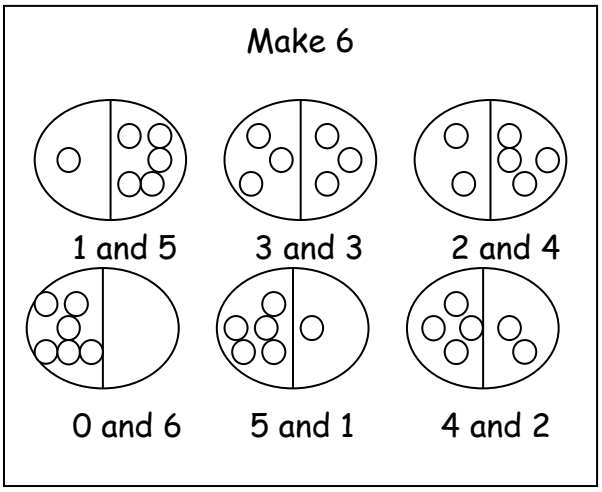
PROGRESSION THROUGH CALCULATION FOR ADDITION

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. *The mental calculation strategies taught will continue to be used and developed and should not be replaced by written methods.*

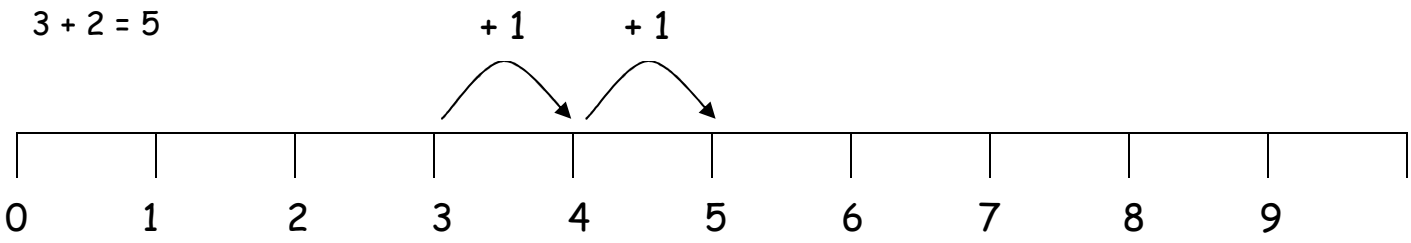
The following stages are standards that we expect the majority of our children to achieve.

Step 1

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should develop ways of recording using pictures, etc.

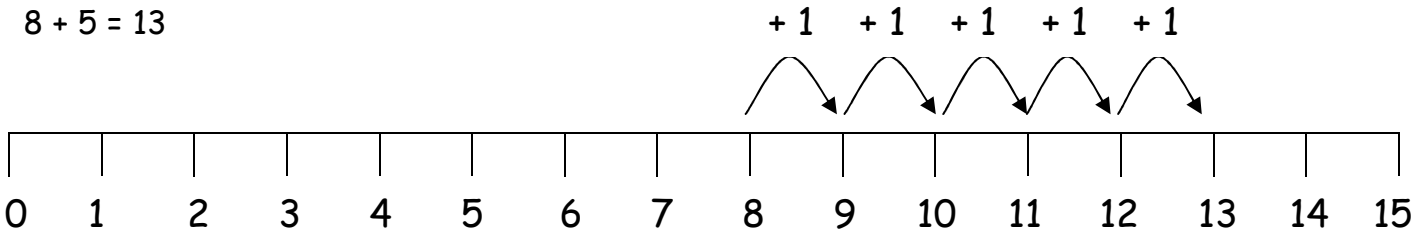


They use practical resources to support calculation and teachers *demonstrate* using a numbered line to count in ones.

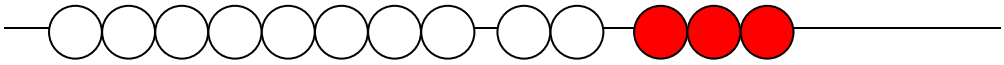


Children then begin to use numbered lines to support their own calculations using a numbered line to count on in ones.

8 + 5 = 13



Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.

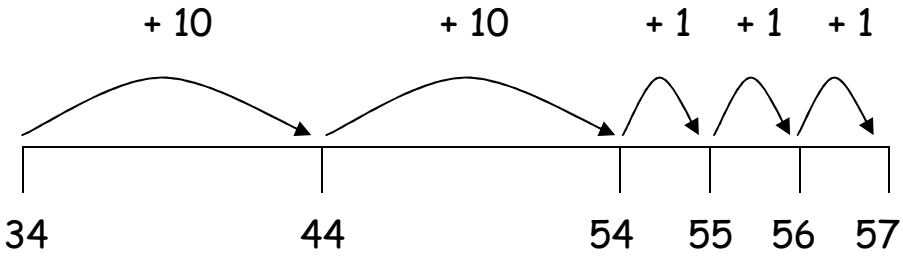


Step 2

Children will begin to use 'empty number lines' themselves starting with the larger number and counting on.

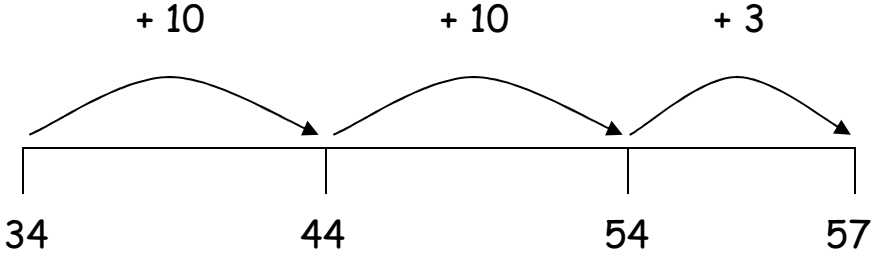
- First counting on in tens and ones.

34 + 23 = 57



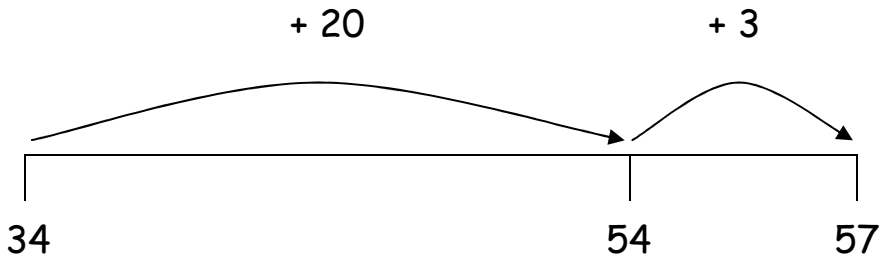
- Then helping the children to become more effective by adding the units in one jump (by using the know fact 4 + 3 = 7)

34 + 23 = 57



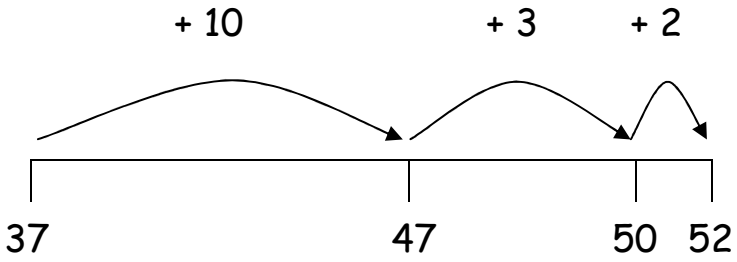
- Followed by adding the tens in one jump and the units in one jump.

34 + 23 = 57



- Bridging through ten can help children to become more efficient.

37 + 15 = 52

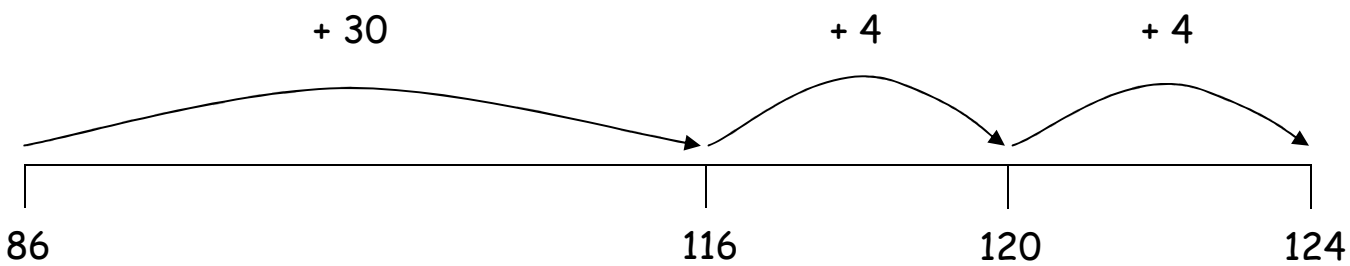


Step 3

Children will continue to use empty number lines with increasingly large numbers, including compensation where appropriate.

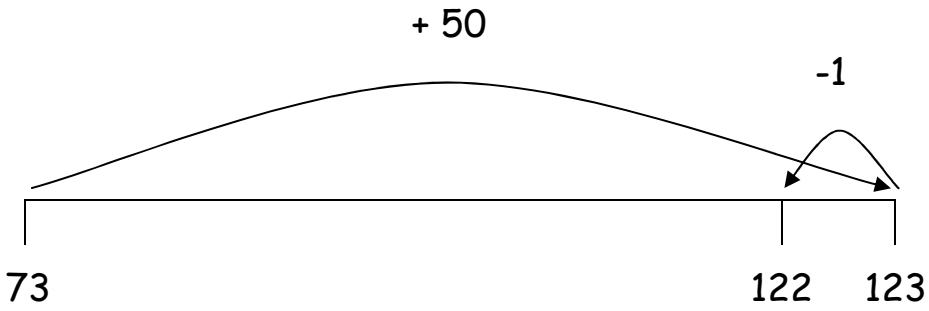
- Count on from the largest number irrespective of the order of the calculation.

38 + 86 = 124



- Compensation

49 + 73 = 122



Step 4

- Partitioning (links to mental strategies)

47 + 76 =
40 + 70 = 110
7 + 6 = 13
110 + 13 = 123

47 + 76 =
47 + 70 = 116
116 + 6 = 123

Step 5

Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies.

- Adding the least significant digits first in preparation for 'carrying'.

$$\begin{array}{rcc} & 6 & 7 \\ + & 2 & 4 \\ \hline & 1 & 1 \\ & 8 & 0 \\ \hline & 9 & 1 \\ \hline \end{array}$$

$$\begin{array}{rccc} & 2 & 6 & 7 \\ + & & 8 & 5 \\ \hline & & 1 & 2 \\ & 1 & 4 & 0 \\ & 2 & 0 & 0 \\ \hline & 3 & 5 & 2 \\ \hline \end{array}$$

Step 6

From this, children will begin to use a more formal method.

- Standard column method.

$$\begin{array}{r} 6\ 5 \\ +\ 2\ 4 \\ \hline 8\ 9 \end{array} \qquad \begin{array}{r} 3\ 5\ 6 \\ +\ \ \ 4\ 2 \\ \hline 3\ 9\ 8 \end{array}$$

- With 'carrying'.

$$\begin{array}{r} 5\ 8 \\ +\ 3\ 4 \\ \hline 9\ 2 \\ \scriptstyle +\ \ \ \end{array} \qquad \begin{array}{r} 6\ 2\ 5 \\ +\ \ \ 4\ 8 \\ \hline 6\ 7\ 3 \\ \scriptstyle +\ \ \ \end{array} \qquad \begin{array}{r} 7\ 8\ 3 \\ +\ \ \ 4\ 2 \\ \hline 8\ 2\ 5 \\ \scriptstyle +\ \ \ \end{array} \qquad \begin{array}{r} 3\ 6\ 7 \\ +\ \ \ 8\ 5 \\ \hline 4\ 5\ 2 \\ \scriptstyle +\ \ \ \end{array}$$

Children should extend the carrying method to numbers with at least four digits.

Step 7

Using similar methods, children will:

- Add several numbers with different numbers of digits
- Begin to add two or more decimal fractions with at least four digits and either one or two decimal places
- Know that decimal points should line up under each other, particularly when adding mixed amounts

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By the end of Year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.

Children should not go onto the next stage if:

1. **they are not ready.**
2. **they are not confident.**

Children should be encouraged to approximate their answers before calculating.
Children should be encouraged to check their answers after calculation using an appropriate strategy.