

Mathematics Written Calculations Policy



Addition

Reception

- Children are introduced to the + sign and write their additions like this:
 $3 + 2 = 5$ (Numbers up to 10)

Year 1

- Children continue to write their additions like this:
 $3 + 2 = 5$
- They also learn to understand the inverse. E.g. $2+3=5$
- Children move onto adding three small numbers.
(Numbers up to 30)

Year 2

- Children begin to use empty number lines starting with the larger number and counting on.

$$15 + 12 = 27$$

15 25 27

- More able children will move onto partitioning, splitting the tens and units.

$$37 + 15 =$$

37 + 15 =

30 7 10 5

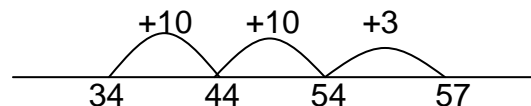
40 + 12 = 52

(Numbers up to 100)

Year 3

- Children continue to use empty number lines with increasingly large numbers.

$$34 + 23 = 57$$



- Children use the partitioning method as in Year 2, but develop it towards column addition using increasingly larger numbers.

$$37 + 15 = \quad 30 + 10 = 40 \quad 40$$
$$7 + 5 = \quad \underline{12} + \quad \text{simplifying to:} \quad \underline{12} +$$
$$52 \quad 52$$

Year 4

- Children will now mostly use the earlier methods for mental calculations purposes, using jottings where appropriate. They will briefly explore the expanded methods with increasingly large numbers. Adding the least significant digits first.

Least significant

$$\begin{array}{r} 625 \\ 78+ \\ \hline 13 \\ 90 \\ 600 \\ \hline 703 \end{array}$$

Leading onto column addition with 'carrying' when appropriate.

$$\begin{array}{r} \text{HTU} \\ 625 \\ 78+ \\ \hline 703 \\ \hline 11 \end{array}$$

Year 5

- Most children will now use the column addition 'carrying' method as standard.
- More able children will move onto adding 3 numbers and numbers with one or two decimals, including money problems.

e.g.

$$\begin{array}{r} 124.9 \\ 86.3+ \\ \hline 211.2 \\ \hline 111 \end{array} \quad \text{and} \quad \begin{array}{r} 281 \\ 226+ \\ 349+ \\ \hline 856 \\ \hline 11 \end{array}$$

Year 6

- Most children will use short column addition as standard, including decimal numbers and addition of three or four large numbers, as in Year 5.
- They will then move onto adding decimal numbers with different amounts of significant figures and challenges where an understanding of place value is tested.

e.g.

$$\begin{array}{r} 12.358 \\ 8.271+ \\ \hline 20.629 \\ \hline 11 \end{array} \quad \begin{array}{r} 147.2 \\ 1.737+ \\ \hline 148.937 \end{array}$$

Subtraction



Reception

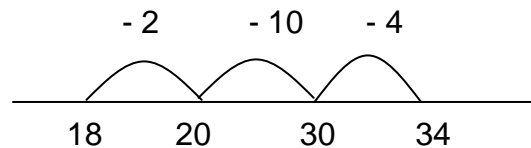
Children are introduced to the – sign and write their subtractions like this:
 $5 - 3 = 2$ (Numbers up to 10)

Year 1

Continue as in Reception, using a number square to support the increase in number size. (Numbers up to 30)

- Children begin to use empty number lines to support mental calculations and then will use the number line to count back

e.g. $34 - 16 = 18$.



Year 2

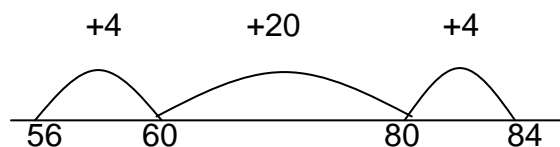
- Number line work continues as in Year 1
- Children will start to simplify this method using partitioning to remove the need for a number line for simpler examples.

e.g. $34 - 16 =$
 $34 - 10 = 24$ $-6 = 18$

(Numbers up to 100)

Year 3

- Children consolidate the Year 2 methods, increasing the size of the numbers when confident.
- Next, children use the empty number line method to count on from the smaller number to the larger number to solve problems where the numbers are relatively close together.
 $84 - 56 = 4 + 20 + 4 = 28$



Year 4

- Children consolidate their use of number lines to count up from the smaller number to the larger number.
- They will move onto compact decomposition (column subtraction) when appropriate.

$$\begin{array}{r} 754 \\ 86- \\ \hline 668 \end{array}$$

Year 5

- Children will use compact decomposition (column subtraction) with increasingly large numbers.

$$\begin{array}{r} 1243 \\ 956- \\ \hline 287 \end{array}$$

- Expand to include zero values and, if ready, move onto decimals.

Year 6

- Children will use the compact decomposition (column subtraction) method moving onto decimals and questions where zero values exist in the larger number.

$$\begin{array}{r} 274.7 \\ 46.8- \\ \hline 127.9 \end{array}$$

- They will then move onto subtracting decimal where an understanding of place value is tested.

e.g. 67.9^{10}

$$\begin{array}{r} 1.73- \\ \hline 66.27 \end{array}$$

Multiplication



Year R

Children will learn to count in 2s, although no formal recordings are made.

Year 1

Children will learn to count in 2s, 5s and 10s, but no formal recordings are made.

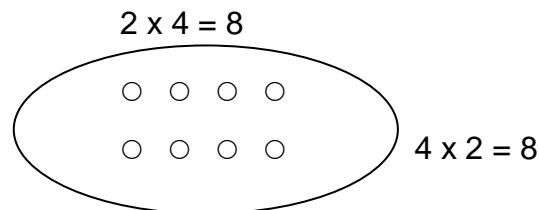
Year 2

Children will develop their understanding of multiplication and use jottings to support calculation.

- Repeated addition

$$2 \times 4 = 4 + 4 = 8 \text{ or 2 lots of 4 or } 2 \times 4 \text{ or } 4 \times 2$$

- Arrays



Year 3

- Children will learn all times tables up to 10×10 and record formally e.g. $8 \times 7 = 56$ or $35 = 5 \times 7$
- Continue to use repeated addition.
- Children will be shown how use partitioning to multiply before moving onto the grid method

$$\begin{aligned} 23 \times 8 &= (20 \times 8) + (3 \times 8) \\ &= 160 + 24 \\ &= \mathbf{184} \end{aligned}$$

Then

$$23 \times 8$$

x	20	3
8	160	24

$$= 160 + 24 = \mathbf{184}$$

Year 4

- Children use the grid method of multiplication for increasingly large numbers, approximating first.

They will approximate first
 153×4 is approximately $150 \times 4 = 600$

X	100	50	3
4	400	200	12

$$= 400 + 200 + 12 = \mathbf{612}$$

extending to:-

TUxTU and HTUxTU

e.g. 328×16

X	300	20	8
10	3000	200	80
6	1800	120	48

$$\begin{array}{r}
 4800 \\
 + 320 \\
 + 128 \\
 \hline
 = 5248 \\
 \small{1}
 \end{array}$$

Some children may choose not to compact this method or partially compact it e.g. instead of 4800, some children may still prefer to write the 3000 & 1800 separately.

- Partitioning will continue to be used with all children as a mental method.
- Children will then use a short multiplication method. (TU x U and HTUxU)

$$\begin{array}{r}
 23 \\
 \times 8 \\
 \hline
 184 \\
 \small{2}
 \end{array}$$

Year 5

- Short multiplication is rehearsed extensively for increasingly large numbers. (ThHTUxU) Decimal problems (including money problems) are also tackled this way.

e.g.

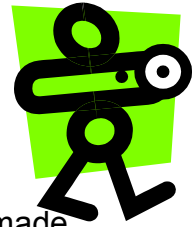
1372	27.35
<u>4x</u>	<u>6x</u>
<u>5488</u>	<u>164.10</u>
<small>12</small>	<small>42 3</small>

Year 6

- Further practising of the short multiplication method takes place
- Most children will move onto long multiplication (TU x TU and HTU x TU)

$$\begin{array}{r}
 72 \\
 \times 38 \\
 \hline
 576 \\
 \hline
 2160 \\
 \hline
 2736 \\
 \small{1}
 \end{array}$$

Division



Year R

Children learn the concept of 'sharing', although no formal recording is made.

Year 1

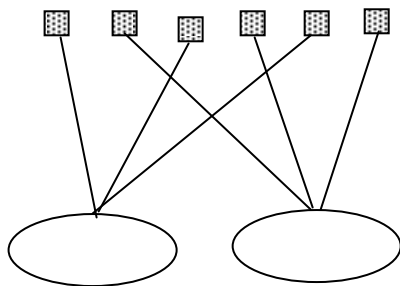
Children learn to find $\frac{1}{2}$ $\frac{1}{3}$ and $\frac{1}{4}$ practically, but no formal recording is made.

Year 2

Children will develop their understanding of division and use jottings to support calculation. ($\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ and $\frac{1}{5}$)

- Sharing equally

6 sweets are shared between 2 people. How many do they each get?



Year 3

- Children continue to work on grouping and sharing.
- Children are introduced to remainders, using their more established times table knowledge.

e.g. $13 \div 3 = 4r1$ ("I know that 4×3 is 12, so that leaves 1 left over")

Year 4

- Children will be shown repeated subtraction i.e. The 'chunking' method. To demonstrate the theory behind short division.

$$\begin{array}{r} 72 \\ -50 \text{ (10x5)} \\ \hline 22 \\ -20 \text{ (4x5)} \\ \hline 2 \end{array} = 14 \text{ remainder 2.}$$

- Children with understanding start to use short division (when dividing by number up to 9 only)

e.g.

$$\begin{array}{r} \underline{32} \text{ r4} \\ 6 \overline{)196} \end{array}$$

Year 5

- Children will continue to use the short division method.
- Children will move onto numbers including decimals (to 1 and 2 decimal places)

$$\begin{array}{r} 12.5 \\ 7 \overline{)87.5} \end{array}$$

- At this point, children will be shown how to record remainders as decimals and fractions.

DECIMALS

$$\begin{array}{r} 32.66 \\ 6 \overline{)196.40} \end{array}$$

= 32.66

FRACTIONS

$$\begin{array}{r} 32 \frac{4}{6} \\ 6 \overline{)196} \end{array}$$

= $32 \frac{4}{6}$

Year 6

- Children will continue to practise Year 5 skills
- When appropriate, children will be shown how to tackle division problems involving larger divisors, using their knowledge of factors.

e.g. $1632 \div 24$

“We know that 24 can be made by 6×4 , so we’ll tackle the problem in 2 steps.”

i.e. $1632 \div 6$ then divide the answer by 4.

$$\begin{array}{r} 0272 \\ 6 \overline{)1632} \end{array} \quad \begin{array}{r} 068 \\ 4 \overline{)272} \end{array}$$


- More able children will be shown the long division method