Westmoor Primary School

Calculations Policy

This policy demonstrates the steps, with exemplars, of how we teach addition, subtraction, multiplication and division.

Agreed by Staff: Summer 2021

Agreed by Governors: Summer 2021

Review Date: Summer 2023

Addition +

Stage 1

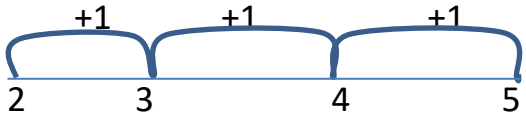
Children understand the concept of addition as the combining of two or more groups. Children use + and = symbols accurately. Calculations should be written on either side of the equal sign so that = is not just interpreted as the answer.

6 + 2 = 8 **8 = 6 + 2**

Children use Numicon and other visual representations to add 2 or more amounts.

2 + 3 = 5

Extend to counting up in ones on a number line



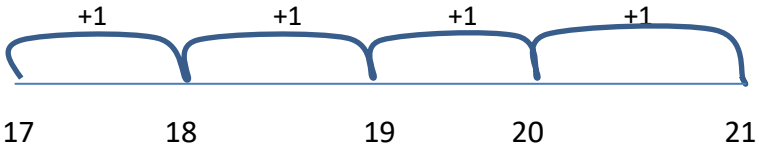
Usings Numicon to add.

A range of models and images to be used.

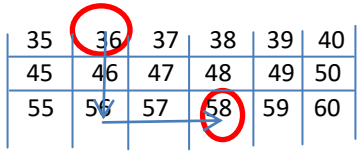
Stage 2

Adding 2 digit numbers with single units, bridging through multiples of 10, using a number line.

17 + 4 = 21

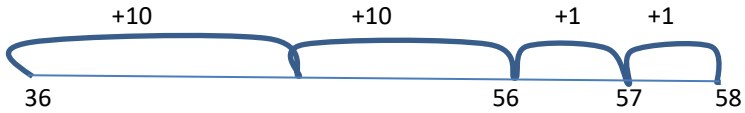


A number line should be a representation of a child's thought process and lead to quick mental strategies.



36 + 22 = 58

.



Years 1 and 2

Stage 3

Adding 2 digit numbers with 2 digit numbers using column methods.
Use expanded method first and no crossing tens boundary at this stage.

. **Expanded method**

30 + 6
\+ **10 + 2**
40 + 8

Formal column method

3 6
\+ **1 2**
4 8

Recommended by the end of year 2

Stage 4

Column addition of 2, 3 and 4 digit numbers using expanded methods

Pupils must have a good understanding of place value

643 +225 =
600 + 40 + 3
\+ 200 + 20 + 5
800 + 60 + 8
= 868

leading to

643 + 275=
600 + 40 + 3
\+ 200 + 70 + 5
800 +110 +8
= 918

to formal method

6 4 3
\+ **2 1 7 5**
9 1 8

Recommended by the end of year 3

Stage 5 - Formal written methods

Short written methods using 'carrying'. The 'carrying' digit should be placed on the 'doorstep'.

$$\begin{array}{r} 7893 \\ +\ {}_{1}5_{1}3_{1}85 \\ \hline 13278 \end{array} \qquad \begin{array}{r} 31.76 \\ +\ 18.0_{1}7 \\ \hline 49.83 \end{array}$$

Recommended by the end of year 4

In years 5 and 6 pupils continue practising formal written methods with increasing large numbers so they become fluent and precise.

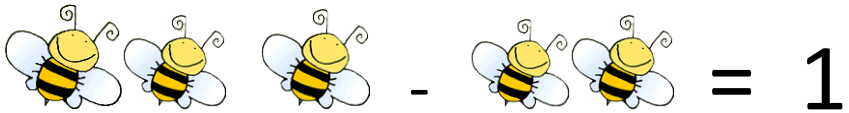
Subtraction -

Stage 1

Children understand the concept of subtraction as taking a number away from another. They understand and use – and = symbols accurately. Calculations should be written on either side of the equals sign so that = is not just interpreted as the answer.

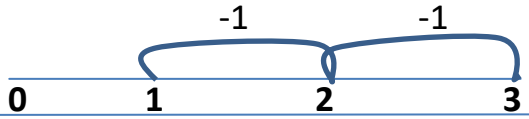
6 - 2 = 4 **4 = 6 - 2**

Children use Numicon and visual representations to subtract numbers.



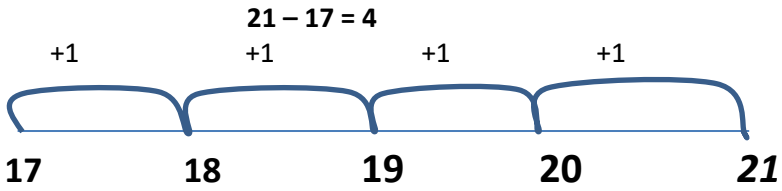
3 2

Extend- Counting backwards in ones on a number line.Use Numicon to subtract.

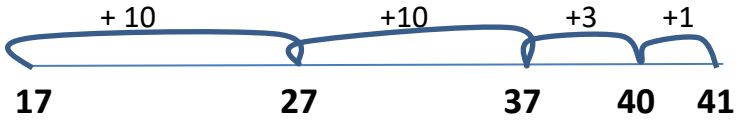


Stage 2

Begin to 'find the difference' by counting on in ones using a number line



Leading to **41 - 17 =**



Years 1 and 2

Stage 3

Subtracting 2 digit numbers from other 2 digit numbers using a column method. Use expanded method first and no exchanging at this stage.

Expanded method

30 + 6
- 10 + 2
40 + 8

Formal method

3 6
- 1 2
4 8

Recommended by the end of year 2

Stage 4 –Expanded Written Method

Column Subtraction of 3 and 4 digit numbers using expanded methods first.

Pupils must have a secure understanding of place value and partitioning.

643 - 221 = **leading to**

600 + 40 + 3
- 200 + 20 +1
400 + 60+4

693 - 275= **leading to**

80 13
600 + 90 + 3
- 200 + 70 + 5
400 + 10+ 8

8 1
6 9 3
- 2 7 5
4 1 8

Stage 5 - Formal written methods

Short written methods using 'borrowing'.

```
   8 1              5  16 1
  7893             36.76
- 5385           - 13.87
  2508             22.89
```

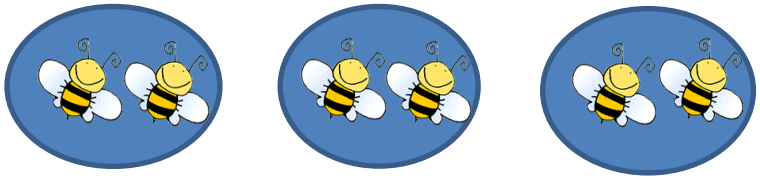
Recommended by the end of year 4

In years 5 and 6 pupils continue practising formal written methods with increasing large numbers so they are fluent and precise.

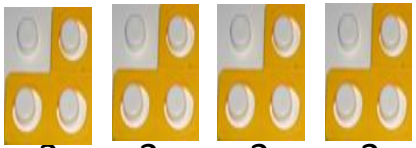
Multiplication x

Stage 1

Begin to understand the concept of 'multiplication' and recognise the' x' symbol. Children use Numicon and visual representations to show groupings of amounts.



3 lots of 2 3 x 2 = 2



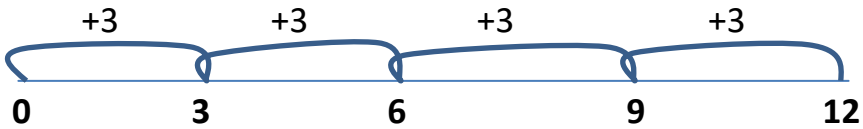
3 + 3 + 3 + 3

4 groups of 3
4 x 3 = 12

Stage 2

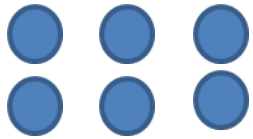
To use a number line to show multiplication as repeated addition.

4 x 3 = 12 3 + 3 + 3 + 3



To use an array to represent multiplication and know multiplication can be done in any order. Use x symbol with confidence.

2 x 3= 6



3 x 2 = 6

Recommended by the end of year 2

Stage 3

To use '**grid method**' as an informal method to carry out multiplication calculations. Use numbers appropriate to current level of attainment. Begin by using an array in a grid.

An array 23 x 8 leading to 3 7 2 x 24

X	3
3	● ● ●

X	20	3
8	160	24

=184

x	300	70	2
20	6000	1400	160
4	1200	280	8

7 5 6 0
+ 1 4 1 8 8
8 9 4 8

Recommended by the end of year 4

Stage 4

To use formal written methods to multiply 4 digits by 1 or 2 digit numbers, extending to long multiplication.

Short method leading to

(TU x U)

23 x 7

2 3
x 7
2 1
+ 1 4 0 (20 x 7)
1 6 1

2 3
x 2 7
1 6 1

Long multiplication

(HTU x T U)

315 x 25

3 1 5
x 2 5
1 5 7 5 (315 X 5)
+ 6 3 0 0 (315 x 20)
7 8 7 5

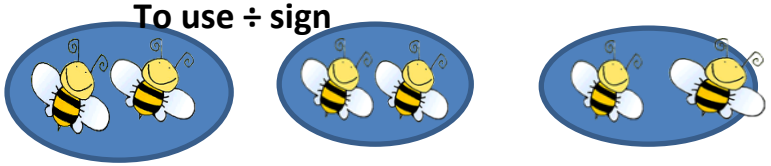
Practising and securing these formal written methods in years 5 and 6.

Division ÷

Stage 1

Begin to understand the concept of 'division' as 'sharing' and recognise the '÷' symbol. Use a range of model and images to show 'sharing' an amount equally.

To use ÷ sign



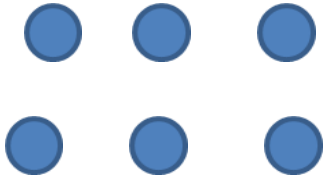
6 shared equally by 3

Use Numicon to show
6 ÷ 2 = 3

Stage 2

To describe division as sharing an amount equally.

To understand division within the multiplication tables. U ÷ U and TU ÷ U



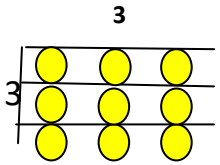
6÷3 =2

Recommended by year 2

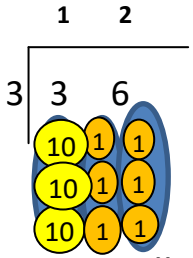
Stage 3

To use the short division method to divide numbers, including decimals. Identify remainders.

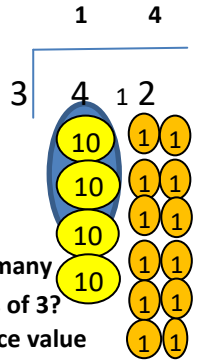
9÷3= 3



36 ÷3



42 ÷ 3



How many groups of 3?
Using place value Counters to group and exchange.

137 ÷ 3

```
   1 3 7
   1 2
3 | 4 1 1
```

Recommended by the end of year 4

Stage 4

To use long division method to divide 3 and 4-digit numbers by 2 digit numbers.

432 ÷ 15

```
    0 2  8 r 12
15 | 4 3  2
   - 3 0
     1 3  2
   - 1 2  0
       1  2
```

8640 ÷ 15

```
    0 5  7  6
15 | 8 6  4  0
   - 7 5
     1 1  4
   - 1 0  5
       9  0
     - 9  0
       0  0
```

To practise and secure short and long division in years 5 and 6.