Stages in Addition

Addition - Early Stages

Children will engage in a wide variety of songs and rhymes, games and activities.

- They will begin to relate addition to **combining two groups of objects**, first by **counting all** and then by **counting on** from the largest number.
- They will find **one more** than a given number.

In practical activities and through discussion they will begin to use the vocabulary involved in addition.

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'You have five apples and I have three apples. How many apples altogether?'

A number track is to be introduced, as appropriate, to support children when counting on.

Addition – Stage One

- Given a number, identify **one more**
- Read, write and **interpret mathematical statements** involving addition (+) and the equals (=) sign
- **Add** one- digit and two-digit numbers within 20, including zero
- Solve **missing number problems** e.g. 10 + ? = 16

Ensure that children are confident with the methods outlined in the previous year's guidance **before moving on.**

Children will continue to practise counting on from any number e.g.

'Put five in your head and count on four.'

Initially use a number track to count on for addition, counting on from the largest number:
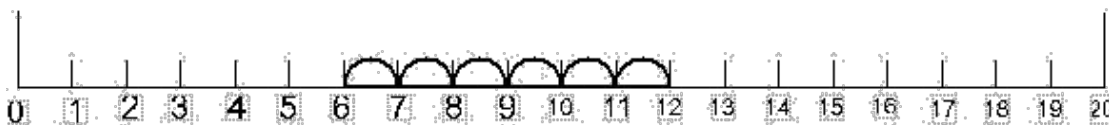
5 + 4 = 9

'Put your finger on number five. Count on (count forwards) four.'
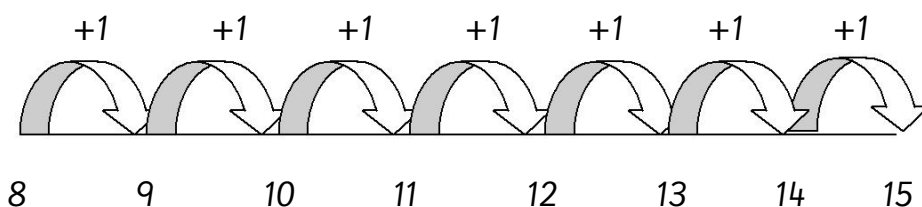
Then progress to a marked number line:

6 + 6 = 12

'Put your finger on number six and count on six.'

8 + 7 = 15

'Put your finger on number eight and count on seven.'

Ensure children are confident with using a marked number line before moving on to an empty number line (see stage two guidance).

Continue to practise counting on from the largest number for addition with totals within 20.

Be sure to use language to support children's understanding and use lots of practical examples in these early stages (such as making "jumps" along or up a number line)

Addition – Stage Two

- Add numbers using concrete objects, pictorial representations, and mentally, including:

    o A two digit number and ones
    o A two digit number and tens
    o Two two-digit numbers
    o Three one-digit numbers

Ensure that children are confident with the methods outlined in the previous stage's guidance before moving on.

To support children with the use of an empty number line, use the following resources:
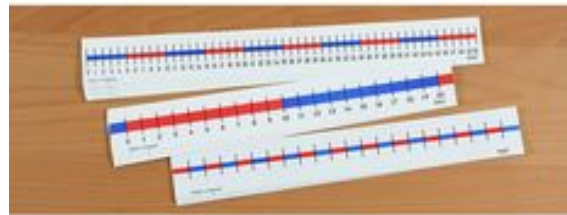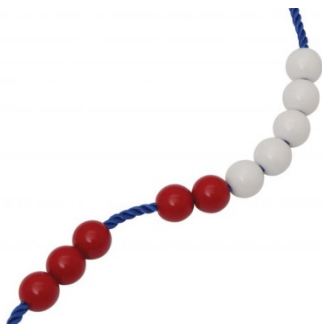
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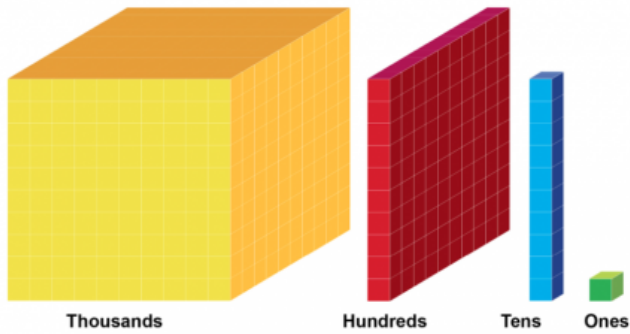
Thousands   Hundreds   Tens   Ones

100 square

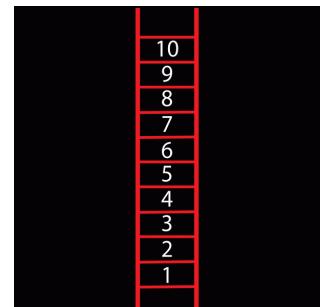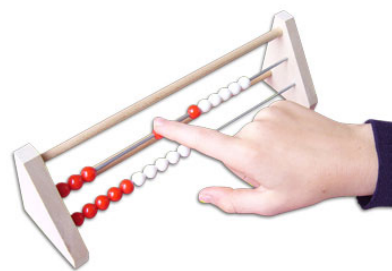| 1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Number lines

Number beads
ladder

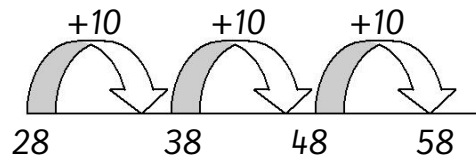Number

Counting on in ones using an **empty number line**, within 100…

28 + 6 = 34

| +1 | +1 | +1 | +1 | +1 | +1 |

28   29   30   31   32   33   34

…and in tens

28 + 30 = 58

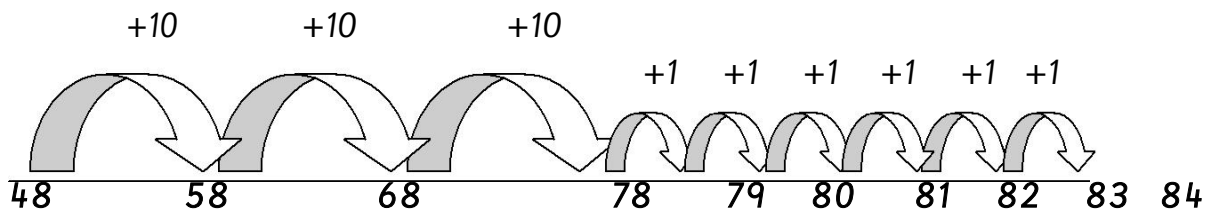| +10 | +10 | +10 |
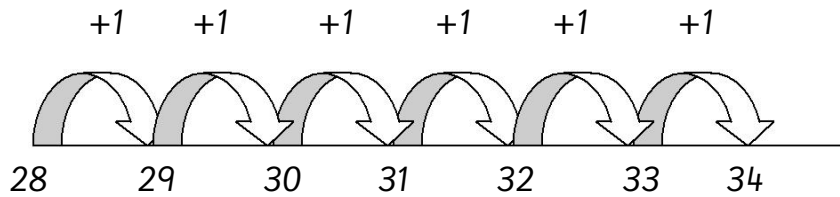
28   38   48   58

Use in conjunction with a 100 square to show jumps of tens.

48 + 36 = 84

'Put the biggest number first (48), and then partition the smaller number (36 = 30 + 6) and count on: 48 + 30 + 6.'

| +10 | +10 | +10 | +1 +1 +1 +1 +1 +1 |

48   58   68   78   79 80 81 82 83 84

Use in conjunction with a 100 square to show jumps of tens and ones.

If children are confident, use more efficient jumps…

| + 30 | +2 | +4 |

48   78   80   84
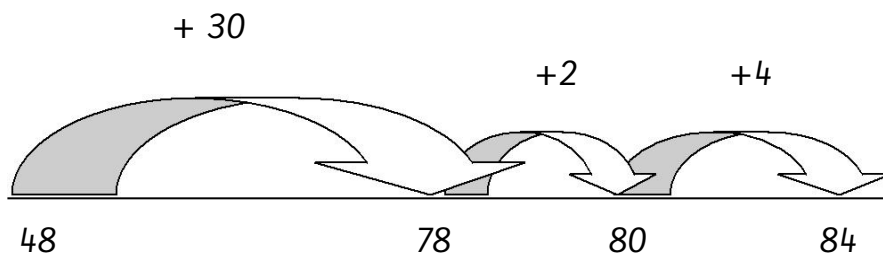
Use in conjunction with a 100 square to show jumps of tens and ones/units.

Also use **the partitioning method** to add two two-digit numbers:

43 + 25 = 68

40   3 20   5

40 + 20 = 60
3 + 5 = 8
60 + 8 = 68

'Partition the numbers into tens and ones/units.
Add the tens together and then add the
ones/units Together. Recombine to give the
answer'.

Then move on to calculations that bridge the tens:

48 + 36 = 40 + 8 + 30 + 6

40 + 30 = 70
8 + 6 = 14
70 + 14 = 84

48 + 36 = 84

This is an alternative way of recording the partitioning method.

Further develop addition with numbers that bridge 100, using a 200 grid to support.
If, at any time, children are making significant errors, return to the previous stage in calculation.
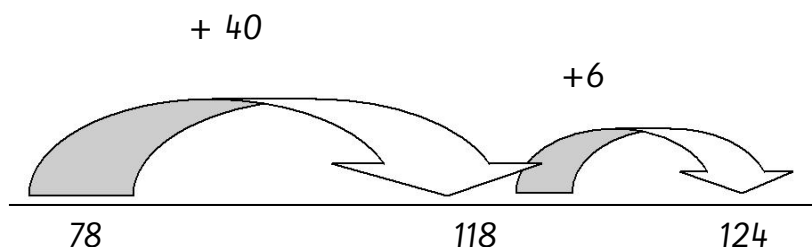
Addition – Stage Three

- **Add numbers with up to three digits, using formal written method of column addition**

Ensure that children are confident with the methods outlined in the previous stage's guidance before moving on.

Further develop the use of the **empty number line** with calculations that bridge 100:

78 + 46 = 124

```
        + 40
                        +6
   _____        _____
  /           \      /      \
 78          118           124
```

Use a 200 grid to support counting on in tens and bridging 100...

... and with addition of a three-digit and a two -digit number:

165 + 56 = 221

```
        +50              +6
   _____        _____
  /           \      /      \
165          215           221
```
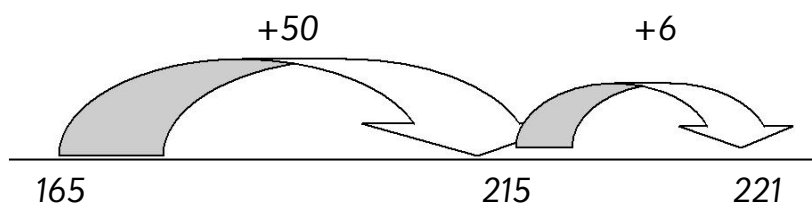
Further develop the **partitioning method** with calculations that bridge 100:

$$85 + 37 = 80 + 5 + 30 + 7$$
$$80 + 30 = 110$$
$$5 + 7 = 12$$
$$110 + 12 = 122$$
$$85 + 37 = 122$$

The partitioning method can also be used with three-digit numbers.

Introduce the **expanded written method** with the calculation presented both horizontally and vertically (in columns).

To support children with the explanded method, use the following resources:
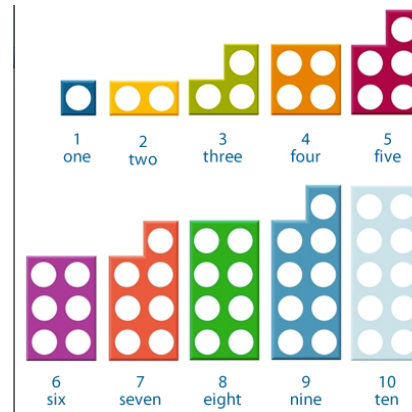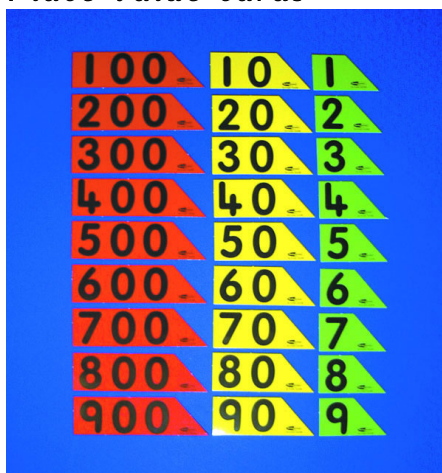
100 square

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

Numicon

| 1 one | 2 two | 3 three | 4 four | 5 five |
| 6 six | 7 seven | 8 eight | 9 nine | 10 ten |

Place value cards

100	10	1
200	20	2
300	30	3
400	40	4
500	50	5
600	60	6
700	70	7
800	80	8
900	90	9

Cuisenaire rods

Deines

Thousands   Hundreds   Tens   Ones

(the above resources will also be relevant when moving onto the formal written method at a later stage)

Initially use calculations where it has not been necessary to bridge across the tens or hundreds:

63 + 32 = 95

$$60 + 3$$
$$+ \quad 30 + 2$$
$$90 + 5 = 95$$

'Partition the numbers into tens and ones/units. Add the tens together and then add the ones/units together. 'Recombine to give the answer.'

Then…

$$6\ 3$$
$$+\ 3\ 2$$
$$5\ (3 + 2)$$
$$9\ 0\ (60 + 30)$$
$$9\ 5$$

Add the least significant digits (units) together first and then the tens in preparation for the formal written method.

This will lead into the **formal written method***..*

$$6\ 3$$
$$+\ 3\ 2$$
$$9\ 5$$

Use the language of place value to ensure understanding:
'Three add two equals five'
Write five in the units column. 60 add 30 equals 90. Write 9 (90) in the tens column.

Informal/mental methods would be more appropriate for numbers of this size, but use two-digit numbers when introducing the column method.

Then introduce calculations where it is necessary to bridge, returning to an expanded method initially:

68 + 24 = 92

$$60 + 8$$
$$+ \quad 20 + 4$$
$$80 + 12 = 92$$

'Partition the numbers into tens and ones/units. Add the tens together and then add the ones/units together. 'Recombine to give the answer.'

Then…

```
      6 8
  +   2 4
      1 2  (8 + 4)
  +   8 0 (60 + 20)
      9 2
```

Add the least significant digits (units) together first and then the tens in preparation for the formal written method.

If children are ready, introduce the **formal written method***, where it is necessary to 'carry' ten from the units to the tens column:*

```
      6 8
  +   2 4
      9 2
      1
```

Use the language of place value to ensure understanding: **'Eight add four equals 12'** *Write two in the units column and 'carry' 10 across into the tens column. 60 add 20 and the ten that we 'carried' equals 90. Write 9 (90) in the tens column. 92 is the answer.*

The digit that has been 'carried' should be recorded under the line in the correct column.

When children are confident, extend with examples where it is necessary to bridge across the tens and the hundreds:

76 + 47 = 123

```
    70 + 6
  + 40 + 7
   110 +13 = 123
```

'Partition the numbers into tens and ones/units. Add the tens together and then add the ones/units together. Recombine to give the answer.'

Then…

```
      7 6
    +4 7
    + 1 3 (7 + 6)
    1 1 0 (70 + 40)
    1 2 3
```

Add the least significant digits (units) together first and then the tens in preparation for the formal written method.

If children are ready introduce the **formal written method**, *where it is necessary to 'carry' across the columns and bridge 100:*

76 + 47 = 123

```
   4 7
 +7 6
 ─────
 1 2 3
 1 1
```

Use the language of place value to ensure understanding:
'Seven add six equals 13'
Write three in the units column and 'carry' 10 across into the tens column. 40 add 70 and the ten that we 'carried' equals 120. Write 2 (20) in the tens column and 'carry' 100 across into the hundreds column.

The digits that have been 'carried' should be recorded under the line in the correct column.

If children are confident, further develop with the addition of a three- digit number and a two -digit number:

178 + 43 = 221

```
     1 7 8
 +     4 3
   ───────
     2 2 1
       1 1
```

If, at any time, children are making significant errors, return to the previous stage in calculation.

- Add numbers with up to 4 digits using the formal written method of column addition where appropriate

Ensure that children are confident with the methods outlined in the previous stage's guidance before moving on.

Continue to teach the use of empty number lines with three and four digit numbers, as appropriate.

Further develop the formal written method of addition, with three-digit numbers. Revisit the **expanded** method first, if necessary:

176 + 147 = 323

```
      1 7 6
    + 1 4 7
        1 3   (7 + 6)
    +   1 1 0   (70+40)
      2 0 0   (100+100)
      3 2 3
```

This will lead into the **formal written method**…

176 + 147 = 323

```
      1 4 7
    + 1 7 6
      3 2 3
      1 1
```

Use the language of place value to ensure understanding:

'Seven add six equals 13.'

Write three in the units column and 'carry' 10 across into the tens column. 40 add 70 and the ten that we carried equals 120. Write 2 in the tens column (20) and 'carry' 100 across into the hundreds column. 100 add 100 and the 100 that has been carried equals 300. Write 3 in the hundreds column (300).

The digits that have been 'carried' should be recorded under the line in the correct column.

If children are confident, introduce the addition of a four-digit number and a three digit number:

1845 + 526 = 2371

```
    1 8 4 5
  + 5 2 6 2
    2 3 7 1
      1   1
```

Continue to develop with addition of two four-digit numbers and with decimals (in the context of money or measures).

If, at any time, children are making significant errors, return to the previous stage in calculation.

Addition – Stage Five

- **Add whole numbers with more than 4 digits, including using formal written method (column addition)**

Ensure that children are confident with the methods outlined in the previous stage's guidance before moving on.

Continue to teach the use of empty number lines with larger numbers (and decimals), as appropriate.

Continue to develop the formal written method for addition with larger numbers (and decimal numbers) and with the addition of three or more numbers:

21848 + 1523 = 23371

```
  2 1 8 4 8
+   1 5 2 3
  2 3 3 7 1
      1   1
```

Continue to use the language of place value to ensure understanding. Ensure that the digits that have been 'carried' are recorded under the line in the correct column.
Use the **formal written method** for the addition of decimal numbers:

£154.75 + £233.82 = £388.57

$$
\begin{array}{r}
154{\cdot}75 \\
+\ 233{\cdot}82 \\
\hline
388{\cdot}57 \\
\hline
1
\end{array}
$$

Ensure that the decimal points line up.

Continue to use the language of place value to ensure understanding

Continue to practise and apply the formal written method throughout stage six.

If, at any time, children are making significant errors, return to the previous stage in calculation.

Addition - Stage Six

No objectives have been included in the programmes of study explicitly related to written methods for addition in stage six. However, there is an expectation that children will continue to practise and use the **formal written method for larger numbers and decimals** and use these methods when solving problems, when appropriate (see previous stage's guidance for methods).

Our aim is that by the end of stage six, children **use mental methods (with jottings)** when appropriate, but for calculations that they cannot do in their heads, they use an efficient **formal written method** accurately and with confidence.