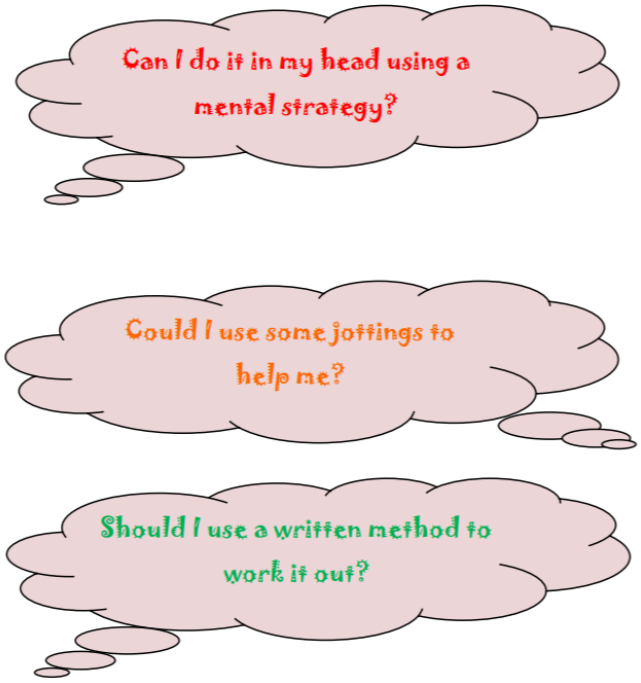
Leighterton Primary School
Written Calculation
Policy

Age -related expectations

This written methods calculation policy is organised according to age-related expectations as set out in the National Curriculum 2014. Children are not raced through to the next year group's methods, they are challenged with more sophisticated problems in order to apply their knowledge in a range of contexts.

Choosing a calculation method:

Children will be taught and encouraged to follow the same process when deciding how to approach a calculation to ensure the most appropriate and efficient method for the numbers involved:



To work out a tricky calculation:
Approximate,
Calculate,
Check.

Addition : Year 3

Add numbers with up to 3 digits

=> Where numbers are not easy to add mentally (efficiently)

$$\begin{array}{rrrl} & 3 & 6 & 2 \\ + & 1 & 5 & 7 \\ \hline & & & 9 \quad \leftarrow \text{Add the ones} \\ & 1 & 1 & 0 \quad \leftarrow \text{Add the tens} \\ & 4 & 0 & 0 \quad \leftarrow \text{Add the hundreds} \\ \hline & 5 & 1 & 9 \quad \leftarrow \text{Combine} \end{array}$$

Only when children are very secure do they move to compact column (see Y4)

Subtraction : Year 3

Initially with no exchanging:

89 − 35 = 54

	80	+	9
−	30	+	5
	50	+	4

↑ Start with the ones

Subtracting 2 and 3 digits

Then with exchanging using resources e.g. diennes

238 − 146 = 92

Exchange

100

	200			30		8
−	100			40		6
				90	+	2

↑ Start with the ones

Multiplication : Year 3

Multiply 2 digits by a single digit

1) Grid Method

63 x 4 =

	60	3
4	240	+ 12

Use place value e.g 24 x 10 = 240

Add together = 252

When secure or alternatively:

$$\begin{array}{rrr} & 7 & 2 \\ \times & & 6 \\ \hline & 1 & 2 \quad (6 \times 2) \\ + & 4 & 2 \; 0 \quad (6 \times 70) \\ \hline & 4 & 3 \; 2 \\ \hline \end{array}$$

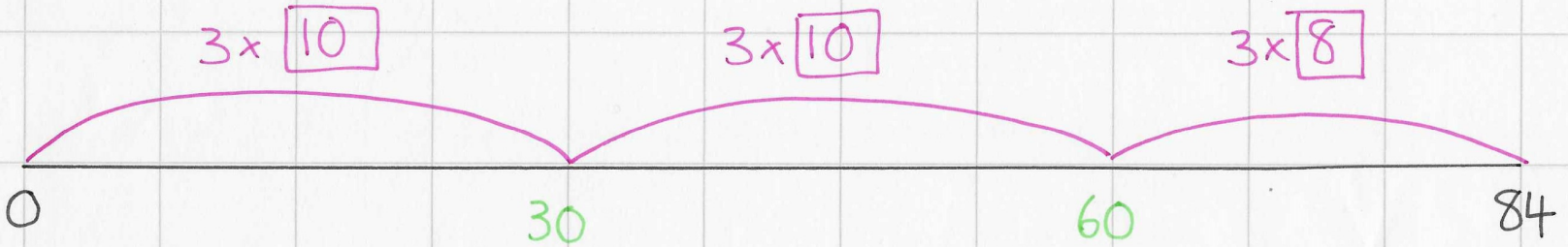
Division : Year 3

Divide 2 digits by a single digit

Grouping on a numberline:

$84 \div 3 = \underline{28}$

Children use times tables and make efficient jumps



Add: $10 + 10 + 8 = \underline{28}$

Only when really secure → move to short division (see Y4)

Column Addition : Year 4 (using practical resources)

Add numbers with up to 4 digits

	3	5	1	7
+		3	9	6
	3	9	1	3
		(1)	1	

1. Start by adding the units

'Carry' numbers across columns underneath the bottom line

2. Reinforce correct place value - remind them that this is actually 10 + 90 + 10 = 110

Column Subtraction : Year 4

Up to 4 digits

Once children are secure with decomposition (Year 3) with 4 digits. Move onto compact method:

$$\begin{array}{r} 2\,{}^{6}\!\not{7}\,5\,4 \\ -\;1\,5\,6\,2 \\ \hline 1\,1\,9\,2 \end{array}$$

Use the language of 'exchanging' hundreds for tens etc...

Ensure numbers are lined up in place value columns

Children may still use place value counters to support.

Multiplication : Year 4

Multiply 2/3 digits by 1 digit

Once children are ready -> move to short multiplication:

$$\begin{array}{r} 327 \\ \times \quad 4 \\ \hline 1308 \\ \hline \end{array}$$

1 (2)

1) Start by multiplying the ones e.g $7 \times 4 = 28$

2) Carry tens then complete next column

$4 \times 2 = 8 + 2 = 10$

etc....

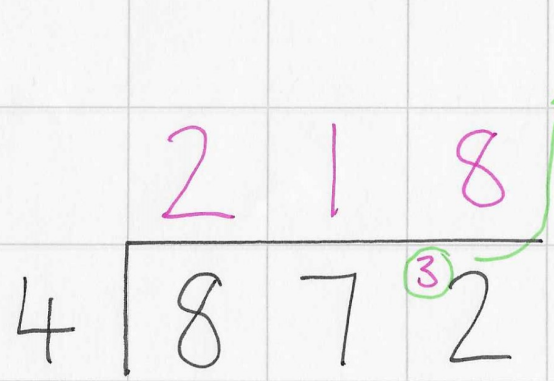
Children encouraged to 'approximate' first

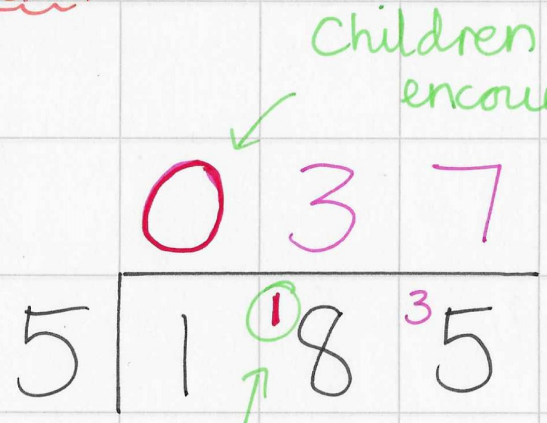
e.g. $300 \times 4 = 1200$

Short Division : Year 4

3 digits by 1 digit (no remainde

Children are encouraged to divide mentally using known facts (see mental calculation policy). They decide when a written method is more efficient.





Always link to place value.

Demonstrated using practical resources

'Carry' it with you.

Column Addition: Year 5

More than 4 digits + up to 2 d.p.

$$\begin{array}{r} 23481 \\ +\ \ 1362 \\ \hline 24843 \\ \hline \quad\ 1 \end{array}$$

$$\begin{array}{r} 24.68 \\ +\ \ 7.30 \\ \hline 31.98 \\ \hline 1 \end{array}$$

Include place value holder

Line up decimal point

$$\begin{array}{r} 19.36 \\ 3.65 \\ +\ \ 0.79 \\ \hline 23.80 \\ \hline 1\ \ 1\ \ 2 \end{array}$$

Line up decimal point

Column Subtraction : Year 5

exchanging

$$\begin{array}{r} {}^{2}\cancel{3}\,{}^{10}\cancel{1}\,{}^{1}0\,(4)\,{}^{1}\cancel{5}\,{}^{1}6 \\ -\quad 2\,1\,2\,8 \\ \hline 2\,8\,9\,2\,8 \end{array}$$

* line up digits in place value columns

At least 4 digits + up to 2 d.p.

Add place value holder

$$\begin{array}{r} {}^{6}\cancel{7}\,{}^{10}\cancel{1}\,{}^{1}6\,{}^{8}\cancel{9}.\,{}^{1}0 \\ -\quad 3\,7\,2.\,5 \\ \hline 6\,7\,9\,6.\,5 \end{array}$$

Line up decimal point

Formal Multiplication: Year 5 (Long)

4 digit by 2 digit

	1	2	4	3
x			1	5
	6	2	1	5
+	1	2	4	3	0
	1	8	6	4	5

Step 1: Multiply by the ones digit

x 5

Carrying underneath

x 10

Must include 0 as place value holder because we're x by 10 not 1

Short Division

Year 5

Divide 4 digit by 1 digit with remainder

Remainder as a fraction/decimal

No remainder:

$$6 \overline{)\,1\,{}^{1}4\,{}^{2}4\,6} = 261$$

With remainder

$$7 \overline{)\,1\,{}^{1}7\,{}^{3}1\,{}^{3}9} = 245 \text{ r } 4$$

$$8 \overline{)\,1\,{}^{1}1\,{}^{3}7\,{}^{5}8} = 0147 \text{ r } \frac{2}{8}$$

$\frac{2}{8}$ ↑ recognise as $\frac{1}{4}$ = 0.25 ↙

or

1 4 7.2 5

Children need to interpret the remainder in context e.g. Money

Column Addition : Year 6

Add several numbers of increasing complexity (up to 3 d.p.)

	tth	th	h	t	o
	8	1	0	5	9
		3	2	6	4
+	1	7	1	2	1
	1	0	1	4	4	4
		1		1	1	

	t	o	.	tth	hth	thth
	2	3	.	3	6	1
		7	.	4	0	2
+	1	4	.	3	0	0
		4	5	.	0	6	3
		1	1			

* Numbers + decimal point should be lined up vertically

* Empty decimal places should be filled with 0

Column Subtraction: Year 6

Subtracting with increasingly large numbers (up to 3 d.p).

$$\begin{array}{r} 1\,{}^{6}\!\not{7}\,{}^{12}\!\not{3}\,{}^{1}2\,{}^{0}\!\not{X}\,{}^{1}0 \\ -\quad 1\,6\,9\,0\,8 \\ \hline 1\,5\,6\,3\,0\,2 \end{array}$$

* Numbers + decimal point should be lined up vertically.

$$\begin{array}{r} 6\,5.{}^{7}\!\not{8}\,{}^{1}0\,9 \\ -\quad 3.2\,8\,0 \\ \hline 6\,2.5\,2\,9 \end{array}$$

* Empty decimal places should be filled with zero to show place value.

Formal Multiplication : Year 6

Short + long multiplication as in Year 5 and multiply decimals up to 2 d.p. by a single digit

$$\begin{array}{r} 3.19 \\ \times \quad 8 \\ \hline 25.52 \\ \hline {\scriptstyle 1\quad 7} \end{array}$$

* line up the decimal point in the question and the answer

Children apply this to money and measures.

Formal Division : Year 6

Divide 4 digits by single and 2-digit numbers (including decimals) and represent the remainder in a range of ways.

$$12 \overline{)2548}$$

$2\,1\,2$ r $\frac{4}{12}$ $(=\frac{1}{3})$

$= 212.3\dot{3}$

Multiples list :

12	84
24	96
36	108
48	120
60	132
72	144

$$8 \overline{)12.436^{4}0}$$

$1.5\,4\,5$

Line up the decimals

Add zero until the decimal stops or until you can round to 2 d.p.