Calculation Policy – Years 5 and 6

Tuesday 6th November 2018

Which number is the odd one out?
Why?
(There could be more than one answer)

3	33	15	36
12	27	34	18
72	39	30	6
24	21	9	42

Why are methods different today?

- A desire to do something different to counter the nation's phobia around mathematics
- Development of understanding of effective methods to teaching mathematics since the mid-1990s
- Exploration of effective approaches from some of the most successful education systems in the world
- Extensive research and trialling

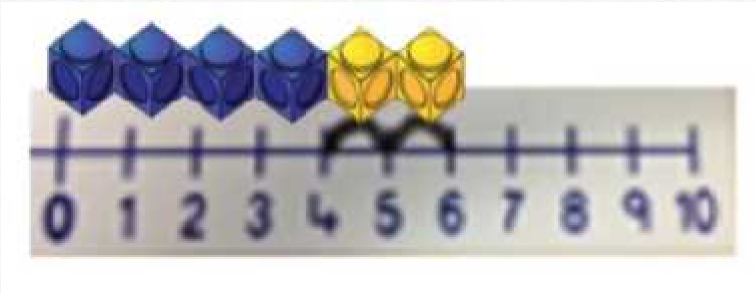
There is no “right” way to work

- Methods selected will depend upon the situation and the numbers involved, including when to use calculators. Efficiency is as important as accuracy.
- Children make decisions about methods and draw on a range of strategies and approaches when applying maths in context.
- Children in the same class could be using different methods to others depending on their ability, confidence and stage of mathematical development.

Addition

Stage 2

Using practical apparatus, pen and paper jottings (horizontally), working towards the number line.

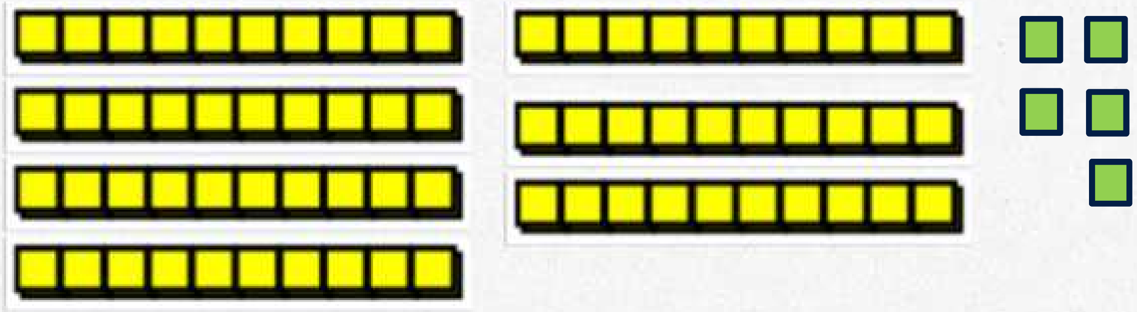


Stage 2

<u>42 + 33</u>

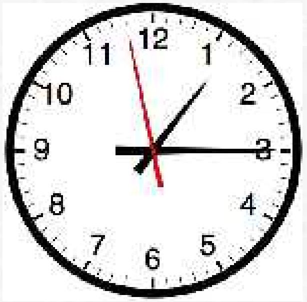
40 + 30 = 70 (collect the ‘tens’ together)

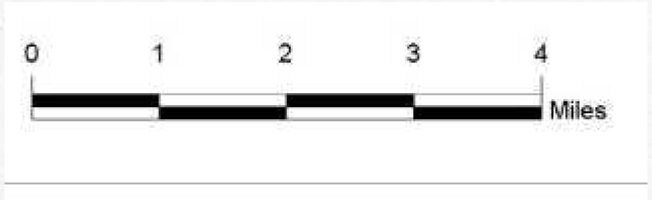
2 + 3 = 5 (collect the ‘ones’ together – note the change in terminology from ‘units’ to ‘ones’).

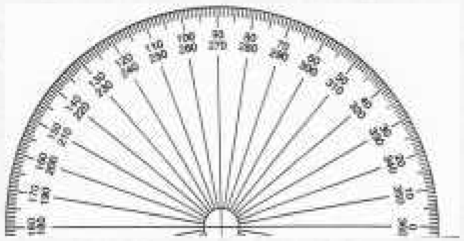


70 + 5 = 75 (add the totals together)

Number lines have their uses in a range of everyday situations





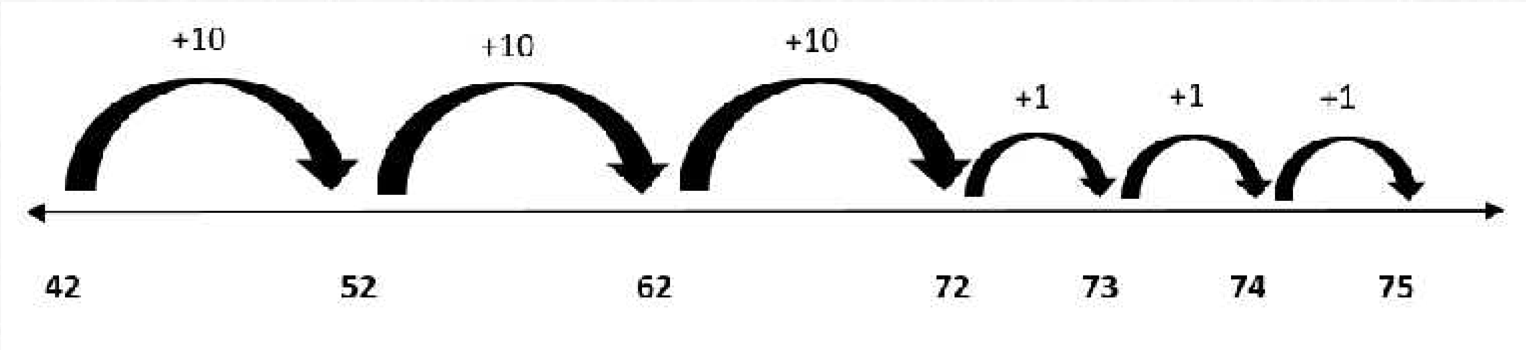


Stage 2

Using a number line for TO + TO (number square to help)

42 + 33

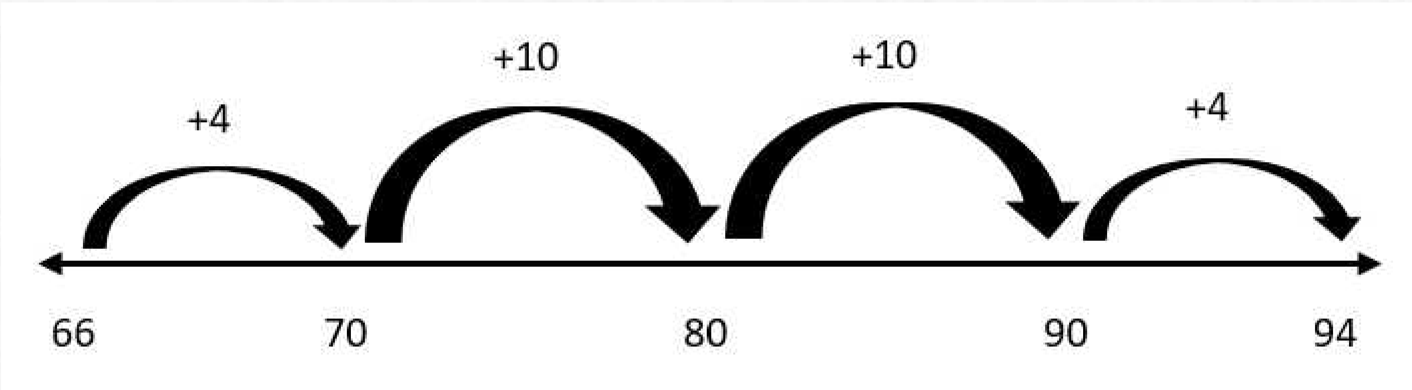
Start at 42. Jump forward in tens 3 times. Then jump forward in ones three times.



Stage 2

Children would continue to consolidate the use of number lines at this stage, moving towards jumping to the next ten:

66 + 28



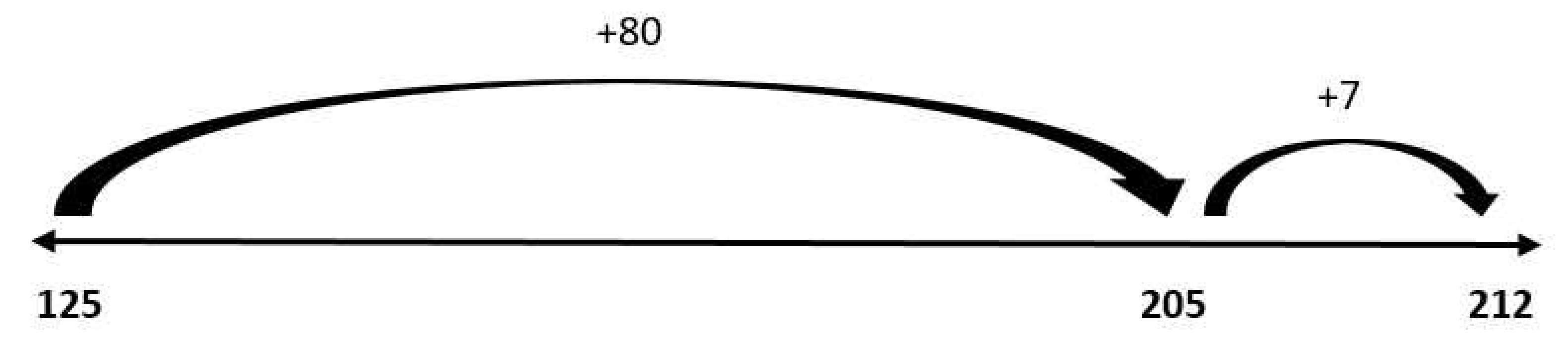
66 + 28 = 94

Stage 2

Children will continue to use horizontal methods (number line), but coming up against questions of a more difficult nature.

125 + 87

Here, the children could do eight jumps of ten. However, many children should now be confident enough to add this all in one go.

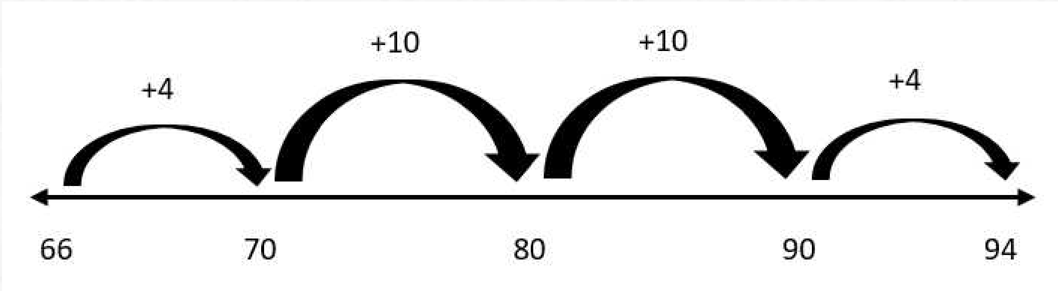


Over to you:

Try using a number line to solve one of these calculations:

64 + 32

146 + 38



Stage 3

Once children are confident with horizontal methods, we would move into vertical methods.

<u>Expanded Partitioning Method</u>

This is set out vertically, in a similar fashion to the traditional form of addition.

$$\begin{array}{r} 215 \\ +\ \underline{133} \end{array}$$

Stage 3

$$
\begin{array}{r}
215 \\
\underline{133} \; + \\
8 \; (5 + 3)
\end{array}
$$

Start by adding together the least significant digits (the ones).

Stage 3

$$\begin{array}{r} 215 \\ \underline{133} \ + \\ 8\ (5 + 3) \\ 40\ (10 + 30) \end{array}$$

Then, add together the tens (10 + 30). Ensure these are referred to as tens, and not ‘1’ + ‘3’.

Stage 3

215

<u>133</u> +

8 (5 + 3)

40 (10 + 30)

<u>300</u> (200 + 100)

After this, add together the hundreds (200 + 100), again ensuring they are referred to as ‘hundreds’.

Stage 3

215

133 +

8 (5 + 3)

40 (10 + 30)

300 (200 + 100)

348

Then, add together each column.

8 + 0 + 0 = 8, 40 + 0 = 40, 300 + 0 = 300

Over to you:

Try using expanded partitioning to solve one of these calculations:

432 + 156

381 + 517

215
133 +
8 (5 + 3)
40 (10 + 30)
300 (200 + 100)
348

Stage 4

Once children are confident in using these methods, they can then begin to use the **traditional vertical method.**

It is important that they do not use this method until they are fully confident in their application of place value, and are secure in the methods talked through so far.

It is expected that children will begin to use this method towards the end of Year 3, but for some children, they will reach this stage at a later point.

Stage 4

$$\begin{array}{r} 215 \\ +\ \underline{133} \\ \underline{348} \end{array}$$

This method is quite straightforward. However, it becomes more difficult when children are asked to carry digits.

5 (ones) + 3 (ones) = 8 ones

1 (ten) + 3 (tens) = 4 tens

2 (hundreds) + 1 (hundred)= 3 (hundreds)

Stage 4

226

+193

419

1

Start with the least significant digits (ones) 6 + 3 = 9.

Add the tens (2 + 9 = 11). Because the answer is a two digit number, it has to be carried under the hundreds.

Add the hundreds (2 + 1 = 3, + the ‘1’ being carried = 4)

Stage 4

This method can be extended to larger numbers…

$$
\begin{array}{r}
2763 \\
+\ \underline{1438} \\
\underline{4201} \\
\scriptstyle 1\,1\,1\ \
\end{array}
$$

Stage 4

… and decimal numbers.

$$
\begin{array}{r}
124.90 \\
+\ \underline{117.25} \\
\underline{242.15} \\
{\scriptstyle 1\ 1\quad\ \ \ }
\end{array}
$$

Possible problems with vertical methods

- Children must ensure that they line up the digits appropriately e.g. ones under ones, tens under tens. If they don't, they will end up adding the incorrect amounts together.
- This can be a problem if a child's presentation is poor.
- Children may not remember to add the 'carried' digit, or place the carried digit in the incorrect column.

Over to you:

Try using the vertical column method to solve one of these calculations:

3145 + 6532

4286 + 3439

126.3 + 382.8

$$\begin{array}{r} 226 \\ +\underline{193} \\ \underline{419} \\ 1 \end{array}$$

To conclude…

The aim is that children will master the formal methods during KS2.

If they do not grasp it but can use non-standard methods efficiently this does not always point to a major problem.

It is about having a toolbox of formal, informal and mental methods at the child's disposal to use where appropriate, depending on the context.

To conclude…

It is essential that parents appreciate the approaches being used in school and back these up at home. If children are doing one thing at home and another at school, the child can easily become confused.

When working on addition, subtraction, multiplication and division in class, teachers will let parents know via the weekly slip in the homework diary which methods are currently being covered in class.