

## Route Towards a Formal Written Method for Subtraction – Year 2

### National Curriculum Programme of Study;

Subtract numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers

[Non-statutory - Recording subtraction in columns supports place value and prepares for formal written methods with larger numbers.]

### BY THE END OF YEAR 2...

Children will be confident in using a range of base 10 equipment in columns. They will be able to subtract two 2-digit numbers and start to record the value of the digits on the baseboard in the tens and units columns.

Using grouped objects for subtraction, without exchanging

Once secure with the understanding of place value for two-digit numbers, teachers should demonstrate, using concrete objects grouped in tens, how numbers can be represented on base boards (A3 in size) and then used for calculating.



'Familiar' objects should be used initially. Balloons packaged into boxes of ten are ideal, and they clearly show the number contained on the labelling. Discuss the contents and count the contents of a box with the children. Discuss the value of the single balloons as both 'units' and 'ones'.

Show how a number such as 28 can be represented using the balloons. *How many packs of ten balloons can we use? How many balloons will that be? How many single balloons will we need to make our total?* Place the balloons on the base board

1

*We need to give away 5 balloons, so we will subtract them from the 28.*

Write the subtraction calculation '28 - 5'. Ensure the units being subtracted do not exceed those in the initial number, i.e. 8, and thus exchanging from tens to ones will not be necessary.



Demonstrate how to subtract the 5 single balloons from the 8, by moving them down on the grid. *Do we need to move any of these packs of 10 away? Why not?* Ensure children understand that the ones/units digit is changing, but the tens digit is not.

Model how the remaining balloons are moved to the 'answer line' at the bottom of the grid. *How many balloons do we have left? How many tens? How many ones?*



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Once secure, teachers can annotate the base board alongside the concrete objects. This starts to link to the next stage in the progression towards a formal written method, where calculations are laid out vertically.

Ensure the inverse operation of addition is integrated as much as possible. *If I added my 5 balloons back on, how many balloons would I have?* Model this by working backwards, up the grid, resulting in the same image the children started with.

## Route Towards a Formal Written Method for Subtraction – Year 3

### National Curriculum Programme of Study;

- subtract numbers with up to three digits, using formal written methods of columnar subtraction

BY THE END OF YEAR 3...

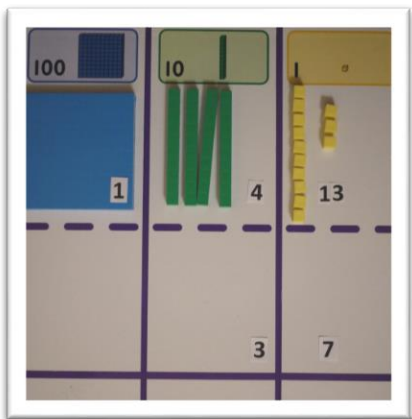
By the end of Year 3, children will be able to show their understanding as;

$$\begin{array}{r}
 8 \quad 12 \\
 \cancel{8} \quad \cancel{3} \quad 12 \\
 - \quad 4 \quad 5 \quad 7 \\
 \hline
 4 \quad 7 \quad 5 \\
 \hline
 \end{array}$$

Following on from year 2...

Using grouped objects for subtraction, with exchanging, and matched recording

Modelling the subtraction of two numbers (HTU – TU, then HTU - HTU) using base 10 equipment and a baseboard.



In the example here, showing  $153 - 37$ , the equipment is placed on the baseboard, with annotated digits alongside. Discuss the fact that there are not enough separate ones to subtract 7 easily, so you will need to exchange a ten for ten ones.

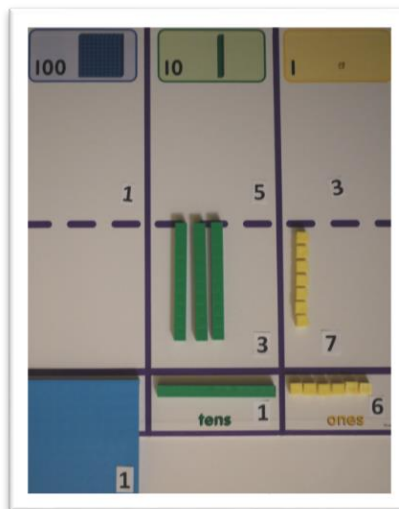
Reinforce that this number can now be read as 'one hundred and forty, thirteen'.

Once 2 change is made, the 7 ones can be subtracted (moved down) 2 by the 3 tens. The remaining equipment is brought down to the bottom of the grid, to the answer bar. The value of the digits should be written on the baseboard throughout the calculation, to enable children to see the links and the formal written method.

between the practical model

Initially, calculations should exchanging between the tens

The formal written method introduced alongside the base board displaying the and children should be to find the similarities at all Refer to each part of the make links between the two the one ten exchanged for ten have I changed the 5 to a 4 in with the practical equipment?



$$\begin{array}{r}
 4 \\
 1 \quad \cancel{5} \quad 13 \\
 - \quad 3 \quad 7 \\
 \hline
 1 \quad 1 \quad 6
 \end{array}$$

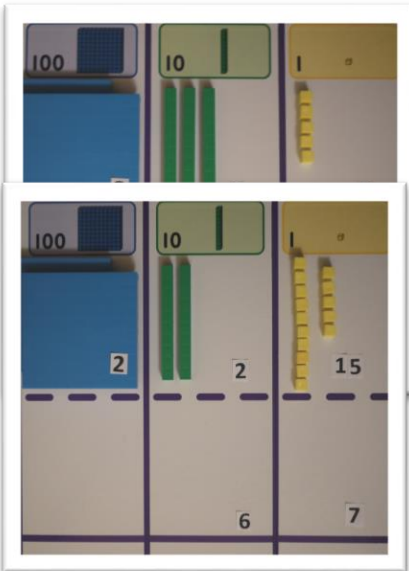
only involve and ones. should be annotated apparatus, encouraged stages.

calculation and ensure the children representations. How have I shown ones in the written method? Why the tens column? How did this look

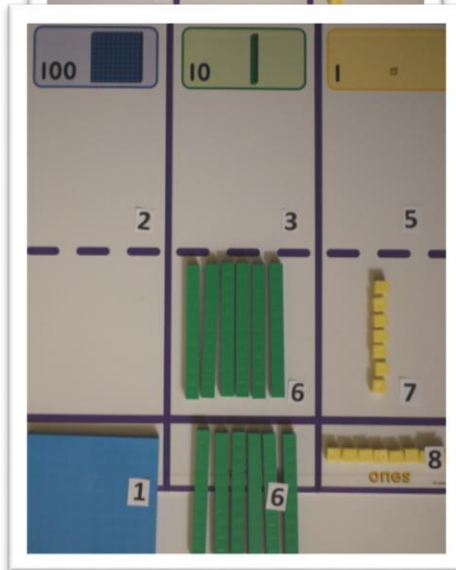
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Continue to integrate the concept of addition and subtraction being the inverse of each other with questions such as; 'If I had 126 in my answer bar at the bottom of the grid, and I had subtracted 37 as we have done here, what must my starting number have been? Did I still need to exchange?'

Once confident, children should be introduced to examples requiring exchange from hundreds to tens as well as tens to ones, such as 235-67 shown here.



*'two hundred and twenty and fifteen, subtract sixty seven'*



*'one hundred and twelve tens and fifteen, subtract sixty seven'*

$$\begin{array}{r}
 1 \quad 12 \\
 \cancel{2} \quad \cancel{3} \quad 15 \\
 - \quad \quad 6 \quad 7 \\
 \hline
 1 \quad 6 \quad 8
 \end{array}$$

### Route Towards a Formal Written Method for Subtraction – Year 4

National Curriculum Programme of Study;

- subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate

- solve addition and subtraction two-step problems in context, deciding which operations and methods to use and why
- solve simple measure and money problems involving fractions and decimals to two decimal places

### BY THE END OF YEAR 4...

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

Thousands	Hundreds	Tens	Ones
3	4	0	5
1	2	8	4

Thousands	Hundreds	Tens	Ones
3	3	10	5
1	2	8	4
2	1	2	1

$$\begin{array}{r}
 3450 \\
 - 1284 \\
 \hline
 2121
 \end{array}$$

### Following on from year 3...

Formal column subtraction, where appropriate

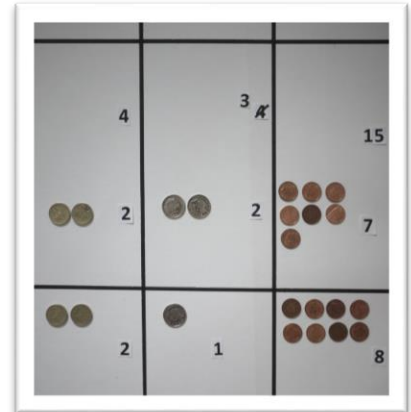
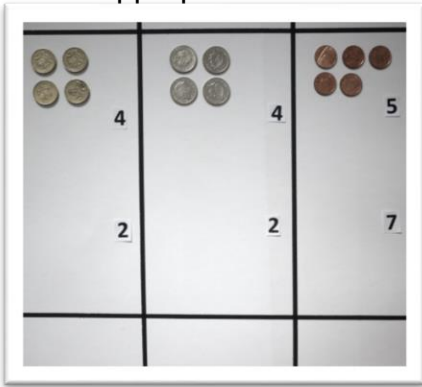
They should be able to subtract numbers with different numbers of digits, including calculations where more than one exchange is needed.

Thousands	Hundreds	Tens	Ones
3	1	1	1
3	6	1	5

$$\begin{array}{r}
 3111 \\
 - 708 \\
 \hline
 3615
 \end{array}$$

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 base board where appropriate.



$$£4.45 - £2.27$$

$$\begin{array}{r}
 4 \quad . \quad \overset{3}{\cancel{4}} \quad 5 \\
 + \quad 2 \quad . \quad 2 \quad 7 \\
 \hline
 2 \quad . \quad 1 \quad 8
 \end{array}$$

## Route Towards a Formal Written Method for Subtraction – Year 5

### National Curriculum Programme of Study;

- subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)
- Pupils use all four operations in problems involving money

### BY THE END OF YEAR 5...

By the end of Year 5, children will be able to show their understanding as;

$$\begin{array}{r}
 \begin{array}{cccccc}
 & 5 & & 1 & & 2 & & 1 \\
 4 & \cancel{6} & & 1 & & \cancel{3} & & 2 \\
 - & 2 & & 3 & & 5 & & 2 & & 8 \\
 \hline
 2 & 2 & & 6 & & 0 & & 4
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & 4 & & 11 & & 1 & & & 2 & & 1 \\
 1 & \cancel{5} & & \cancel{2} & & 1 & & . & \cancel{3} & & 0 & & 4 \\
 - & & & 3 & & 7 & & 9 & & . & 0 & & 8 & & 3 \\
 \hline
 1 & 1 & & 4 & & 2 & & . & 2 & & 2 & & 1
 \end{array}
 \end{array}$$

### Following on from Year 4...

Formal column subtraction, including subtraction of mixed decimal numbers in a range of contexts

Children should continue to use the place value counters, in columns, to support their conceptual understanding of subtraction and the place value of larger and smaller numbers (to 3 decimal places).

Include examples in context as well as those requiring the subtraction of several numbers and different numbers of decimal places.

$$\text{£}42.38 - \text{£}14.85$$

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & 3 & & 11 & & & & 1 \\
 \cancel{4} & \cancel{2} & & . & & 3 & & 8 \\
 - & 1 & & 4 & & . & & 8 & & 5 \\
 \hline
 2 & 7 & & . & & 5 & & 3
 \end{array}
 \end{array}$$

## Route Towards a Formal Written Method for Subtraction – Year 6

### National Curriculum Programme of Study;

- Pupils practise addition for larger numbers using the formal written methods of columnar addition.
- Solve addition one step and multi-step problems in context.

### BY THE END OF YEAR 6...

By the end of Year 6, children will be able to show their understanding as;

$$\begin{array}{r}
 \begin{array}{cccccc}
 2 & 1 & 1 & 1 & 2 & 1 \\
 \cancel{3} & 0 & \cancel{2} & 4 & \cancel{3} & 2 \\
 - & 1 & 1 & 0 & 7 & 0 & 9 \\
 \hline
 1 & 9 & 1 & 7 & 2 & 3
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \begin{array}{ccccccc}
 0 & 1 & 5 & & 1 & & \\
 \cancel{1} & 2 & \cancel{6} & . & 0 & 3 & 5 \\
 - & & 5 & 2 & . & 8 & 0 & 3 \\
 \hline
 0 & 7 & 3 & . & 2 & 3 & 2
 \end{array}
 \end{array}$$

### Following on from Year 5...

### Formal column subtraction for any number of values, with mixed decimal places

Children should continue to work in columns, for large numbers as well as those to several decimal places, in context where appropriate. Children should be expected to make use of the inverse nature of addition and subtraction where appropriate.

E.g. Maximum crowd capacity at three American Football grounds are;

Stadium	Crowd capacity
Ohio	102329
Michigan	109901
Los Angeles Coliseum	93607

What is the difference between the numbers of seats available at each stadium?

E.g. Two numbers have a difference of 1.5803. One of the numbers is 4.7218. What is the other? Is this the only answer? How could you find another solution?



$$\begin{array}{r} 4 . 7 2 1 8 \\ - ? . ? ? ? ? \\ \hline 1 . 5 8 0 3 \end{array}$$

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