3}{10}$ of 120 = 36 $\frac{1}{4} = 12$ $\frac{3}{4} = \text{—}$  $\frac{3}{10} + \frac{4}{10} = \frac{7}{10}$ $\frac{9}{100} - \frac{7}{100} = \frac{2}{100}$  Children can record on a number line equivalentents between $\frac{1}{10}$ and 0.1  Count on and back in tenths as decimals and relate to counting on/back in 10ths (fractions).  $25 \div 10 = 2.5$ 2 ones and 5 tenths  $25 \div 100 = 0.25$ 0 ones, 2 tenths and 5 hundredths or 25 hundredths	<p>Use the rows of a multiplication square to show equivalence</p> <div></div> <p>E.g: <math>\frac{1}{2}, \frac{2}{4}, \frac{3}{6}, \frac{4}{8}</math> <math>\frac{2}{3}, \frac{4}{6}, \frac{6}{9}, \frac{8}{12}</math></p> <p>Use a bead string to support counting in hundredths</p> <div></div> <p>Count back in 1 and 1/10 from 101.</p> <p><math>\frac{3}{4} + \frac{3}{4} = \frac{6}{4}</math></p> <div>  = 1 <math>\frac{1}{2}</math></div> <p>Relate division by 10 and 100 to place value grid.</p> <table><tr><th>Thousands</th><th>Hundreds</th><th>Tens</th><th>Ones</th><th>tenths</th><th>hundredths</th></tr><tr><th>Th</th><th>H</th><th>T</th><th>U</th><th>t</th><th>h</th></tr><tr><td></td><td></td><td>2</td><td>5</td><td></td><td></td></tr><tr><td></td><td></td><td></td><td>2</td><td>5</td><td></td></tr></table> <p>Models and images for introducing decimal fractions can be</p>	Thousands	Hundreds	Tens	Ones	tenths	hundredths	Th	H	T	U	t	h			2	5						2	5	
Thousands	Hundreds	Tens	Ones	tenths	hundredths																						
Th	H	T	U	t	h																						
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	digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths		found in the Numicon Teachers' resources Y4.
Year	Objectives	Examples	Models and Images
Y5	<ul style="list-style-type: none"> <li>Add and subtract fractions with the same denominator and denominators that are multiples of the same number</li> <li>Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams</li> </ul>	$\frac{2}{4} + \frac{1}{8} =$ $\frac{1}{3} - \frac{1}{9} =$ $\frac{3}{4} \times 3 =$ $1 \frac{1}{4} \div 5 =$ <p>Children's calculating with fractions involves addition and subtraction and continues to develop to include multiplying proper fractions by whole numbers e.g. <math>\frac{2}{5} \times 7</math>. All of the calculating with fractions should be supported through practical and pictorial methods.</p>	$\frac{3}{4} - \frac{3}{12} = \frac{9}{12} - \frac{3}{12} = \frac{6}{12} = \frac{1}{2}$ $\frac{2}{5} + \frac{2}{3} = \frac{6}{15} + \frac{10}{15} = \frac{16}{15} = 1 \frac{1}{15}$ $\frac{2}{5} \times 7 = \frac{14}{5} = 2 \frac{4}{5}$ 

Year	Objectives	Examples	Models and Images
Y6	<ul style="list-style-type: none"> <li>Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions</li> <li>Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, <math>\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}</math>]</li> <li>Divide proper fractions by whole numbers [for example, <math>\frac{1}{3} \div 2 = \frac{1}{6}</math>]</li> </ul>	$3\frac{1}{2} + \frac{1}{3} =$ $4\frac{1}{2} - 2\frac{2}{3} =$ $\frac{1}{2} \times \frac{1}{4} =$ $\frac{2}{3} \div 4 =$	$2\frac{2}{5} + \frac{3}{4} = \frac{12}{5} + \frac{3}{4} = \frac{48}{20} + \frac{15}{20} = \frac{63}{20} = 3\frac{3}{20}$  $\frac{1}{3} \times \frac{3}{4} = \frac{3}{12} = \frac{1}{4}$  <p>Using an array to support the multiplication of fractions builds on the children's understanding of multiplication as repeated addition.</p> <p>Use a 'whole' grid and divide it according to the fractions the question asks you to multiply. In this case, the grid will be divided into thirds one way and quarters the other way.</p> <div style="display: flex; align-items: center;"> <div style="text-align: center;">  </div> <div style="margin-left: 20px;"> <p>The whole is now divided into twelfths.</p> <p>Highlight what fraction you are multiplying to find your</p> </div> </div> <p style="text-align: right;">See Mike Askew's article <i>Models of Mind</i>, <a href="http://nrich.maths.org/8348">http://nrich.maths.org/8348</a></p>