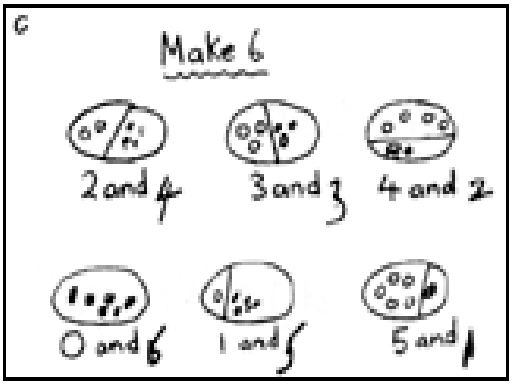
# Ysgol Acrefair

## Mathematics Policy for Teaching of Written Calculations

## Addition Strategies

### Nursery, Reception and Year 1

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

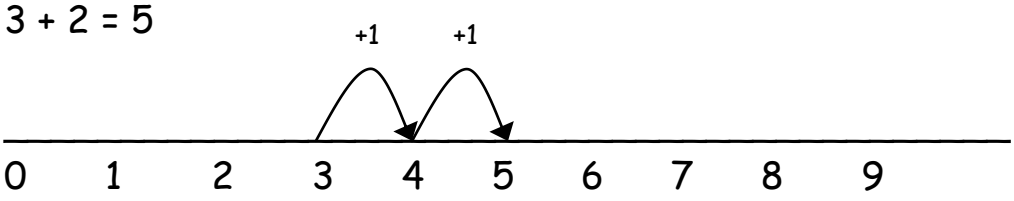



They use numberlines and practical resources to support calculation and teachers *demonstrate* the use of the numberline.

+ = Signs and missing numbers

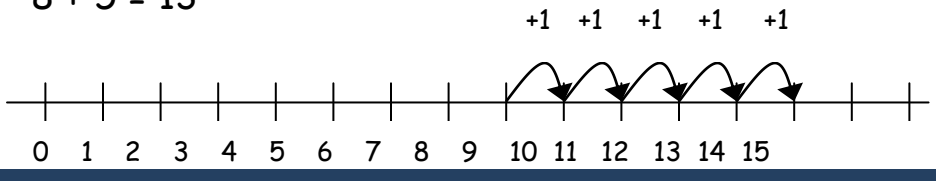
3 + 4 = □ 3 + △ = 7 □ ÷ △ = 7

3 + 2 = 5



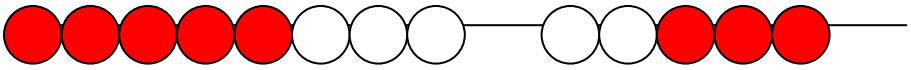

Children then begin to use numbered lines to support their own calculations using a numbered line to count on in ones.

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.

Numicon can be used to demonstrate addition, showing tens and units, children can overlay the number shapes to show the correct answer.



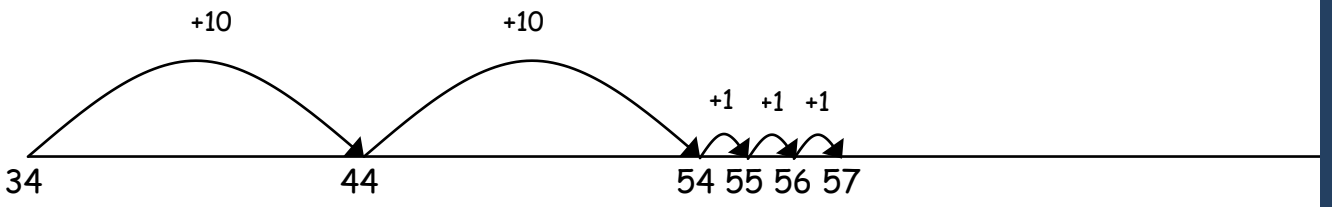
**Year 2**

**+ = Signs and missing numbers with appropriate numbers**

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

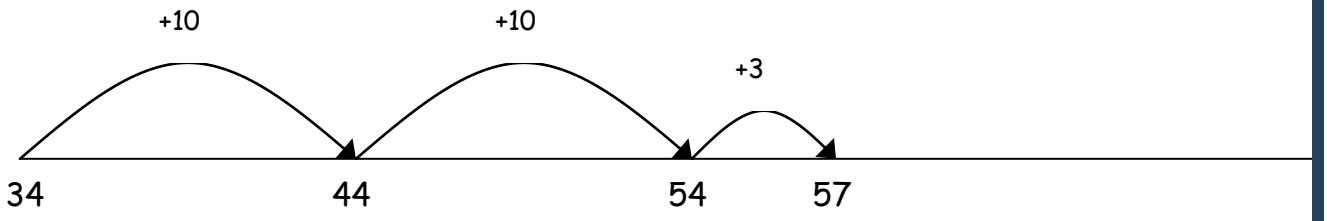
✓ First counting on in tens and ones.

34 + 23 = 57



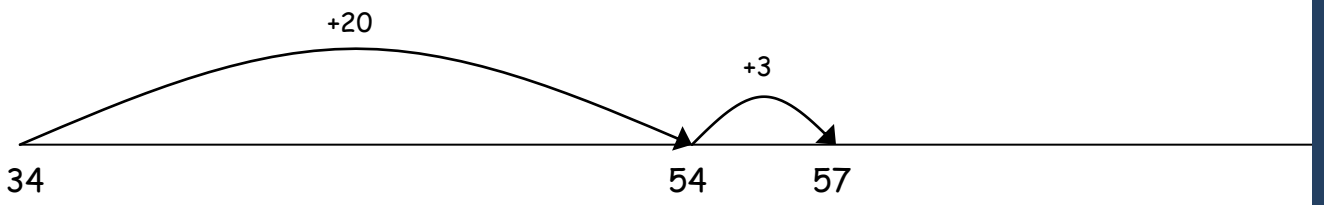

✓ Then helping children to become more efficient by adding the units in one jump (by using the known fact 4 + 3 = 7).

34 + 23 = 57



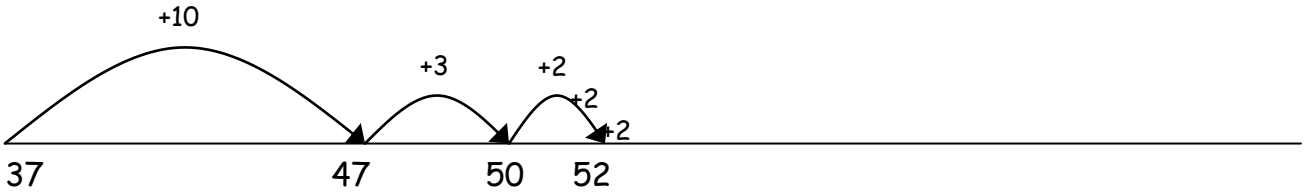

✓ Followed by adding the tens in one jump and the units in one jump.

34 + 23 = 57

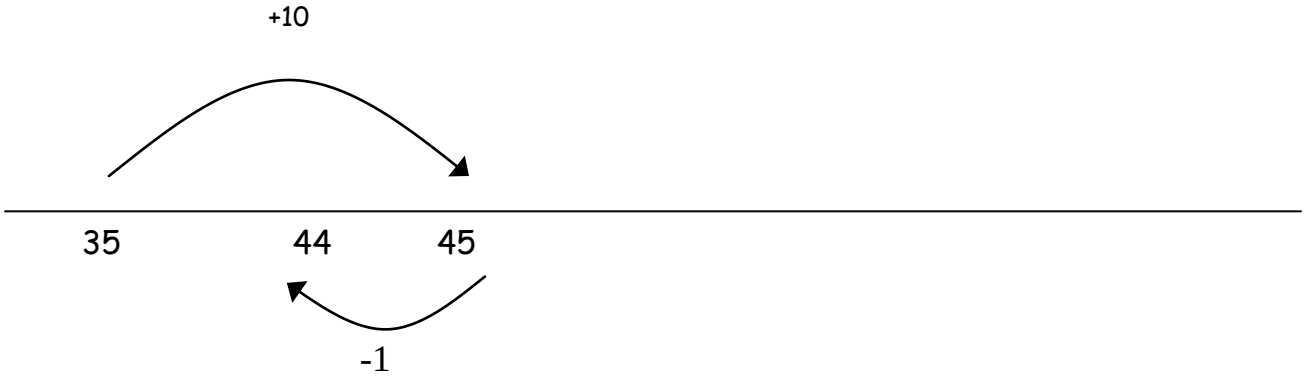



✓ Bridging through ten can help children become more efficient.

37 + 15 = 52




Adding 10 and adjusting by 1




Year 3

**+ = Signs and missing numbers with appropriate numbers**

47 + 76 = (47 + 70) + 6

or (40 + 70) + (7 + 6)

356 + 427 = 356 + (400 + 20 + 7)

= 756 + 20 + 7

= 783

or (300 + 400) + (50 + 20) + (6+7)

**Vertical layout – expanded work**

75

+ 57 adding most significant digit first

120

12

132 partial sums added mentally

247

+ 76

200

110

13

323

**Year 4**

**+ = Signs and missing numbers with appropriate sized numbers**

| | |
|---|---|
| 625 | 783 |
| + 48 | + 242 |
| 600 | 900 |
| 60 | 120 |
| 13 | 5 |
| 673 | 1025 |

**Money – vertical addition**

| |
|---|
| £3.49 |
| + £3.45 |
| £6.00 |
| £0.80 |
| £0.14 |
| £6.94 |

Years 5 and 6

**+ = Signs and missing numbers with appropriate numbers**

| | |
|---|---|
| 587 | 7648 |
| + 475 | + 1486 |
| 900 | 8000 |
| 150 | 1000 |
| 12 | 120 |
| 1062 | 14 |
| | 9134 |

**Explore adding the least significant digit first.**

$$
\begin{array}{r}
587 \\
+\ 475 \\
\hline
12 \\
150 \\
900 \\
\hline
1062
\end{array}
$$

**Contracting the work to a compact efficient form**

$$
\begin{array}{r}
587 \\
+\ 475 \\
\hline
1062 \\
{\scriptstyle 1\ 1}
\end{array}
$$

**Money addition**

$$
\begin{array}{r}
£11.66 \\
£\ 9.53 \\
+\quad £\ 3.55 \\
\hline
£23.00 \\
£\ 1.60 \\
£\ 0.14 \\
\hline
£24.74
\end{array}
\qquad
\begin{array}{r}
£11.66 \\
£\ 9.53 \\
+\quad £\ 3.55 \\
\hline
£24.74 \\
{\scriptstyle 1\ 1\ 1}
\end{array}
$$

**Addition of decimals**

137·8 + 24·73

$$
\begin{array}{r}
137{\cdot}80 \\
+\quad 24{\cdot}73 \\
\hline
100{\cdot}00 \\
50{\cdot}00 \\
11{\cdot}00 \\
1{\cdot}50 \\
0{\cdot}03 \\
\hline
162{\cdot}53
\end{array}
\qquad
\begin{array}{r}
137{\cdot}80 \\
+\quad 24{\cdot}73 \\
\hline
162{\cdot}53 \\
{\scriptstyle 1\ 1}
\end{array}
$$

## Subtraction Strategies

### Nursery, Reception and Year 1

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

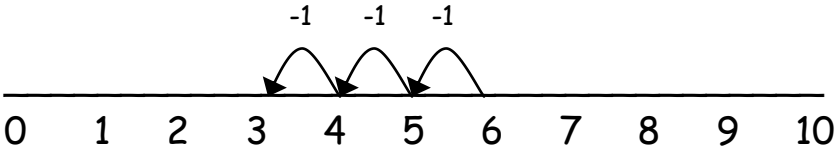
They use numberlines and practical resources to support calculation.

**- = Signs and missing numbers with appropriate sized numbers**

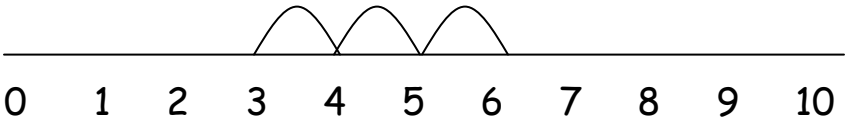
7 - 3 = □ 7 - △ = 4 □ ÷ △ = 4

Teachers *demonstrate* the use of the numberline.

6 – 3 = 3

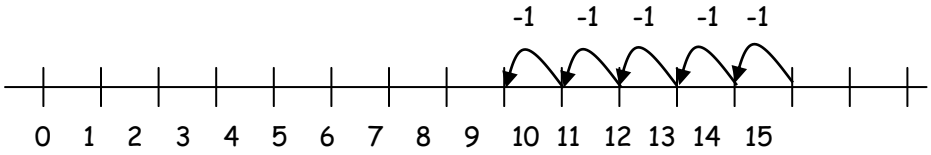



The numberline should also be used to show that 6 - 3 means the 'difference between
6 and 3' or 'the difference between 3 and 6' and how many jumps they are apart.



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

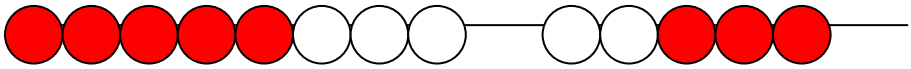
13 – 5 = 8




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

Numicon can be used to demonstrate subtraction, by overlaying the shape shadows to identify the remaining values.

13 – 5 = 8



**Year 2**

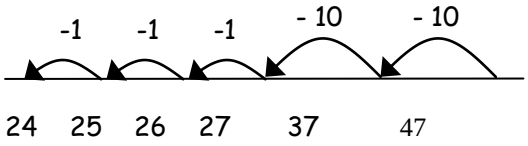
**- = Signs and missing numbers with appropriate sized numbers**

Children will begin to use empty number lines to support calculations.

**Counting back**

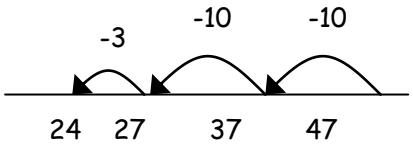
✓ First counting back in tens and ones.

47 – 23 = 24



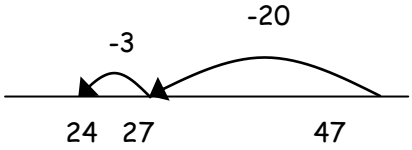
- ✓ Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 – 3 = 4).

47 – 23 = 24



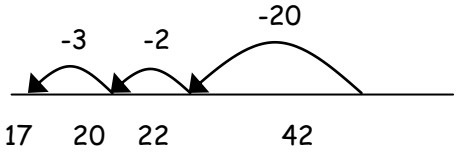

- ✓ Subtracting the tens in one jump and the units in one jump.

47 – 23 = 24




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

42 – 25 = 17



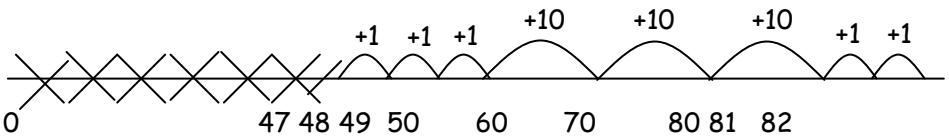

**Counting on**

If the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, it can be more efficient to count on.

Count up from 47 to 82 in jumps of 10 and jumps of 1.

The number line should still show 0 so children can cross out the section from 0 to the smallest number. They then associate this method with 'taking away'.

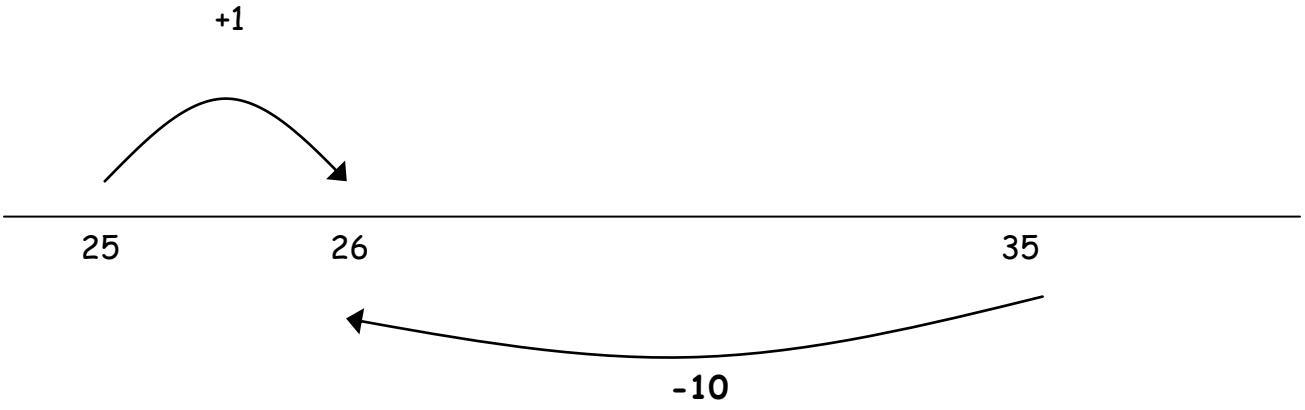
82 - 47




**Help children to become more efficient with counting on by:**

- ✓ Subtracting the units in one jump;
- ✓ Subtracting the tens in one jump and the units in one jump;
- ✓ Bridging through ten.
- ✓ Adding 10 and adjusting by 1

Subtract 10 and adjust

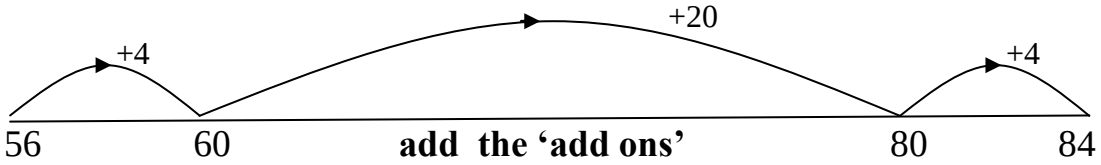


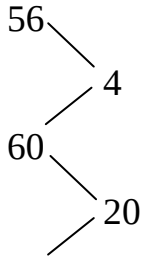

**Year 3**

**- = Signs and missing numbers with appropriate sized numbers**

**Introduce vertical subtraction - Complementary Addition**

84 – 56



80

4

84

28

**Year 4 and 5**

**- = Signs and missing numbers with appropriate sized numbers**

178 – 56

56

4

60

40

100

70

170

8

178

122

783 – 356

356

4

360

40

400

300

700

80

780

3

783

427

754

- 286

14 to make 300

400 to make 700

54 to make 754

468

754

-286

14 (300)

454 (754)

468

## Year 6

**- = Signs and missing numbers with appropriate sized numbers**

6467

- 2684

16 (2700)

300 (3000)

3467 (6467)

3000

700

70

13

3783

**Subtraction of decimals**

423·1 – 17·42

423·10

- 17·42

0·58 (18·00)

82·00 (100)

323·10 (423·00)

300

100

5·68

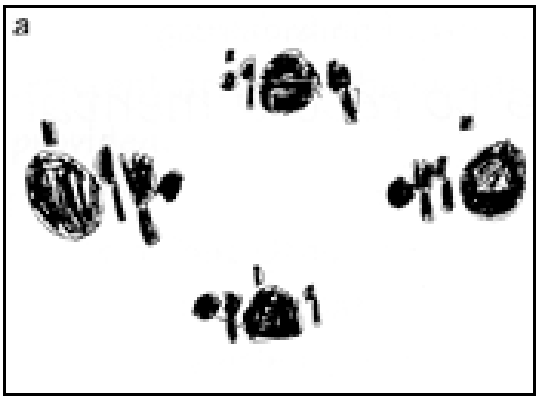
405·68

$$\begin{array}{r} {\scriptstyle 1\ 12\ \ 1^{0}} \\ 4\not{2}\not{3}\cdot\not{1}0 \\ -\ \ 17\cdot42 \\ \hline 405\cdot68 \end{array}$$

**Multiplication Strategies**

**Nursery,Reception and Year 1**

Children will experience equal groups of objects and will count in 2s and 10s and begin to count in 5s. They will work on practical problem solving activities involving equal sets or groups.



## Y2

**X = Signs and missing numbers with appropriate sized numbers**

7 x 2 = □ 7 x △ = 14 □ ÷ △ = 14

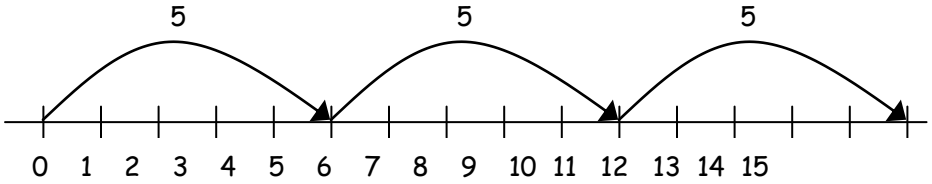
Children will develop their understanding of multiplication and use jottings to support calculation:

- ✓ **Repeated addition**

3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3

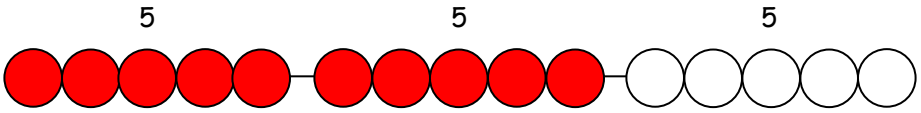
Repeated addition can be shown easily on a number line:

5 x 3 = 5 + 5 + 5



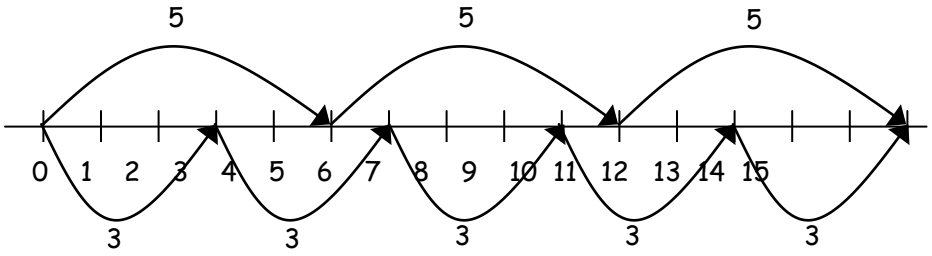

on a bead bar and on Numicon:

5 x 3 = 5 + 5 + 5



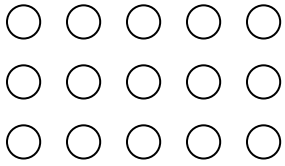

✓ **Commutativity**

Children should know that 3 x 5 has the same answer as 5 x 3. This can also be shown on the number line.




✓ **Arrays**

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method.

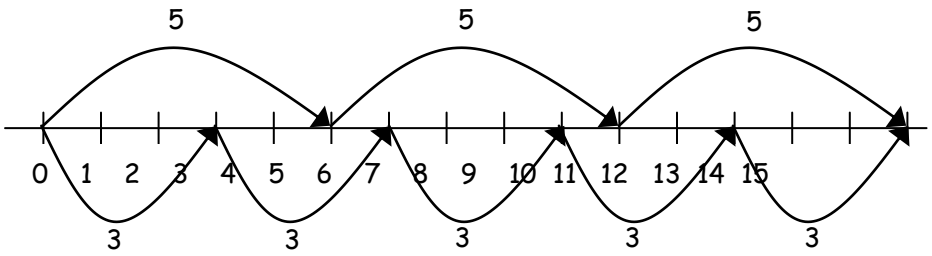


5 x 3 = 15

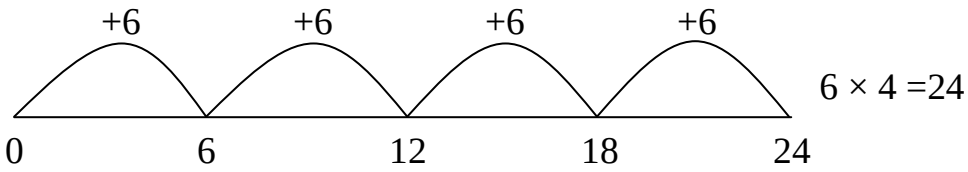
3 x 5 = 15

**Year 3**

**X = Signs and missing numbers with appropriate sized numbers**




Multiplication as repeated addition on a number line.




6 × 4 =24

**Multiplication**

Mental Method using partitioning e.g. 38 × 7 = (30 × 7) + (8 × 7)

**Year 3 and 4**

Grid layout

| | | | |
|---|---|---|---|
| × | 30 | 8 | |
| 7 | 210 | 56 | 266 |

Extended to bigger numbers

| × | 50 | 6 | |
|---|---|---|---|
| 20 | 1000 | 120 | 1120 |
| 7 | 350 | 42 | 392 |

1512

Leading to short multiplication

$$\begin{array}{rr} & 56 \\ \times & 27 \\ \hline 56 \times 20 & 1120 \\ 50 \times 7 & 350 \\ 6 \times 7 & 42 \\ \hline & 1512 \end{array}$$

**Year 5**

**X = Signs and missing numbers with appropriate sized numbers**

Vertical format, expanded working (HTU x U and TU x TU)

$$\begin{array}{rrl} & 38 & \\ \times & 7 & \\ \hline & 210 & (30 \times 7) \\ & 56 & (8 \times 7) \\ \hline & 266 & \end{array} \qquad \begin{array}{rrl} & 56 & \\ \times & 27 & \\ \hline & 1000 & (50 \times 20) \\ & 120 & (6 \times 20) \\ & 350 & (50 \times 7) \\ & 42 & (6 \times 7) \\ \hline & 1512 & \end{array}$$

Extend to simple decimals with one decimal place.

4· 9 x 3 is approximately 5 x 3 = 15

$$\begin{array}{ll} 4\cdot 9 \times 3 & 4\cdot 0 \times 3 = 12\cdot 0 \\ & 0\cdot 9 \times 3 = \underline{2\cdot 7} \\ & \underline{14\cdot 7} \end{array}$$

Year 6

**X = Signs and missing numbers with appropriate sized numbers**

Grid Method or partitioning - long multiplication (ThHTU x U and HTU x TU)

Extend to decimals with up to two decimal places.

## Division Strategies

## Nursery, Reception and Year 1

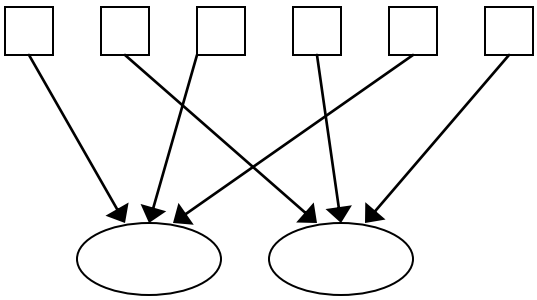
Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.

## Year 2

Children will develop their understanding of division and use jottings to support calculation

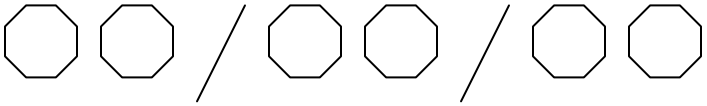
- ✓ **Sharing equally**

6 sweets shared between 2 people, how many do they each get?



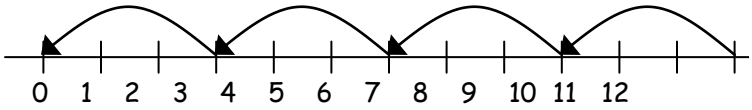
✓ **Grouping or repeated subtraction**

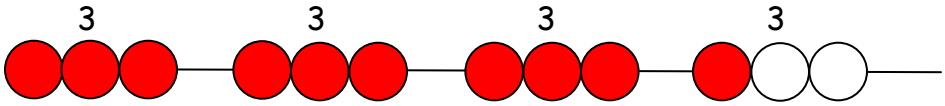
There are 6 sweets, how many people can have 2 sweets each?



✓ **Repeated subtraction using a number line, bead bar or Numicon**

12 ÷ 3 = 4




The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?'

✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

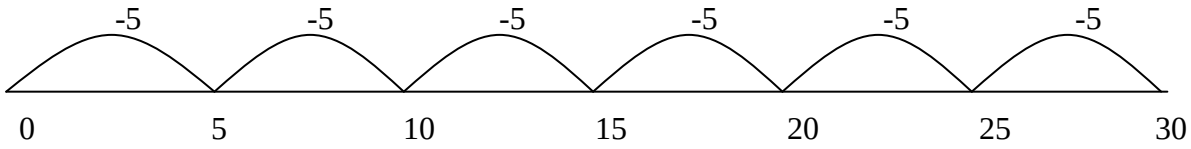
**÷ = Signs and missing numbers with appropriate sized numbers**

□ ÷ 2 = 4 20 ÷ △ = 4 □ ÷ △ = 4

**Year 3**

**÷ = Signs and missing numbers with appropriate sized numbers**

**Division - by repeated subtraction**




$5 \times 6 = 30$

$30 \div 5 = 6$

6)18
- 6
12
- 6
6
-6
0

leading to 6)72

60 -10 × 6
12
12 -2 × 6
0

7)84

70 -10 × 7
14
14 -2 × 7
0

**Year 4 and 5**

**÷ = Signs and missing numbers with appropriate sized numbers**

Year 4

96 ÷ 6

6 | 96

60 10 × 6

36 6 × 6

0

Year 5

196 ÷ 6

6 | 196

180 30 × 6

16 2 × 2

12

Answer 16 Answer 32 r 4

**Year 6**

**÷ = Signs and missing numbers with appropriate sized numbers**

$972 \div 36$

$$
\begin{array}{r|l}
36 & 972 \\
\cline{2-2}
 & 720 \quad 20 \times 36 \\
\cline{2-2}
 & 252 \quad 7 \times 36 \\
 & 252 \\
\cline{2-2}
 & 0 \\
\cline{2-2}
\end{array}
$$

Answer 27

Extend to decimals with up to two decimal places.

$87{\cdot}5 \div 7$ is approximately $80 \div 8 = 10$

$$
\begin{array}{rl|l}
 & 7 & 87{\cdot}5 \\
\cline{2-3}
- & & 70{\cdot}0 \quad 10 \times 7 \\
\cline{2-3}
 & & 17{\cdot}5 \\
- & & 14{\cdot}0 \quad 2 \times 7 \\
 & & 3{\cdot}5 \quad 0{\cdot}5 \times 7 \\
 & & 3{\cdot}5 \\
\cline{2-3}
 & & 0{\cdot}0 \\
\cline{2-3}
\end{array}
$$

Answer: $12{\cdot}5$