

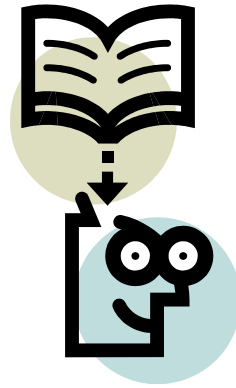


Springfield Junior School

Calculations Policy

Written by	N Staddon
Date	May 2017
Ratified by Governors	
Issue number	2
Date for review	May 2019
Signed Chair of Governors	
Signed Head teacher	

Maths



Development and Progression of Written Methods of Calculations

A guide for parents to develop their understanding of the methods used for recording calculations throughout the school.

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 also encouraged to use the 'bar method' of calculating and have access to a variety of resources and equipment to help develop their skills. 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.

N Staddon

ADDITION

STAGE 3	<p>(a) $86 + 57$</p> <div style="text-align: center; margin: 10px 0;"> </div> <p>Partition one number</p> <p>(b) $86 + 57 = 86 + 50 + 7 = 136 + 7 = 143$</p> <p>Partition both numbers</p> <p>(c) $67 + 24 = (60 + 20) + (7 + 4) = 80 + 11 = 91$ (Horizontal add tens first)</p> <div style="display: flex; align-items: center; margin-top: 20px;"> <div style="margin-right: 20px;"> $\begin{array}{r} 47 \\ +45 \\ \hline 92 \\ \hline 1 \end{array}$ </div> <p>Column method, to include carrying.</p> </div>
STAGE 4	<p>Column method of 3 digits, to include carrying.</p> $\begin{array}{r} 247 \\ +145 \\ \hline 392 \\ \hline 1 \end{array}$
STAGE 5	<p>Column method of 6 digits and decimals, to include carrying.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 10px;"> <div style="text-align: center;"> $\begin{array}{r} 587 \\ +475 \\ \hline 1062 \\ 11 \end{array}$ </div> <div style="text-align: center;"> $\begin{array}{r} 3587 \\ +675 \\ \hline 4262 \\ 111 \end{array}$ </div> <div style="text-align: center;"> $\begin{array}{r} \text{£}6.72 \\ 8.56 \\ +2.30^* \\ \hline \text{£}17.58 \\ 11 \end{array}$ </div> <div style="margin-left: 20px;"> <p>*Fill "empty" columns with a zero.</p> </div> </div>

STAGE 6

Larger numbers, decimals and mixed numbers.

$$\begin{array}{r} 7648 \\ +1486 \\ \hline 9134 \\ 111 \end{array}$$

$$124.9 + 7.25$$

$$\begin{array}{r} 124.90^* \\ + 7.25 \\ \hline 132.15 \\ 11 \end{array}$$

*Fill "empty"
columns
with a zero

SUBTRACTION

STAGE 3	<p>(a) $81 - 57 =$ difference $+3$ $+20$ $+1 = 24$</p> $\begin{array}{r} 57 \quad 60 \quad \quad \quad 80 \quad 81 \\ \hline \end{array}$ <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> $\begin{array}{r} \\ 7 \quad 8 \quad 4 \\ - \quad 5 \quad 6 \\ \hline 7 \quad 2 \quad 8 \\ \hline \end{array}$ <p>Check answers with inverse</p>
STAGE 4	<p>Decomposition. To use the language of 'take one' when using exchange of units.</p> $\begin{array}{r} \\ 7 \quad 8 \quad 4 \\ - \quad 5 \quad 6 \\ \hline 7 \quad 2 \quad 8 \\ \hline \end{array}$ $\begin{array}{r} \\ \cancel{7} \quad 3 \quad 4 \\ - \quad 2 \quad 5 \quad 2 \\ \hline 4 \quad 8 \quad 2 \end{array}$ <p>Check answers with inverse.</p>

<p>STAGE 5</p>	$ \begin{array}{r} 6467 \\ \begin{array}{l} \text{5} \\ \text{13} \\ \text{1} \end{array} \\ \hline \cancel{6}4\cancel{6}7 \\ -\cancel{2}684 \\ \hline \underline{3783} \end{array} $ <p>and check answer $\begin{array}{r} 3783 \\ +2684 \\ \hline \underline{6467} \\ \begin{array}{l} \text{1} \\ \text{1} \end{array} \end{array}$</p> <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>
<p>STAGE 6</p>	$ \begin{array}{r} 324.90 \\ \begin{array}{l} \text{1} \\ \text{1} \\ \text{8} \\ \text{1} \end{array} \\ \hline \cancel{3}2\cancel{4}.90 \\ -\quad 7.25 \\ \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>

MULTIPLICATION

STAGE 3

Recalling facts.

$$4 \times 5 = 20, 5 \times 4 = 20$$

Access to unknown facts from the known, e.g. 7×8 can be accessed from knowing 5×8 and 2×8 .

Informal recording of partitioned numbers,

$$15 \times 5 = 10 \times 5 \text{ and } 5 \times 5$$

T	h	H	T	U
		3	6	8
			x	6
		2	2	08
		4	4	

STAGE 4

Multiplication by a single digit.

T	h	H	T	U
		3	6	8
			x	6
		2	2	08
		4	4	

<p>STAGE 5</p>	<p>The expanded method can then be taken into the compact vertical method.</p> <p>The place value columns are still labelled to ensure children understand the value of each digit in the original number and the answer.</p> $ \begin{array}{r} \text{Th H T U} \\ 368 \\ \times \quad 6 \\ \hline 2208 \\ \hline 44 \end{array} $
	<p>Long Multiplication</p> $ \begin{array}{r} 123 \\ \times 13 \\ \hline 369 \quad (\text{multiply by } 3) \\ 1230 \quad (\text{add a } 0 \text{ to show } \times 10 \text{ and multiply by } 1) \\ \hline 1599 \quad (\text{add the answers together}) \end{array} $ <p>Also to include numbers where ‘carrying’ is needed.</p> <p>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’).</p>
<p>STAGE 6</p>	<p>As for stage 5 but multiplying by 3 digit numbers.</p> <p>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’).</p>

DIVISION

STAGE 3	<p>$5 \times 6 = 30$, $6 \times 5 = 30$, $30 \div 5 = 6$, $30 \div 6 = 5$ (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> <p style="text-align: center;"> $-5 \quad -5 \quad -5 \quad -5 \quad -5 \quad 5 \qquad 30 \div 5 = 6$ <hr style="width: 60%; margin: 0 auto;"/> $0 \quad 5 \quad 10 \quad 15 \quad 20 \quad 25 \quad 30$ </p> <p style="text-align: center; margin-top: 20px;"> $-4 \quad -4 \quad -4$ <hr style="width: 30%; margin: 0 auto;"/> $0 \quad 4 \quad 8 \quad 12 \qquad 12 \div 4 = 3$ </p>
STAGE 4	<p>Short Division (bus stop method) Exact answers only – no remainders</p> <p style="text-align: center; margin-top: 20px;"> 211 $3 \overline{) 633}$ </p>

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)

$72 \div 3$

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

10x
10x
2x
2x

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.

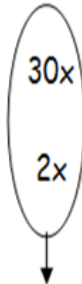
$$\begin{array}{r}
 21.1 \\
 3 \overline{) 63.3}
 \end{array}$$

STAGE 6

AND

$196 \div 6$

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



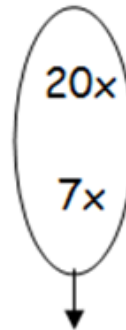
1x	6
2x	12
4x	24
5x	30
10x	60
20x	120

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

Answer: 32 remainder 4 or 32 r 4

$972 \div 36$

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



Answer: 27