



# *Calculation Policy*

## *January 2018*



Development and Progression of Written  
Methods of Calculations

This booklet has been produced to help parents understand how calculations are taught throughout the school. It shows the progression your child will make when working with addition, subtraction, division and multiplication.

Each type of calculation is split into stages. This shows the progression your child will go through. As in line with the new curriculum (Curriculum 2014), the stages no longer refer to levels but to the year group your child is in. The class teacher will choose the step most suitable for your child's individual ability and will move them on when they feel the child is ready. The children will not complete all steps unless the teacher feels it is necessary.

Children are taught to use the Singapore Bar to understand what calculation is needed. They also have access to a variety of resources and equipment to help develop their skills. Both of these are regardless of the year group a child is in.

We teach calculations following the pattern of pictorial, concrete and abstract.

SEND children will be taught methods suitable to the individual child regardless of their year group.

Once children understand the method they are being taught they will deepen their understanding through reasoning and problem solving.

Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

# ADDITION

<b>STAGE 3</b>	<p>(a) <math>86 + 57</math></p> <div style="text-align: center; margin: 10px 0;"> </div> <p>Partition one number</p> <p>(b) <math>86 + 57 = 86 + 50 + 7 = 136 + 7 = 143</math></p> <p>Partition both numbers</p> <p>(c) <math>67 + 24 = (60 + 20) + (7 + 4) = 80 + 11 = 91</math> (Horizontal add tens first)</p> <div style="margin-top: 20px;"> <table style="border-collapse: collapse; margin-right: 20px;"> <tr><td style="padding: 0 5px;">4</td><td style="padding: 0 5px;">7</td></tr> <tr><td style="padding: 0 5px;">+ 4</td><td style="padding: 0 5px;">5</td></tr> <tr><td colspan="2" style="border-top: 1px solid black; padding-top: 2px;"></td></tr> <tr><td style="padding: 0 5px;">9</td><td style="padding: 0 5px;">2</td></tr> <tr><td colspan="2" style="border-top: 1px solid black; padding-top: 2px;"></td></tr> <tr><td style="padding: 0 5px;">1</td><td></td></tr> </table> <p>Column method, to include carrying.</p> </div>	4	7	+ 4	5			9	2			1	
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<b>STAGE 4</b>	<p>Column method of 3 digits, to include carrying.</p> <div style="margin-top: 10px;"> <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="padding: 0 5px;">2</td><td style="padding: 0 5px;">4</td><td style="padding: 0 5px;">7</td></tr> <tr><td style="padding: 0 5px;">+</td><td style="padding: 0 5px;">1</td><td style="padding: 0 5px;">4</td><td style="padding: 0 5px;">5</td></tr> <tr><td colspan="4" style="border-top: 1px solid black; padding-top: 2px;"></td></tr> <tr><td style="padding: 0 5px;">3</td><td style="padding: 0 5px;">9</td><td style="padding: 0 5px;">2</td><td></td></tr> <tr><td colspan="4" style="border-top: 1px solid black; padding-top: 2px;"></td></tr> <tr><td style="padding: 0 5px;">1</td><td></td><td></td><td></td></tr> </table> </div>	2	4	7	+	1	4	5					3	9	2						1			
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<b>STAGE 5</b>	<p>Column method of 6 digits and decimals, to include carrying.</p> <div style="margin-top: 10px;"> <table style="border-collapse: collapse; margin-left: 20px;"> <tr><td style="padding: 0 10px;">587</td><td style="padding: 0 10px;">3587</td><td style="padding: 0 10px;">£ 6.72</td><td></td></tr> <tr><td style="padding: 0 10px;"><u>+475</u></td><td style="padding: 0 10px;"><u>+ 675</u></td><td style="padding: 0 10px;">8.56</td><td></td></tr> <tr><td style="padding: 0 10px;"><u>1062</u></td><td style="padding: 0 10px;"><u>4262</u></td><td style="padding: 0 10px;"><u>+2.30*</u></td><td rowspan="4" style="padding-left: 10px; vertical-align: middle;">*Fill "empty" columns with a zero.</td></tr> <tr><td style="padding: 0 10px;">11</td><td style="padding: 0 10px;">111</td><td style="padding: 0 10px;"><u>£17.58</u></td></tr> <tr><td></td><td></td><td style="padding: 0 10px;">11</td></tr> <tr><td></td><td></td><td></td></tr> </table> </div>	587	3587	£ 6.72		<u>+475</u>	<u>+ 675</u>	8.56		<u>1062</u>	<u>4262</u>	<u>+2.30*</u>	*Fill "empty" columns with a zero.	11	111	<u>£17.58</u>			11			
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<b>STAGE 6</b>	<p>Larger numbers, decimals and mixed numbers.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <math display="block">\begin{array}{r} 7648 \\ +1486 \\ \hline 9134 \\ 111 \end{array}</math> </div> <div style="text-align: center;"> <math>124.9 + 7.25</math> </div> <div style="text-align: center;"> <math display="block">\begin{array}{r} 124.90^* \\ + 7.25 \\ \hline 132.15 \\ 11 \end{array}</math> </div> <div style="text-align: left;"> <p>*Fill "empty" columns with a zero</p> </div> </div>
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*Sarah had 35p in her money box. She was given another 17p by her dad. How much does she have now?*

Calculation =  $35 + 17 =$



# SUBTRACTION

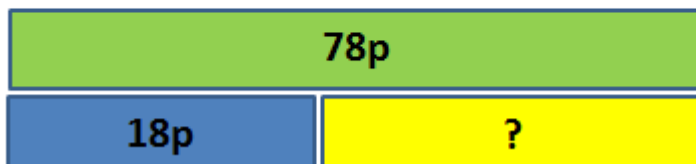
<b>STAGE 3</b>	<p>(a) <math>81 - 57 =</math> difference    <math>+3</math>            <math>+20</math>            <math>+1</math>    <math>= 24</math></p> $\begin{array}{r} 57 \quad 60 \qquad \qquad \qquad 80 \quad 81 \\ \hline \end{array}$ <p style="text-align: center;"><u>(Also use steps of 10 if necessary)</u></p> <p>Decomposition. To use the language of 'take one' when using exchange of units.</p> $\begin{array}{r} \phantom{7} \phantom{1} \\ 7 \phantom{8} \cancel{4} \\ - \phantom{7} \underline{5 \phantom{8}} \phantom{4} \\ \phantom{7} \phantom{2} \phantom{8} \\ \hline \phantom{7} \phantom{2} \phantom{8} \end{array}$ <p>Check answers with inverse</p>
<b>STAGE 4</b>	<p>Decomposition. To use the language of 'take one' when using exchange of units.</p> $\begin{array}{r} \phantom{7} \phantom{1} \\ 7 \phantom{8} \cancel{4} \\ - \phantom{7} \underline{5 \phantom{8}} \phantom{4} \\ \phantom{7} \phantom{2} \phantom{8} \\ \hline \phantom{7} \phantom{2} \phantom{8} \end{array}$ $\begin{array}{r} 6 \phantom{1} \\ \cancel{7} \phantom{3} \phantom{4} \\ - \underline{2 \phantom{5} \phantom{2}} \\ \phantom{4} \phantom{8} \phantom{2} \end{array}$ <p>Check answers with inverse.</p>

<b>STAGE 5</b>	$6467 - 2684$ $\begin{array}{r} 5 \quad 13 \quad 1 \\ \cancel{6} \cancel{4} \cancel{6} 7 \\ - \cancel{2} \cancel{6} \cancel{8} 4 \\ \hline \underline{3783} \end{array}$ <p>and check answer</p> $\begin{array}{r} 3783 \\ + 2684 \\ \hline \underline{6467} \\ 1 \quad 1 \end{array}$ <p>Continue to use inverse to check answers.</p> <p>Decomposition. To use the language of 'take one' when using exchange of units. To include up to 6 digits.</p>
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<b>STAGE 6</b>	$324.9 - 7.25$ $\begin{array}{r} 1 \quad 1 \quad 8 \quad 1 \\ 3 \cancel{2} 4 . \cancel{9} 0 \\ - \quad 7 . 2 5 \\ \hline \underline{317.65} \end{array}$ <p>Continue to use inverse to check answers as appropriate.</p> <p>Decomposition. To use the language of 'take one' when using exchange of units. To include decimals and mixed numbers.</p>
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Peter had 78p, he bought a pen for 18p. How much does he have left?

Calculation =  $78 - 18 =$



## MULTIPLICATION

<b>STAGE 3</b>	<p>Recalling facts.  <math>4 \times 5 = 20</math>, <math>5 \times 4 = 20</math>            Access to unknown facts from the known, e.g. <math>7 \times 8</math> can be accessed from knowing <math>5 \times 8</math> and <math>2 \times 8</math>.</p> <p>Informal recording of partitioned numbers,  <math>15 \times 5 = 10 \times 5</math> and <math>5 \times 5</math></p> <div style="text-align: center; margin: 20px 0;"> <table style="margin: auto;"> <tr><td>Th</td><td>H</td><td>T</td><td>U</td></tr> <tr><td></td><td>3</td><td>6</td><td>8</td></tr> <tr><td></td><td>x</td><td></td><td>6</td></tr> <tr><td colspan="4"><hr/></td></tr> <tr><td>2</td><td>2</td><td>0</td><td>8</td></tr> <tr><td colspan="4"><hr/></td></tr> <tr><td></td><td>4</td><td>4</td><td></td></tr> </table> </div>	Th	H	T	U		3	6	8		x		6	<hr/>				2	2	0	8	<hr/>					4	4	
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<b>STAGE 4</b>	<p>Multiplication by a single digit.</p> <div style="text-align: center; margin: 20px 0;"> <table style="margin: auto;"> <tr><td>Th</td><td>H</td><td>T</td><td>U</td></tr> <tr><td></td><td>3</td><td>6</td><td>8</td></tr> <tr><td></td><td>x</td><td></td><td>6</td></tr> <tr><td colspan="4"><hr/></td></tr> <tr><td>2</td><td>2</td><td>0</td><td>8</td></tr> <tr><td colspan="4"><hr/></td></tr> <tr><td></td><td>4</td><td>4</td><td></td></tr> </table> </div>	Th	H	T	U		3	6	8		x		6	<hr/>				2	2	0	8	<hr/>					4	4	
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<b>STAGE 5</b>	<p>The expanded method can then be taken into the compact vertical method.            The place value columns are still labelled to ensure children understand the value of each digit in the original number and the answer.</p>																												

Th	H	T	U
	3	6	8
	x		6
	2	2	0
			8
	4	4	

Long Multiplication

$$\begin{array}{r} 123 \\ \times 13 \\ \hline \end{array}$$

$$\begin{array}{r} 369 \text{ (multiply by 3)} \\ 1230 \text{ (add a 0 to show } \times 10 \text{ and multiply by 1)} \\ \hline \end{array}$$

$$1599 \text{ (add the answers together)}$$

Also to include numbers where 'carrying' is needed.

**Make sure the children multiply the units first and add a 0 to show they are multiplying by 10. (We call this 'laying an egg').**

**STAGE 6**

As for stage 5 but multiplying by 3 digit numbers.

**Make sure the children multiply the units first, followed by 10s and then 100s. Children need to add 00 to show they are multiplying by 100. (We call this 'laying an egg').**

*Each pen costs 16p, I buy 4 pens. How much do I spend?*

16 x 4 or 4 x 16 =

?			
16p	16p	16p	16p



## DIVISION

<b>STAGE 3</b>	<p><math>5 \times 6 = 30</math>, <math>6 \times 5 = 30</math>, <math>30 \div 5 = 6</math>, <math>30 \div 6 = 5</math> (inverse relationship)</p> <p>Solve problems using repeated subtraction along a number line. Start with the number to divide into and 'chunk' off the multiples.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <math display="block">\begin{array}{cccccc} -5 &amp; -5 &amp; -5 &amp; -5 &amp; -5 &amp; 5 \\ \hline 0 &amp; 5 &amp; 10 &amp; 15 &amp; 20 &amp; 25 &amp; 30 \end{array}</math> </div> <div style="margin-left: 20px;"> <math>30 \div 5 = 6</math> </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 20px;"> <div style="text-align: center;"> <math display="block">\begin{array}{cccc} -4 &amp; -4 &amp; -4 &amp; \\ \hline 0 &amp; 4 &amp; 8 &amp; 12 \end{array}</math> </div> <div style="margin-left: 20px;"> <math>12 \div 4 = 3</math> </div> </div>
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<b>STAGE 4</b>	<p>Short Division (bus stop method) Exact answers only – no remainders</p> <div style="margin-top: 20px;"> <math display="block">\begin{array}{r} 211 \\ 3 \overline{) 633} \end{array}</math> </div>
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**STAGE 5**

Division of up to 4 digits by 1 digit (  $3456 \div 3$  )  
 Remainders and remainders as decimals.  
 $\div$  and  $\times$  10, 100 and 1000

Division of decimals using short division (bus stop method)

$$72 \div 3$$

$$\begin{array}{r}
 24 \\
 \hline
 3 \overline{) 72} \\
 \underline{- 30} \\
 42 \\
 \underline{- 30} \\
 12 \\
 \underline{- 6} \\
 6 \\
 \underline{- 6} \\
 0 \\
 \text{Answer : } 24
 \end{array}$$

1x	3
2x	6
5x	15
10x	30

Children should write key facts in a menu box. This will help them in identifying the largest group they can subtract in one chunk.

Short division to include remainders as decimals and quotients.

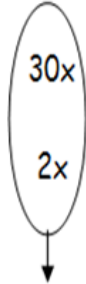
$$\begin{array}{r}
 21.1 \\
 3 \overline{) 63.3}
 \end{array}$$

**STAGE 6**

AND

$196 \div 6$

$$\begin{array}{r} 32 \text{ r } 4 \\ 6 \overline{) 196} \\ \underline{- 180} \\ 16 \\ \underline{- 12} \\ 4 \end{array}$$



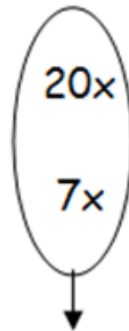
1x	6
2x	12
4x	24
5x	30
10x	60
20x	120

The key facts in the menu box should be extended to include 4x and 20x.

Answer: 32 remainder 4 or 32 r 4

$972 \div 36$

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ \underline{- 720} \\ 252 \\ \underline{- 252} \\ 0 \end{array}$$



Answer: 27

*I have got 78 Jaffa cakes to share with 6 friends, how many Jaffa cakes do they get each?*

Calculation =  $78 \div 6 =$

