

Great Wilbraham C of E Primary School Calculation Policy 2017

Aims of this policy

This calculation policy aims to set out our clear expectations for the progression of calculation stages for each of the four operations. The pre-requisites and informal 'jotting' methods are taught before the children start learning their formal expanded and written methods. This enables the children to learn the written methods much more quickly, as the prior learning has been embedded and the calculation skills needed have already been taught and learnt.

Year Group Expectations

This policy gives a guide as to which method children should be learning in each year group, and although there is some flexibility between year groups we want to ensure that the children have fully mastered key skills and deepen their learning.

Great Wilbraham C of E Primary School Calculation Policy 2017

		What	How
Nursery	+	Count numbers in order up to 10	Pictorial and concrete objects
	-	Say numbers which are one more or less	Pictorial and concrete objects
	x	Count steps, claps or jumps	Pictorial and concrete objects
	÷	Separate a group of 3 or 4 objects in different ways	Pictorial and concrete objects
Reception	+	Add two single digit numbers	Pictorial and concrete objects, number tracks
	-	Subtract two single digit numbers	Pictorial and concrete objects, number tracks
	x	Doubling numbers	Pictorial and concrete objects
	÷	Halving numbers	Pictorial and concrete objects
Year 1	+	Number bonds to 20 Addition jumping forward in ones	Pictorial and concrete objects Number lines
	-	Subtraction facts within 20 Subtraction jumping back in ones	Pictorial and concrete objects Number lines
	x	Count in 2s, 5s, 10s	Pictorial and concrete objects
	÷	Share groups equally	Pictorial and concrete objects
Year 2	+	Develop mental addition of up to 2 digit numbers Add 3 one-digit numbers	Number lines, partitioning Pictorial and concrete objects
	-	Develop mental subtraction of up to 2 digit numbers	Number lines, partitioning Pictorial and concrete objects
	x	Count in steps of 2,3,5,10 Know 2,5,10 times tables	Repeated addition and arrays
	÷	Learn division facts (e.g. $40 \div 10 = 4$)	Repeated addition and arrays
Year 3	+	Add 3 digit numbers	Number lines and expanded written method
	-	Subtract 3 digit numbers	Number lines and expanded written method
	x	Count in 4s, 8s, 50s, 100s Learn 3,4 and 8 times tables Multiply 2 digit numbers by a single digit	Repeated addition and number lines Partitioning method Grid method
	÷	Learn division facts (e.g. $20 \div 4 = 5$) Divide 2 digit numbers by a single digit	Repeated subtraction, pictograms, arrays and number lines
Year 4	+	Add 4 digit numbers Add fractions with same denominator	Compact written method
	-	Subtract 4 digit numbers Subtract fractions with same denominator	Compact written method
	x	Count in 6s, 7s, 9s, 25s, 1000s Learn all times tables Multiply 3 digit numbers by a single digit	Grid method (<i>Autumn</i>) Short multiplication (<i>Expanded & compact</i>)
	÷	Learn division facts Divide 2 digit numbers by a single digit	Pictograms, arrays and number lines Short division (<i>compact</i>)
Year 5	+	Add numbers with more than 4 digits Add fractions	Compact written method (<i>Extend to decimals</i>)
	-	Subtract numbers with more than 4 digits Subtract fractions	Compact written method (<i>Extend to decimals</i>)
	x	Multiply 4 digit numbers by a single digit Multiply numbers involving decimals by 10,100,1000 Multiply fractions by whole numbers	Short Multiplication (<i>Compact</i>) Place value columns
	÷	Divide 4 digit numbers by a single digit Divide numbers involving decimals by 10, 100, 1000	Short division Place value columns
Year 6	+	Add fractions with different denominators	Add numbers with more than 4 digits Compact method (<i>incl decimals</i>)
	-	Subtract fractions with different denominators	Subtract numbers with more than 4 digits Compact method (<i>incl decimals</i>)
	x	Multiply fractions	Multiply 4 digit numbers by 2 digits Long Multiplication (<i>Expanded</i>)
	÷	Divide fractions by whole numbers	Divide 4 digit numbers by 2 digits Long division


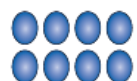
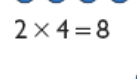
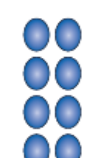

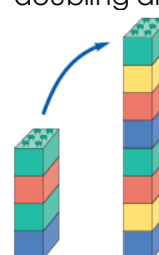
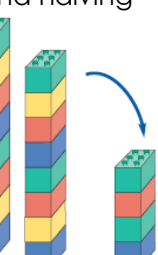
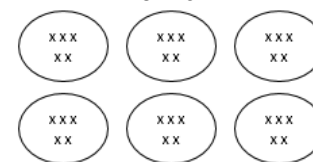


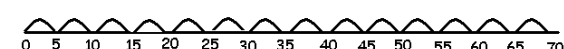
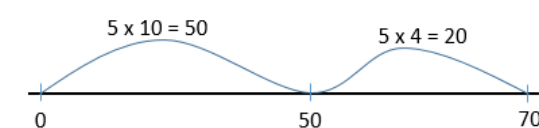
Great Wilbraham C of E Primary School Calculation Policy 2017

Area	Pre-requisites	Jottings to support Mental Calculations	Expanded Written Method	Compact Written Method																								
+	<ul style="list-style-type: none">Must know number bonds to 10 and addition facts for all single-digit numbersAddition can be done in any order: 34 + 56 or 56 + 34Usually start with the biggest numberConcrete apparatus availableUnderstand place value – can partition numbersCounting forwards and backwards in steps of different sizesUnderstand and use bar modelling <div><div>?</div><div>62</div></div> <p>6+2=8 2+6=8</p> <ul style="list-style-type: none">Count forward in steps of 1, 10 and 100 along a number line.	<ul style="list-style-type: none"><u>Pictorial representation</u> Example 8 + 5 = 13 <div><div></div><div></div></div><u>Number line addition</u> 27 + 34 = (61) <div><div></div><div></div></div><p>Start with the bigger number and count on in tens then ones.</p><p>OR</p><div><div></div><div></div></div><p>More able pupils can make larger more efficient jumps.</p>Partitioning 27 + 34 <div><div></div><div></div></div>	<p>Example: 494 + 368</p> <p><u>Intermediate stage</u></p> <table><tr><td>400</td><td>90</td><td>4</td></tr><tr><td>+</td><td>300</td><td>60</td></tr><tr><td></td><td>700</td><td>150</td></tr><tr><td></td><td></td><td>12</td></tr></table> <p>Total = 700 + 150 + 12 = 862</p> <p><u>Final stage</u></p> <table><tr><td>400</td><td>90</td><td>4</td></tr><tr><td>+</td><td>300</td><td>60</td></tr><tr><td></td><td>800</td><td>60</td></tr><tr><td></td><td>100</td><td>10</td></tr></table>	400	90	4	+	300	60		700	150			12	400	90	4	+	300	60		800	60		100	10	<p>Example: 494 + 368</p> <div><div>494</div><div>+ 368</div><div>862</div></div> <p>11</p> <p>Example: £29.94 + £4.37</p> <div><div>£ 29.94</div><div>+ £ 4.37</div><div>£ 34.31</div></div> <p>111</p>
400	90	4																										
+	300	60																										
	700	150																										
		12																										
400	90	4																										
+	300	60																										
	800	60																										
	100	10																										

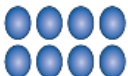
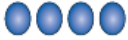
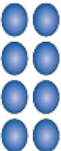
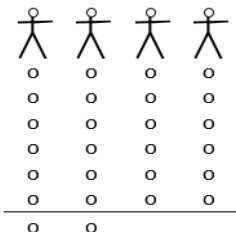
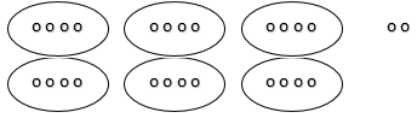



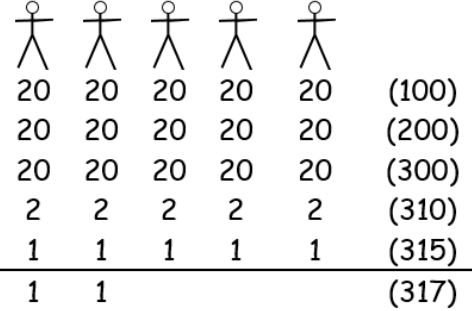

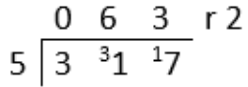
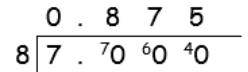
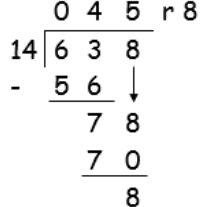
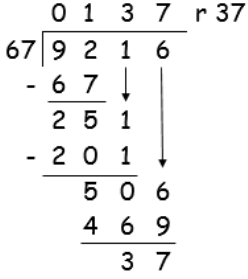
Great Wilbraham C of E Primary School Calculation Policy 2017

Area	Pre-requisites	Jottings to support Mental Calculations	Expanded Written Method	Compact Written Method
-	<ul style="list-style-type: none">Subtraction can be seen as:<ul style="list-style-type: none">Taking Away (Counting Back)Finding the Difference (Counting on)Number bonds to 10Count on/back in 1s/10s on a number lineConcrete apparatus availableCounting forwards / backwards in steps of different sizesUnderstand and use bar modelling <div><div><div>8</div><div>6</div><div>?</div></div><div>8-6=2 8-2=6</div></div> <ul style="list-style-type: none">Complements of 100Subtracting 1, 10 or 100 mentally from 3 digit numbers	<div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div><div><div>0</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>14</div></div><div><div>0</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>11</div></div> <div><div>0</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div>11</div> <div>14</div> <div>The difference between 11 and 14 is 3. 14 - 11 = 3 11 + <input type="text"/> = 14</div> <div><div>Taking Away by Counting Back</div><div>82 - 36 = 46</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div><div><div>-6</div><div>-10</div><div>-10</div><div>-10</div></div><div><div>46</div><div>52</div><div>62</div><div>72</div><div>82</div></div></div> <div>Answer is found at the left hand end of the number line.</div> <div><div>Finding the Difference by Counting On</div><div>82 - 36 = 46</div><div><div>82 - 36 = 46</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div><div><div>+4</div><div>+10</div><div>+10</div><div>+10</div><div>+10</div><div>+2</div></div><div><div>36</div><div>40</div><div>50</div><div>60</div><div>70</div><div>80</div><div>82</div></div></div> <div>OR</div> <div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div> <div><div>+4</div><div>+40</div><div>+2</div></div> <div><div>36</div><div>40</div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div> <div><div>80</div><div>82</div></div> <div>Answer is found by adding up the total amount jumped.</div> <div><div>Example: 723 - 346</div><div><div>Step 1</div><div><div>700</div><div>20</div><div>3</div></div><div>-</div><div><div>300</div><div>40</div><div>6</div></div><div></div><div></div><div></div></div><div><div>Step 2</div><div><div>700</div><div>10</div><div>13</div></div><div>-</div><div><div>300</div><div>40</div><div>6</div></div><div></div><div></div><div>7</div></div><div><div>Step 3</div><div><div>600</div><div>110</div><div>13</div></div><div>-</div><div><div>700</div><div>20</div><div>3</div></div><div><div>300</div><div>40</div><div>6</div></div><div><div>300</div><div>70</div><div>7</div></div></div><div>Answer: 377</div><div>NB – the steps are all done on the same grid. You don't draw a new grid for each step.</div></div> <div><div>Example: 723 - 346</div><div><div>6¹</div><div>7²</div><div>13</div></div><div>-</div><div><div>3</div><div>4</div><div>6</div></div><div><div>3</div><div>7</div><div>7</div></div></div> <div><div>Example:</div><div>£27.26 - £8.73</div><div><div>1¹⁶</div><div>£ 2⁷</div><div>. 12 6</div></div><div>-</div><div><div>£</div><div>8</div><div>. 7 3</div></div><div><div>£ 1</div><div>8</div><div>. 5 3</div></div></div>		

Great Wilbraham C of E Primary School Calculation Policy 2017

Area	Pre-requisites	Jottings to support Mental Calculations	Expanded Written Method	Compact Written Method																				
x	<ul style="list-style-type: none">understand the value of each digitgroup sets of objects reliably  <ul style="list-style-type: none">count up from 0 in 2s, 5s, 10s, etc.Understanding arrays  $4 \times 2 = 8$  $2 \times 4 = 8$  $2 \times 4 = 8$  $4 \times 2 = 8$ <ul style="list-style-type: none">doubling and halving  <p>double 4 is 8 $4 \times 2 = 8$</p>  <p>half of 8 is 4 $8 \div 2 = 4$</p>	<p><u>U x U</u></p> <ul style="list-style-type: none">Repeated addition using pictures 5×6  <p>OR</p>  <p>Using a number line</p>  <p><u>TU x U</u> 5×14</p> <ul style="list-style-type: none">Multiply by repeated addition  <p>Use table facts to make bigger jumps</p>  <ul style="list-style-type: none">Multiply by partitioning $5 \times 10 = 50$ $5 \times 4 = 20$ <p>So $5 \times 14 = 50 + 20 = 70$</p>	<p><u>Short Multiplication</u></p> <ul style="list-style-type: none">Grid Method <table border="1"><tr><td>x</td><td>300</td><td>20</td><td>9</td></tr><tr><td>8</td><td>2400</td><td>160</td><td>72</td></tr></table> <p>= 2632</p> <ul style="list-style-type: none">Expanded Method $\begin{array}{r} 3 \ 2 \ 9 \\ \times \quad 8 \\ \hline 7 \ 2 \quad (8 \times 9) \\ 1 \ 6 \ 0 \quad (8 \times 20) \\ 2 \ 4 \ 0 \ 0 \quad (8 \times 300) \\ \hline 2 \ 6 \ 3 \ 2 \end{array}$ <p>1</p> <p><u>Long Multiplication</u></p> <ul style="list-style-type: none">Grid Method <table border="1"><tr><td>x</td><td>100</td><td>40</td><td>5</td></tr><tr><td>20</td><td>2000</td><td>800</td><td>100</td></tr><tr><td>4</td><td>400</td><td>160</td><td>20</td></tr></table> <p>2900 580 = 3480</p> <ul style="list-style-type: none">Expanded Method $\begin{array}{r} 4 \ 7 \\ \times 1 \ 6 \\ \hline 4 \ 2 \quad (6 \times 7) \\ 2 \ 4 \ 0 \quad (6 \times 40) \\ 7 \ 0 \quad (10 \times 7) \\ 4 \ 0 \ 0 \quad (10 \times 40) \\ \hline 7 \ 5 \ 2 \\ 1 \end{array}$	x	300	20	9	8	2400	160	72	x	100	40	5	20	2000	800	100	4	400	160	20	<p><u>Short Multiplication</u></p> <ul style="list-style-type: none">Compact Method $\begin{array}{r} 3 \ 2 \ 9 \\ \times \quad 8 \\ \hline 2 \ 6 \ 3 \ 2 \\ 2 \ 7 \end{array}$ <p><u>Long Multiplication</u></p> <ul style="list-style-type: none">Compact Method $\begin{array}{r} 1 \ 4 \ 5 \\ \times \quad 2 \ 4 \\ \hline 6 \ 8 \ 0 \quad (4 \times 145) \\ 2 \ 9 \ 0 \ 0 \quad (20 \times 145) \\ \hline 3 \ 5 \ 8 \ 0 \\ 1 \end{array}$ <p>These methods can be extended to include decimal calculations.</p>
x	300	20	9																					
8	2400	160	72																					
x	100	40	5																					
20	2000	800	100																					
4	400	160	20																					

Great Wilbraham C of E Primary School Calculation Policy 2017

Area	Pre-requisites	Jottings to support Mental Calculations	Jottings Extended	Compact Written Methods
÷	<ul style="list-style-type: none"> understand the sharing and grouping models of division That multiplication and division are inverse Repeated addition and subtraction of numbers Understanding arrays <div style="display: flex; align-items: center; margin: 5px;">  <div style="margin-left: 10px;">$4 \times 2 = 8$</div> </div> <div style="display: flex; align-items: center; margin: 5px;">  <div style="margin-left: 10px;">$2 \times 4 = 8$</div> </div> <div style="display: flex; align-items: center; margin: 5px;">  <div style="margin-left: 10px;">$2 \times 4 = 8$</div> </div> <div style="display: flex; align-items: center; margin: 5px;"> <div style="margin-left: 10px;">$4 \times 2 = 8$</div> </div> Finding half and quarter doubling and halving facts to 20 Working out division facts related to times tables facts mentally. Finding remainders on division mentally before learning short division. 	<ul style="list-style-type: none"> Derive division facts from multiplication facts. E.g. $5 \times 4 = 20$, so $20 \div 5 = 4$ and $20 \div 4 = 5$ Using pictograms - sharing model $24 \div 4 = 6 \text{ r } 2$ <div style="text-align: center; margin: 10px;">  </div> Using pictograms - grouping model $24 \div 4 = 6 \text{ r } 2$ <div style="text-align: center; margin: 10px;">  </div> Repeated addition using a number line <div style="text-align: center; margin: 10px;">  </div> <div style="display: flex; align-items: center; margin: 10px;"> <div style="border: 1px solid blue; border-radius: 50%; padding: 5px; margin-right: 10px;">How many 3s in 15?</div> <div style="text-align: center;">  </div> <div style="margin-left: 10px;">$15 \div 3 = 5$</div> </div> 	<ul style="list-style-type: none"> Extend number line method e.g. $70 \div 14 = 5$ <div style="text-align: center; margin: 10px;">  <p>The answer is the number of jumps</p> </div> Extend pictograms - sharing model e.g. $317 \div 5 = 63 \text{ r } 2$ <div style="text-align: center; margin: 10px;">  </div> <p style="text-align: center; margin: 20px 0;">e.g. $373 \div 8 = 46 \text{ r } 5$</p> <div style="display: flex; align-items: center; margin-bottom: 10px;">  <div style="margin-left: 10px;">$\times 8$</div> </div> <div style="display: flex; justify-content: space-between; margin-bottom: 10px;"> <div>$20 \times 8 = 160$</div> <div>(160)</div> </div> <div style="display: flex; justify-content: space-between; margin-bottom: 10px;"> <div>$20 \times 8 = 160$</div> <div>(320)</div> </div> <div style="display: flex; justify-content: space-between; margin-bottom: 10px;"> <div>$5 \times 8 = 40$</div> <div>(360)</div> </div> <div style="display: flex; justify-content: space-between; margin-bottom: 10px;"> <div>$1 \times 8 = 8$</div> <div>(368)</div> </div> <div style="text-align: center;">Remainder 5</div>	<ul style="list-style-type: none"> <u>Short Division</u> e.g. $317 \div 5$ <div style="text-align: center; margin: 10px;">  </div> e.g. $7 \div 8$ (or $7/8$) <div style="text-align: center; margin: 10px;">  </div> <u>Long Division</u> e.g. $628 \div 14$ <div style="text-align: center; margin: 10px;">  </div> e.g. $9216 \div 67$ <div style="text-align: center; margin: 10px;">  </div>