Year 4 Maths Calculations Policy

NC Programme of study

- Add numbers with up to 4dgits using formal written column methods
- Solve addition and subtraction 2-step problems in context, deciding which operations to use
- Solve simple measures and money problems involving fractions and decimals to 2dp
- Continue to practice column methods with increasingly large numbers to aid fluency (non-stat)

Year 4 Addition

BY THE END OF YEAR 4…

By the end of Year 4, children will be able to show their understanding as:

$$\begin{array}{rcccc} & 2 & 1 & 5 & 6 \\ + & 1 & 4 & 8 & 3 \\ \hline & 3 & 6 & 3 & 9 \\ \hline & & 1 & & \end{array}$$

Following on from year 3…
Formal column addition, where appropriate

Children should continue to use the place value counters, in columns, to support their conceptual understanding of addition.
Children should make the choice of reverting to expanded methods if experiencing difficulty.
They should be expected to add several numbers, with different numbers of digits, and respond using column addition.

45 + 1023 + 154 =

Numbers should be placed highest value first.

$$\begin{array}{rcccc} & 1 & 0 & 2 & 3 \\ & & 1 & 5 & 4 \\ + & & & 4 & 5 \\ \hline & 1 & 2 & 2 & 2 \\ \hline & & 1 & 1 & \end{array}$$

Apply understanding of addition in other contexts involving decimals

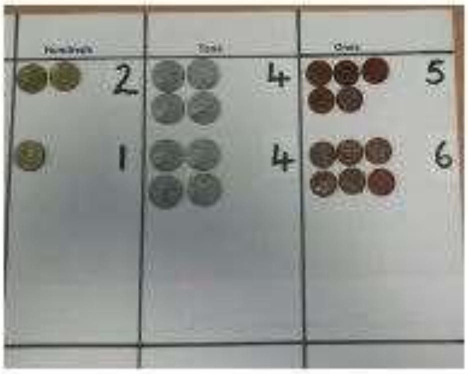
Use other practical resources such as coins (£1, 10p, 1p) and masses (100g, 10g, 1g) when adding in the context of measures (to 2 d.p.) Encourage children to explain their thinking in terms of the practical equipment, continuing to make use of the grid where appropriate.

Relate 'H' to pounds/100 pence; 'T' to 10 pence; 'O' to 1 pence.

Emphasise keeping the decimal points 'in a straight line'.

Children should make the choice of reverting to expanded methods if experiencing difficulty.

£2.45 + £1.46



$$\begin{array}{r} 2\,.\,45 \\ +\ \underline{1\,.\,46} \end{array}$$

$$\begin{array}{r} 2\,.\,45 \\ +\ 1\,.\,46 \\ \hline 3\,.\,91 \\ \hline {}_{1}\ \end{array}$$

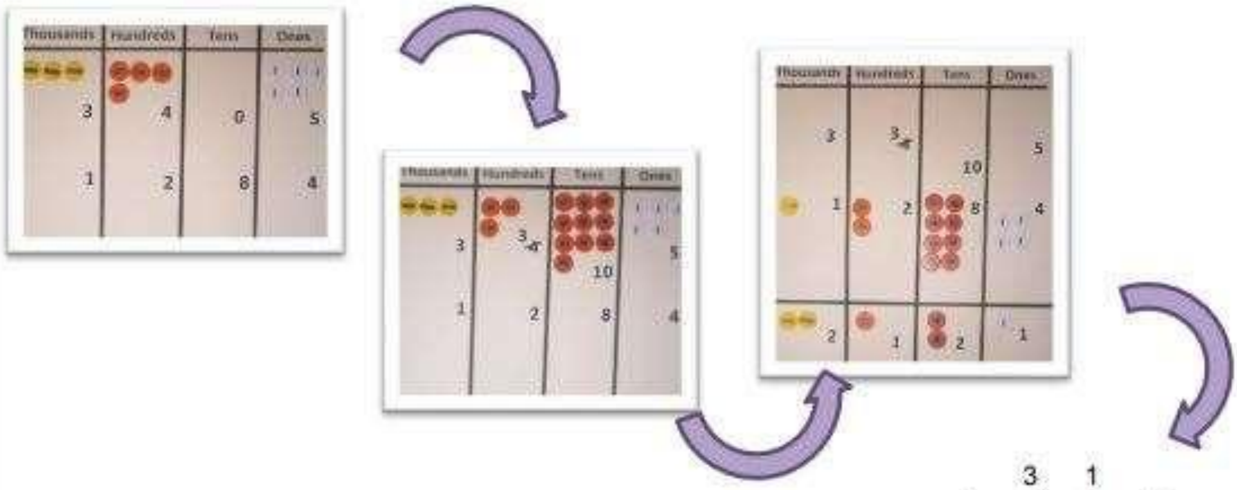
NC Programme of study

- Subtract numbers up to 4dgits using formal written column methods
- Solve addition and subtraction 2-step problems in context, deciding which operations to use
- Solve simple measures and money problems involving fractions and decimals to 2dp

Year 4 Subtraction

BY THE END OF YEAR 4…

By the end of Year 4, children will be able to show their understanding as:



$$\begin{array}{ccccc} & & {}^{3} & {}^{1} & \\ & 3 & \cancel{4} & 0 & 5 \\ - & 1 & 2 & 8 & 4 \\ \hline & 2 & 1 & 2 & 1 \\ \hline \end{array}$$

Following on from year 3…
Formal column subtraction, where appropriate

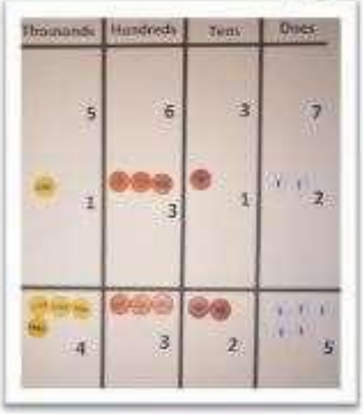
Children should continue to use the place value counters, in columns, to support their conceptual understanding of subtraction when working with increasingly larger numbers.

They should be able to subtract numbers with different numbers of digits, including calculations where more than one exchange is needed.

Children should be able to subtract more than one number, with different numbers of digits, making decisions regarding the order of subtraction based on mental skills.

E.g. 5637 – 708 – 1312
Children should decide whether to first subtract 708 or 1312 from 5637, followed by the other number. Alternatively they may choose to calculate 708 + 1312 (using column addition), and then subtract the resulting 2020 from 5637.

Using grouped objects for subtraction, with exchanging



$$\begin{array}{rcccc} & 5 & 6 & 3 & 7 \\ - & 1 & 3 & 1 & 2 \\ \hline & 4 & 3 & 2 & 5 \\ \hline \end{array}$$

$$\begin{array}{rcccc} & \overset{3}{\cancel{4}} & \overset{1}{3} & \overset{1}{\cancel{2}} & \overset{1}{5} \\ - & & 7 & 0 & 8 \\ \hline & 3 & 6 & 1 & 7 \\ \hline \end{array}$$

Apply understanding of subtraction in other contexts involving decimals

Children should use other practical resources, such as coins (£1, 10p, 1p) and masses (100g, 10g, 1g) when subtracting in the context of measures (to 2 d.p.). Encourage children to explain their thinking in terms of the practical equipment, continuing to make use of the grid where appropriate.

£4.45 - £2.27

$$\begin{array}{rcccc} & 4 & . & \overset{3}{\cancel{4}} & \overset{1}{5} \\ - & 2 & . & 2 & 7 \\ \hline & 2 & . & 1 & 8 \\ \hline \end{array}$$

Make reference to inverse operation for checking calculations.

NC Programme of study

- Recall and use multiplication and division facts for the tables up to 12x12
- Multiply 2 and 3 digit numbers by a 1 digit number using formal written layout
- Solve problems involving multiplication and adding. Use distributive law to multiply 2 digit x 1 digit numbers and harder correspondence problems

Year 4 Multiplication

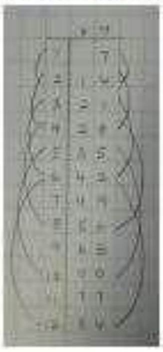
BY THE END OF YEAR 4…

By the end of Year 4, children will be able to show their understanding as:

Compact column written method for multiplication

	3	4	2
x			7
2	3	9	4
	2	1	

Following on from Year 3…
Expanded column method for multiplication (TO x O)



	3	6
x		7
	4	2
2	1	0
2	5	2

The expanded column method for multiplication should be introduced alongside times table toolboxes.

Model the expanded column method, paying particular attention to the value of the digits involved.

Compact column method for multiplication (TO x O)

Once confident with the expanded column method for multiplication, and showing considerable conceptual understanding, children can progress towards the compact method.
As at all earlier stages, this should be introduced alongside the previous expanded method, enabling children to understand the positioning of numbers, reducing the need to teach a 'process'.

	3	6
x		7
2	5	2
	4	

Multiplying a three-digit number by a single digit number

When increasing the size of the numbers being multiplied, to HTO x O, children should make use of known facts, toolboxes and their understanding of multiplying numbers by 10 and 100.

The calculation should be modelled alongside, using the expanded column method.

Children should be asked about the different parts of the calculation: *Where do we get 18 from? Which numbers were multiplied together to result in 240? Which method makes it easier to add the separate parts at the end?*

$$
\begin{array}{r}
143 \\
\times \quad 6 \\
\hline
18 \\
240 \\
600 \\
\hline
858 \\
\hline
\end{array}
$$

$$
\begin{array}{r}
143 \\
\times \quad 6 \\
\hline
858 \\
\hline
{\scriptstyle 2\ 1\ \ }
\end{array}
$$

Once conceptual understanding is embedded, shorten the written form of the calculation using the formal compact multiplication method.

Show the compact form alongside the expanded, for the same calculation, and allow the children to decide for themselves where the different parts of the calculation are recorded.

Showing children a completed compact short multiplication recording and asking them to write it in expanded form, is an effective way of assessing understanding.

Solve practical problems where children need to scale up. Relate to known number facts, e.g. How tall would a 25cm sunflower be if it grew 6 times taller? (What toolbox is needed to support this calculation?)

NC Programme of study

- Recall and use multiplication and division facts for the tables up to 12x12
- Divide 2 and 3 digit numbers by a 1 digit number using formal written layout

Year 4 Division

BY THE END OF YEAR 4…
By the end of Year 4, children will be able to show their understanding as: Use the short written method of division of 3 digit numbers by 1 digit numbers (include exchange and remainders)

$$\begin{array}{r|lll} & 1 & 0 & 8\ \ r5 \\ \hline 6 & 6 & 5 & {}^{5}3 \end{array}$$

Using place value counters to demonstrate the need for exchange when dividing

Examples of division calculations requiring exchange need to be chosen carefully to enable the children to use the place value counters in an efficient way, strengthening their conceptual understanding.

E.g. 42 ÷ 3

$$\begin{array}{r|ll} & 1 & \\ \hline 3 & 4 & {}^{1}2 \end{array}$$

Start with 42 represented using the smallest number of counters. Add the boundary line.
Share the '10' counters between the three rows, placing one in each row. Indicate the single '10' counter remaining, alongside the two '1' counters.

Discuss the fact that the single '10' counter cannot be shared equally between the three rows, so it must be exchanged for ten '1' counters. Emphasise that the total has not changed, but 42 is now represented as 30 and 12. Model the formal written layout alongside the visual image of the counters ensuring children recognise the similarities between the two.

Share the twelve '1' counters between the three rows, placing four in each. Indicate the number of tens and ones in each row, writing the answer above the boundary line. Complete the formal written layout alongside the final visual image.

$$\begin{array}{r|ll} & 1 & 4 \\ \hline 3 & 4 & {}^{1}2 \end{array}$$

Exchanging with remainders

A similar approach should be used when dividing larger numbers, and when carrying out calculations with remainders.

E.g. 427 ÷ 3

The '100' counters are shared between the three rows, giving one counter to each row, with one left over.

The last '100' counter is exchanged for ten '10 counters. There now twelve 'ten' counters to share between the three rows.

$$\begin{array}{r|lll} & 1 & & \\ \hline 3 & 4 & {}^{1}2 & 7 \end{array}$$

The twelve 'ten' counters and the seven '1' counters are shared between the three rows.
There are four '10' counters in each row, and two '1' counters. There is one '1' counter remaining.

$$\begin{array}{r|llll} & 1 & 4 & 2 & \text{r.}1 \\ \hline 3 & 4 & {}^{1}2 & 7 & \end{array}$$

Therefore 427 ÷ 3 = 142 r.1

When deemed appropriate, children should start to complete short division calculations using the formal written layout , without the support of the place value counters. Children should still be encouraged to verbalise their understanding as they did when working practically.