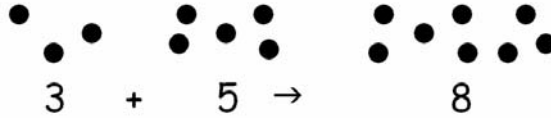


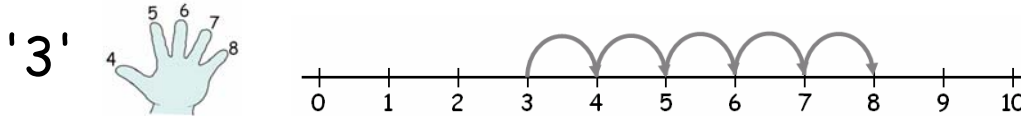
## Addition

- Story around structure - I have a set of 3 objects to start with and I get 5 more 'How many altogether?'
- Often modelled with sets of 'things' - essentially the story follows the same plot of 'have', 'more', 'altogether'
- Lots of songs and rhymes.
- Very practical.

**Count all** - a child doing  $3 + 5$  counts out three counters and then five counters and then finds the total by counting all the counters.



**Count on from the first number** - a child finding  $3 + 5$  counts on from the first number: 'four, five, six, seven, eight'.



**Count on from the larger number** -  $3 + 5$  a child chooses the larger number, even when it is not the first number, and counts on from there: 'six, seven, eight'



## Mental methods for addition

### Developing number lines - Year 2 onwards

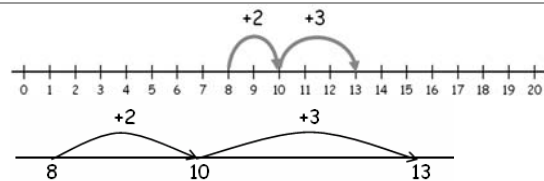
Children are able to count on from the larger number.

First in ones and then in tens.

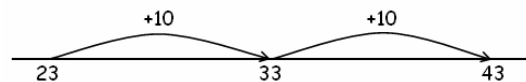
They can use a marked number line to perform addition calculations, then progress to using a partial, then empty number line.

This provides a means of supporting and developing children's counting strategies with a pictorial recording.

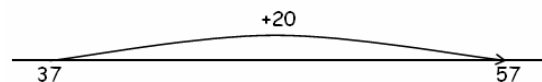
Bridging through 10 e.g.  $8 + 5$



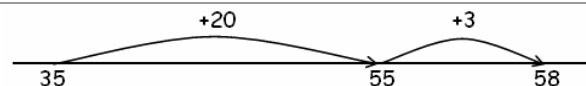
Counting in tens e.g.  $20 + 23$



Counting in multiples of ten e.g.  $37 + 20$  ( $37 + 10 + 10 = 57$ )



Counting in multiples of ten and ones e.g.  $35 + 23$



### Partitioning - Year 2 onwards

- Add the tens and then the ones to form partial calculations and then add these partial calculations.

$$\begin{aligned}
 & \textcircled{35} + 23 \\
 & = 30 + 5 + 20 + 3 \\
 & = 30 + 20 + 5 + 3 \\
 & = 50 + 8 \\
 & = 58
 \end{aligned}$$

- Partitioning both numbers into tens and ones, add the tens, then add the ones.

$$\begin{aligned}
 76 + 47 & = 70 + 40 + 6 + 7 \\
 & = 110 + 13 \\
 & = 123
 \end{aligned}$$

## Written method for addition

*It is important that children's mental methods of calculation are practised and secured alongside their learning and use of an efficient written method for addition.*

**To add successfully, children need to be able to:**

- recall all addition pairs to  $9 + 9$  and complements in 10;
- add mentally a series of one-digit numbers, such as  $5 + 8 + 4$ ;
- add multiples of 10 (such as  $60 + 70$ ) or of 100 (such as  $600 + 700$ ) using the related addition fact,  $6 + 7$ , and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of 100, 10 and 1 in different ways.

### Expanded method - year 3/4

- Move on to a layout showing the addition of the tens to the tens and the ones to the ones separately. To find the partial calculations either the tens or the ones can be added first, and the total of the partial calculations can be found by adding them in any order. As children gain confidence, ask them to start by adding the ones digits first always.
- The addition of the tens in the calculation  $47 + 76$  is described in the words 'forty plus seventy equals one hundred and ten', stressing the link to the related fact 'four plus seven equals eleven'.
- The expanded method leads children to the more compact method so that they understand its structure and efficiency. The amount of time that should be spent teaching and practising the expanded method will depend on how secure the children are in their recall of number facts and in their understanding of place value.

Write the numbers in columns.

Adding the tens first:

$$\begin{array}{r} 47 \\ + 76 \\ \hline 110 \\ 13 \\ \hline 123 \end{array}$$

Adding the ones first:

$$\begin{array}{r} 47 \\ + 76 \\ \hline 13 \\ 110 \\ \hline 123 \end{array}$$

*Discuss how adding the ones first gives the same answer as adding the tens first. Refine over time to adding the ones digits first consistently.*

### Compact method - year 4/5/6

- In this method, recording is reduced further. Carry digits are recorded below the line, using the words 'carry ten' or 'carry one hundred', not 'carry one'.
- Later, extend to adding three two-digit numbers, two three-digit numbers and numbers with different numbers of digits, and decimals.

$$\begin{array}{r} 47 \\ + 26 \\ \hline 73 \\ 1 \end{array} \quad \begin{array}{r} 368 \\ + 423 \\ \hline 791 \\ 1 \end{array} \quad \begin{array}{r} 368 \\ + 491 \\ \hline 859 \\ 1 \end{array}$$
  

$$\begin{array}{r} 3587 \\ + 675 \\ \hline 4262 \\ 111 \end{array} \quad \begin{array}{r} 6584 \\ + 5848 \\ \hline 12432 \\ 111 \end{array}$$

Column addition remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable.

**Note:** Children who have difficulties reliably 'carrying' should revert to using an expanded method, returning to the compact method as and when appropriate.

**Note:** Pupils with specific learning difficulties find it difficult to 'unlearn'. Those who have been taught a mental strategy of 'adding the most significant digit first' may need to continue using this strategy in written methods of addition.

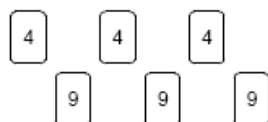
For example:

$$\begin{array}{r} 234 \\ + 788 \\ \hline 900 \\ 110 \\ 12 \\ \hline 1022 \end{array}$$

### Using and Applying

- Once children are secure with this method check understanding by using missing number examples

Use five of the number cards to make the calculation correct



$$\begin{array}{r} \square \square \square \\ + \square \square \\ \hline 548 \end{array}$$