



Written Calculation Methods at Cedars Primary School.

Our Calculation Policy

Our calculation policy has been written to meet the teaching and learning requirements of the New Mathematics Curriculum that was introduced in September 2014. It aims to give pupils an understanding of number by using resources and images before progressing to using formal written methods.

The early learning in number and calculation in Foundation follows the 'Development Matters' EYFS document. This calculation policy is designed to build on progressively from the context and methods established in the Foundation Stage.

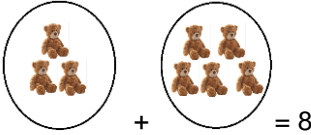
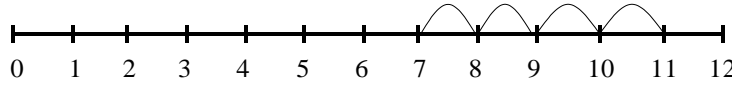
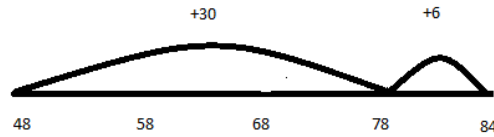

This policy will enable a consistent and smooth progression of learning across the school and help children to become successful mathematicians.


Age Stage Expectations

Our Written Calculation Policy is organised according to expectations for a child's age, as set out in the National Curriculum 2014. However, it is vital that pupils are taught according to the stage they are currently working at. They will be moved to the next stage as soon as they are ready to. Therefore, some pupils might be working at a lower stage until they are secure enough to progress to the next part of the written method or alternatively some pupils might be working at a higher stage.

Please speak with your child's class teacher if you have any questions.

Addition

<p>Year 1</p>	<p><u>Stage 1</u> This builds on from prior learning of adding in Foundation by combining two sets of objects into one group.</p>  <p><u>Stage 2</u> Number lines are used to help pupils to add by counting on in ones. The children will be encouraged to start adding from the largest number.</p> <p>7 + 4</p>  <p><u>Stage 3</u> The children will interpret addition number sentences with mixing box problems. To help them find the 'missing number' they will use everyday objects and number lines.</p> <p>3 + 4 = □</p> <p>3 + □ = 7</p> <p>7 = 3 + □</p> <p>7 = □ + 4</p>
<p>Year 2</p>	<p><u>Stage 4</u> 48 + 36 = 84 The children will be taught to partition the second number into tens and ones. Then they will use a number line to count on from the largest number.</p> <p>48 + 30 + 6 = 84</p> 
<p>Year 3</p>	<p><u>Stage 5</u> Once pupils can add successfully with a number line we introduce them to a more formal written method. As they learn the written method they will use resources to aid their workings and to ensure they understand and can explain what is happening with the numbers. They will need to start adding from the right hand side of the calculation.</p> <p>23 + 34 = 57</p>  $ \begin{array}{r} 20 + 3 \\ + 30 + 4 \\ \hline 50 + 7 \end{array} $

	<p>$25 + 47 = 72$</p>  <p>12 ones become 1 ten and 2 ones.</p> $\begin{array}{r} 25 \\ + 47 \\ \hline 12 \text{ (5+7)} \\ \underline{60} \text{ (20+40)} \\ 72 \end{array}$
Year 4	<p><u>Stage 6</u> Pupils will progress to a more efficient method where all the place value workings are not necessary. They will start adding from the right hand side of the calculation. So 6 ones add 3 ones equals 9 ones. 3 tens add 7 tens equals 10 tens (one hundred), therefore the zero is placed in the tens column and the one (the hundred) carried under the hundreds column.</p> <p>$236 + 73 = 309$</p> $\begin{array}{r} 236 \\ + 73 \\ \hline 309 \\ 1 \end{array}$ <p>$6 + 3 = 9$ $3 + 7 = 10$ (place the 0 in the tens column and carry the 1 under the hundreds column) $2 + 1$ (under the equals sign) = 3</p>
Year 5 and Year 6	<p><u>Stage 7</u> Pupils will add decimals in the context of money and measures. They will progress to adding several numbers with different numbers of decimal places.</p> <p>$£23.59 + £7.55 = £31.14$</p> $\begin{array}{r} £23.59 \\ + £7.55 \\ \hline £31.14 \\ 111 \end{array}$ <p>Empty decimal places can be filled with a zero to show the place value in each column.</p> $\begin{array}{r} 23.361 \\ + 9.080 \\ 59.770 \\ \hline 1.300 \\ \underline{93.511} \\ 212 \end{array}$

Subtraction

Year 1

Stage 1

The children learn to subtract by 'taking away' everyday objects and using pictures to show their workings before recording their work as a number sentence.

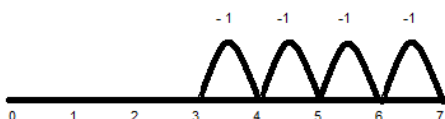


$$5 - 2 = 3$$

Stage 2

The children are taught to use a number line to count back in ones from a number.

$$7 - 4 = 3$$



Stage 3

The children will interpret subtraction number sentences with missing numbers. To help them find the 'missing number' they will use everyday objects and number lines.

$$7 - 3 = \square$$

$$7 - \square = 4$$

$$\square - 3 = 4$$

Year 2

Stage 4

Pupils will be taught how to find the difference (distance) between objects and images before relating this to number sentences.

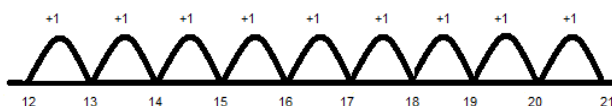


Seven is 3 more than 4

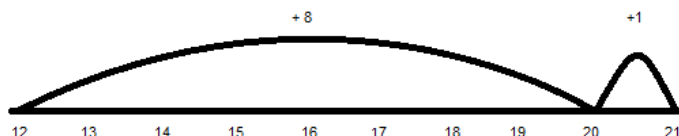
Stage 5

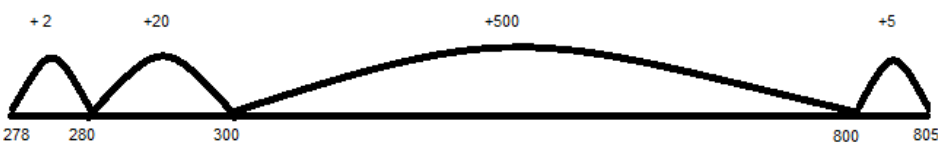
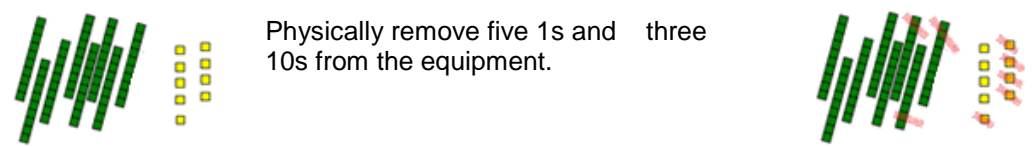
Children will progress to using a completed number line (or hundred square) to find the difference between two numbers. They will make jumps from the smallest to the largest numbers and add up their jumps to find the difference.

$$21 - 12 = 9$$

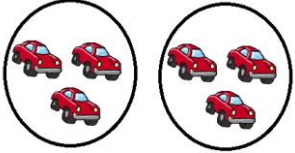


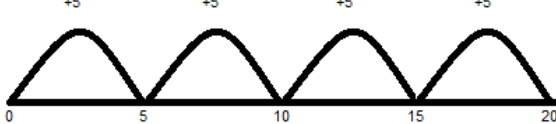


Once secure with this method they will be taught to make larger 'more efficient' jumps to multiples of 10 and add the jumps to find the difference between the two numbers.




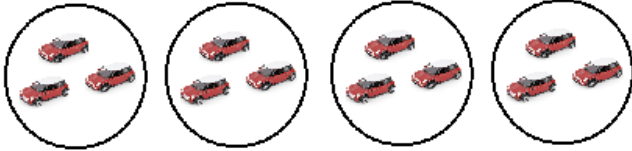
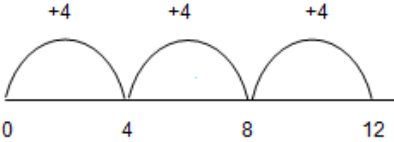
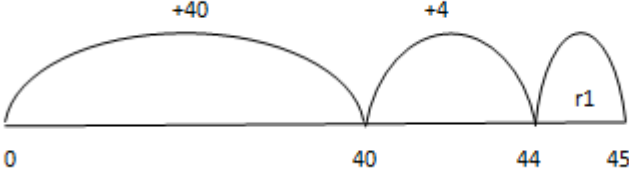
<p>Year 3</p>	<p><u>Stage 6</u> The children will be working with larger numbers and be encouraged to make efficient jumps to multiples of 10 or 100 along their number line.</p> <p>$805 - 278 = 527$</p> 
<p>Year 4</p>	<p><u>Stage 7</u> Once pupils are secure with using a number line to subtract they will start to write the calculation in a column format. They will be taught to subtract from the right hand side of the calculation and use equipment to ensure they understand what is happening.</p> <p>$89 - 35 = 54$</p>  <p>Physically remove five 1s and three 10s from the equipment.</p> $\begin{array}{r} 80 + 9 \\ - 30 + 5 \\ \hline 50 + 4 \end{array}$ <p><u>Stage 8</u></p> <p>$95 - 58 = 37$</p> <p>There are not enough ones to do 5-8 so a ten must be exchanged (turned into ones). So 95 becomes 80 and 15.</p> $\begin{array}{r} 80 + 15 \\ - 50 + 8 \\ \hline 30 + 7 \end{array}$ <p>Once pupils are secure with place value this becomes:</p> $\begin{array}{r} 89 \\ - 58 \\ \hline 37 \end{array}$
<p>Year 5 and Year 6</p>	<p><u>Stage 9</u> Pupils will subtract decimals in the context of money and measures. They will progress to subtracting numbers with numbers that have different decimal places.</p> <p>$3483 - 1574 = 1909$ $15.30 - 9.74 = 5.56$</p> $\begin{array}{r} 2 \\ 3 \\ - 1 \\ \hline 1 \end{array}$ $\begin{array}{r} 0 \\ 15 \\ - 9 \\ \hline 5 \end{array}$

Multiplication

Year 1	<p><u>Stage 1</u> The children use a range of practical resources to double numbers (multiply by two).</p> <p>Double 3 is 6</p> 						
Year 2	<p><u>Stage 2</u> The children are shown lots of images to show multiplication.</p>  <p>$5 + 5 = 10$ or $2 \times 5 = 10$ or 2 lots of 5 equal 10</p> <p>Alternatively we could say:</p>  <p>$2+2+2+2 = 10$ or $5 \times 2 = 10$ or 5 lots of 2 equal 10</p> <p><u>Stage 3</u> Then the children will be shown how to use a number line to multiply.</p> <p>$4 \times 5 = 20$ 4 lots of 5 = 20</p>  <p>By the end of Year 2 the children are expected to know their 2, 5 and 10 multiplication tables.</p>						
Year 3	<p><u>Stage 4</u> $18 \times 9 = 162$. The children are taught to split up (partition) 18 into 10 and 8. These numbers are placed in a grid. The 10 is then multiplied by 9 and the 8 is multiplied by 9. Finally the two answers are added together.</p> <p>$18 \times 9 = 162$.</p> <table border="1" data-bbox="284 1585 603 1709"><tr><td>x</td><td>10</td><td>8</td></tr><tr><td>9</td><td>90</td><td>72</td></tr></table> <p>$90 + 72 = 162$</p> <p>By the end of Year 3 the children are expected to know their 3, 4 and 8 multiplication tables. There is a multiplication table at the end of this document which can be used to help your child learn their times tables.</p>	x	10	8	9	90	72
x	10	8					
9	90	72					

<p>Year 4</p>	<p><u>Stage 5</u> A formal method is introduced to the children. They will use a vertical format to show their workings (jottings).</p> <p>$18 \times 9 = 162$</p> $\begin{array}{r} 18 \\ \times 9 \\ \hline 72 \quad (9 \times 8) \\ 90 \quad (9 \times 10) \\ \hline 162 \\ 1 \end{array}$ <p><u>Stage 6</u> They will then progress to short multiplication where it is not necessary to show their jottings.</p> $\begin{array}{r} 18 \\ \times 9 \\ \hline 162 \\ 17 \end{array}$ <p>By the end of Year 4 the children are expected to know their multiplication tables to 12x12. There is a multiplication table at the end of this document which can be used to help your child learn their times tables.</p>
<p>Year 5</p>	<p><u>Stage 7</u> When multiplying larger numbers the children will use an expanded form we call the 'ladder' method. Once secure they will use long multiplication to show their workings.</p> <p>$57 \times 27 = 1512$</p> $\begin{array}{r} 56 \\ \times 27 \\ \hline 42 \quad (7 \times 6) \\ 350 \quad (7 \times 50) \\ 120 \quad (20 \times 6) \\ 1000 \quad (20 \times 50) \\ \hline 1512 \\ 1 \end{array}$ <p><u>Stage 8</u></p> $\begin{array}{r} 56 \\ \times 27 \\ \hline 392 \quad (7 \times 56) \\ 1120 \quad (20 \times 56) \\ \hline 1512 \\ 1 \end{array}$
<p>Year 6</p>	<p><u>Stage 9</u> The children will use short and long multiplication to multiply decimals.</p> <p>$6.79 \times 3 = 20.37$</p> $\begin{array}{r} 6.79 \\ \times 3 \\ \hline 20.37 \\ 2 \quad 2 \quad 2 \end{array}$

Division

<p>Year 1</p>	<p>Division can be done as 'sharing equally' an amount or as 'grouping' where you find how many groups of the number you are dividing by (the divisor) fit into a certain amount.</p> <p><u>Stage 1</u> In Foundation the children will divide by sharing objects. This will be built upon in Year 1.</p>  <p>12 shared between 3 is 4</p>
<p>Year 2</p>	<p><u>Stage 2</u> The children will be using practical resources to help them divide using grouping.</p> <p>How many groups of 3 there are in 12?</p>  <p>$12 \div 3 = 4$</p> <p><u>Stage 3</u> Pupils will start to use a number line to find out how many groups of the number they are dividing by fit into a given value. Initially they will have a number line with all the values on it.</p> <p>To solve $12 \div 4$ the children will count in single groups of 4 from zero to 12.</p>  <p>So there are 3 groups of 4 in 12.</p> <p>$12 \div 4 = 3$</p> <p>Some children might decide to jump 2 groups of 4 (8) or 3 groups of 4 (12) if they know their multiplication tables.</p>
<p>Year 3</p>	<p><u>Stage 4</u> The children will continue to use a number line to find out how many groups of the number they are dividing by fit into a given value. Due to the numbers becoming larger in the number sentences they are solving, individual jumps along the number line can be very time consuming. So we encourage the children to make larger jumps along the number line using multiplication facts which we call 'Jazzy Jottings'.</p> <p>$45 \div 4 = 11 \text{ r}1$</p>  <p style="text-align: right;"><u>Jazzy Jottings</u></p> <p style="text-align: right;">$4 \times 10 = 40$ $4 \times 1 = 4$</p>

Year 6	<p>For some calculations pupils will need to record their jottings for long division. In Year 6 the children will be expected to show their answers as a remainder, fraction or as a decimal. They will also be dividing numbers that contain decimals.</p> <p> $432 \div 15 = 28 \text{ r } 12$ $= 28 \frac{4}{5}$ $= 28.8$ </p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> $\begin{array}{r} 028 \text{ r } 12 \\ 15 \overline{)432} \end{array}$ </div> <div style="text-align: left;"> <p><u>Jazzy Jottings</u></p> $15 \times 1 = 15$ $15 \times 2 = 30$ $15 \times 3 = 45$ $15 \times 4 = 60$ $15 \times 5 = 75$ $15 \times 6 = 90$ $15 \times 7 = 105$ $15 \times 8 = 120$ $15 \times 9 = 135$ </div> </div>
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12 by 12 Multiplication Table

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

At school we will be chanting multiplication tables and we would recommend using the following language:

‘One times two is two, two times two is four, three times two is six...’