Bury St. Edmunds Calculation Policy

Foundation, KS1 and KS2 Calculation Methods

A Guide for Parents

The information in this booklet is to help <u>you</u> to help your child with maths.

It explains some of the different strategies used for mental and written calculations in school from Foundation Stage to the end of Year 6.

It gives a wide variety of ways of helping your child at home.

It also includes a selection of websites, which your child may enjoy.

By the end of year 6, children will been taught a range of calculation methods, both mental and written. They will progress through the stages when they are ready and confident.

Children should be encouraged to approximate their answers before calculating. Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.

Addition – Mental Methods

Step 1: Children are encouraged to develop a mental picture of numbers. They develop ways of recording calculations using pictures, etc.
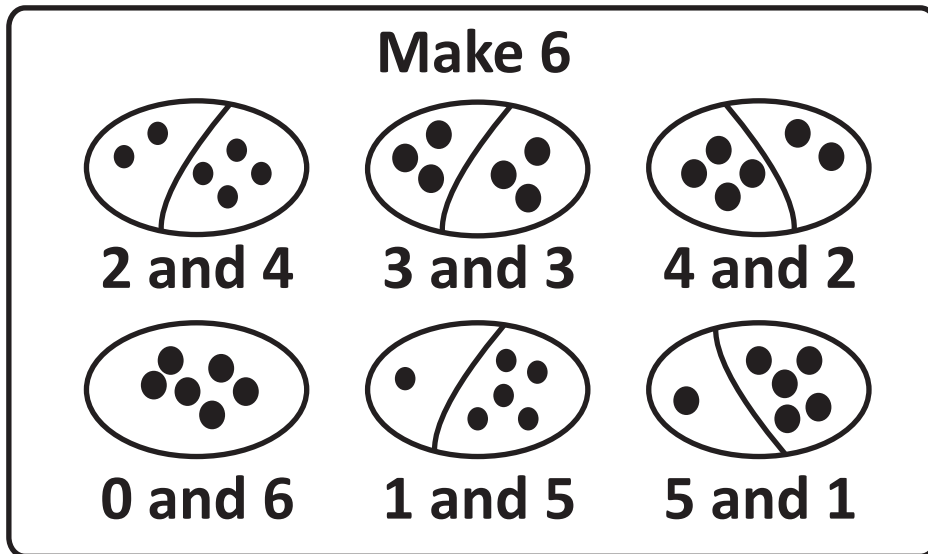
Make 6

2 and 4   3 and 3   4 and 2

0 and 6   1 and 5   5 and 1

Practical resources and familiar objects are used to support addition skills and teachers demonstrate the use of the numberline. Children also use number songs, stories, and games.
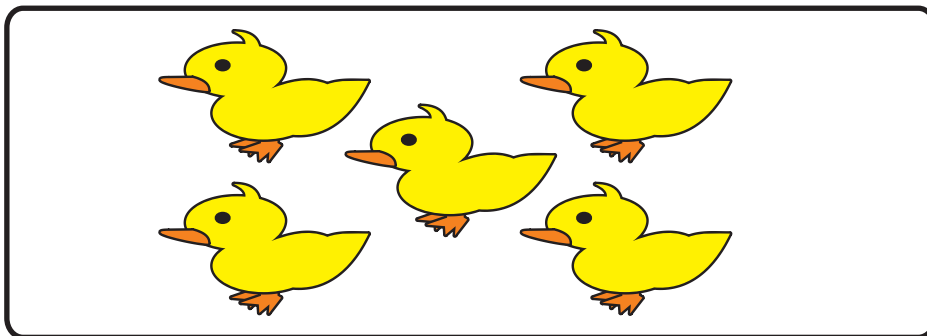
Step 2: As your child progresses they will use a numberline, bead strings, and bead frames to help the pupil count on. Children are developing number bonds and doubles and begin to use the numbered line to count on in units.
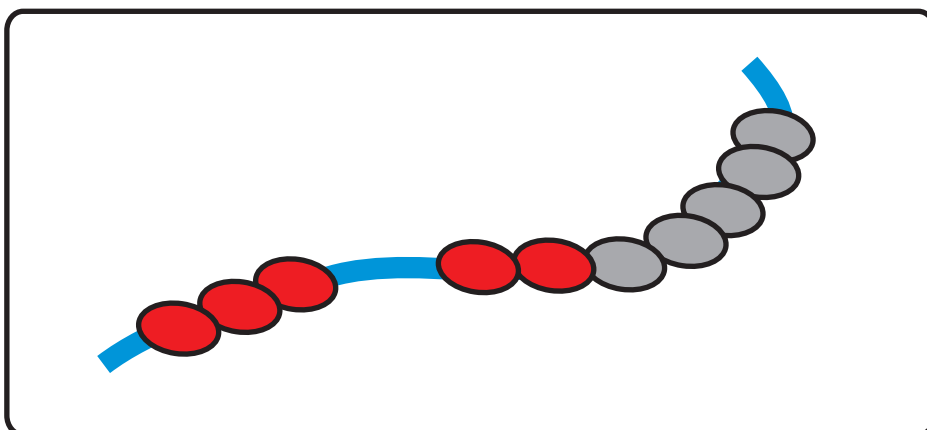
Addition - Informal Written Methods

Step 3: Children will begin to use 'empty number lines' themselves, starting with the larger number and counting on in tens and units.

9   10   11   12
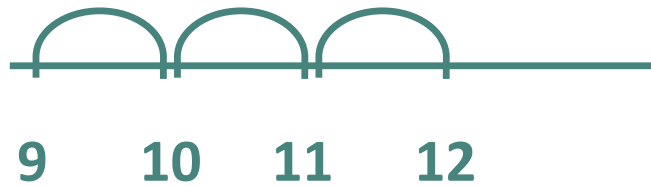
Step 4: Children will learn to partition the numbers into tens and units to find a total.

12 + 26 =

Partition the numbers into tens and units (or ones):

10 + 2   +   20 + 6

Add the tens together and add the units together:

10 + 20 = 30   2 + 6 = 8

Recombine the numbers to give the total:

30 + 8 = 38

Addition- Formal Written Method

Step 5: Students begin to use larger numbers, decimals in the context of money, and time.

Example: column addition without carrying

```
      67                          267
  +   24                      +    85
      11    (7 + 4)               12    (7 + 5)
      80    (60 + 20)            140    (60 + 80)
      91                         200
                                 352
```

Example: column addition with carrying

```
     625          3587            42
 +    48      +    675          6432
     673          4262           786
      1            1 1 1           3
                             +   4681
                                11944
```

Subtraction - Mental Methods

Step 1: Practical resources and familiar objects are used to support addition skills and teachers demonstrate the use of the numberline. Children also use number songs, stories and games. Children count backwards from different starting points.
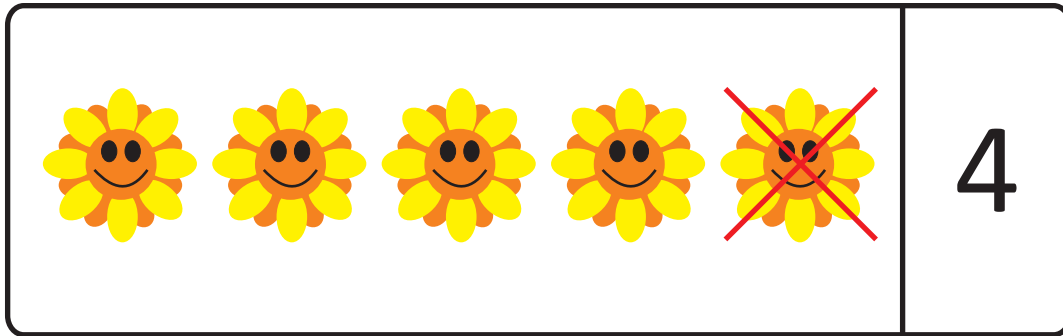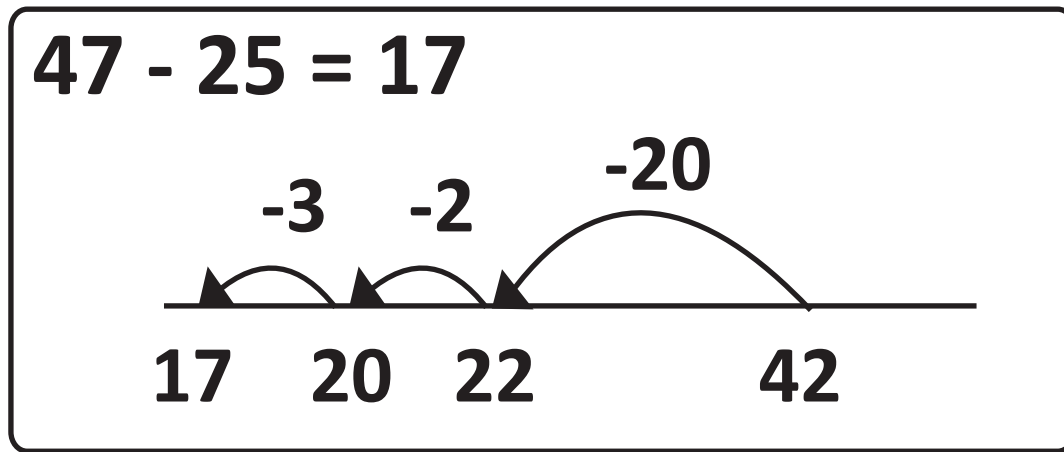
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Step 2: As your child progresses they will use a numberline, bead strings, and bead frames to help them count back.

$$13-5=8$$
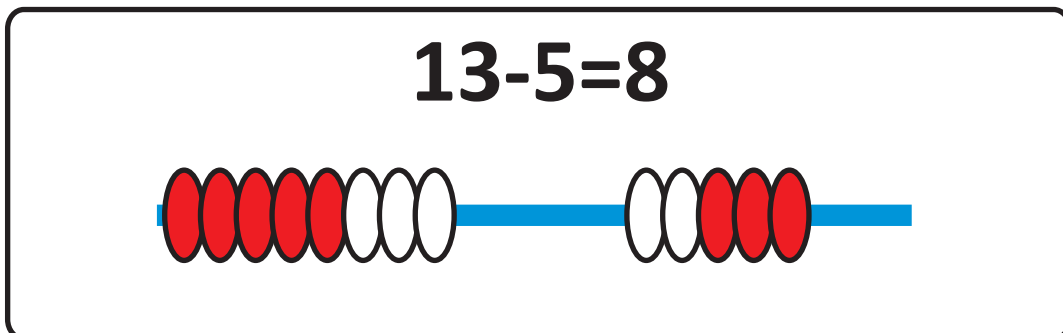
Step 3: Counting back in tens and units using an empty numberline.

$$47 - 23 = 24$$

-1 -1 -1 -10 -10

24   25   26   27   37   47

$$47 - 25 = 17$$

-3   **-2**   **-20**

17   20   22   42
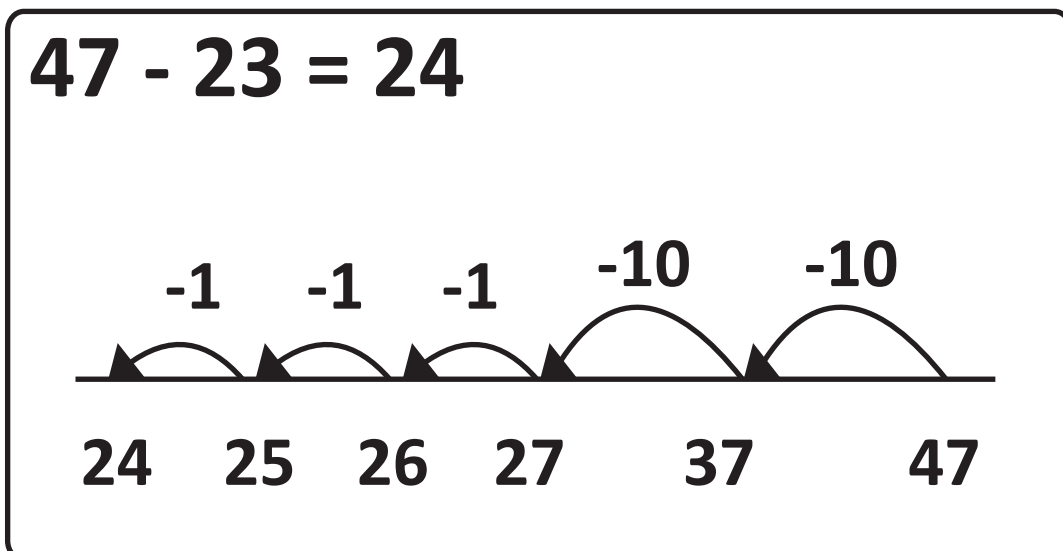
Subtraction: Formal Written Methods

Step 4: Children will learn to partition by splitting the number into its place value parts, such as TENS and UNITS. You then subtract the units from the units, and the tens from the tens.

|			
89	=	80 + 9	(without exchange)
- 57	=	- 50 + 7	
		30 + 2 = 32	

In the example below, 1 unit is less than 6 units, so you have to exchange 70 + 1 into 60 + 11. In the past we would call this borrowing, but the term exchange is now used.

71	=	$\overset{60}{\cancel{70}} + {}^{1}1$	(with exchange)
- 46	=	- 40 + 6	
		20 + 5 = 25	

These formal methods will extend to larger numbers and decimal numbers.
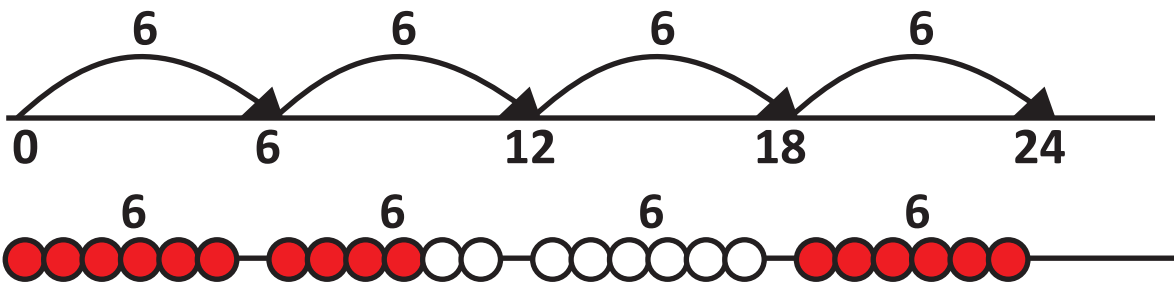
Multiplication- Mental Methods

Step 1: Children will experience equal groups of objects and count repeated groups of the same size.
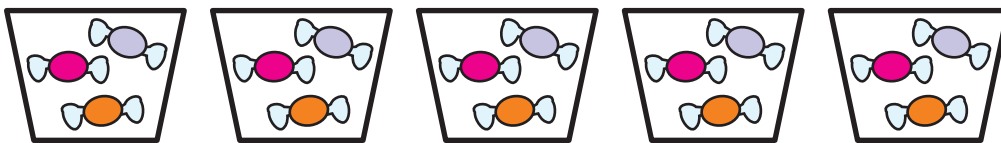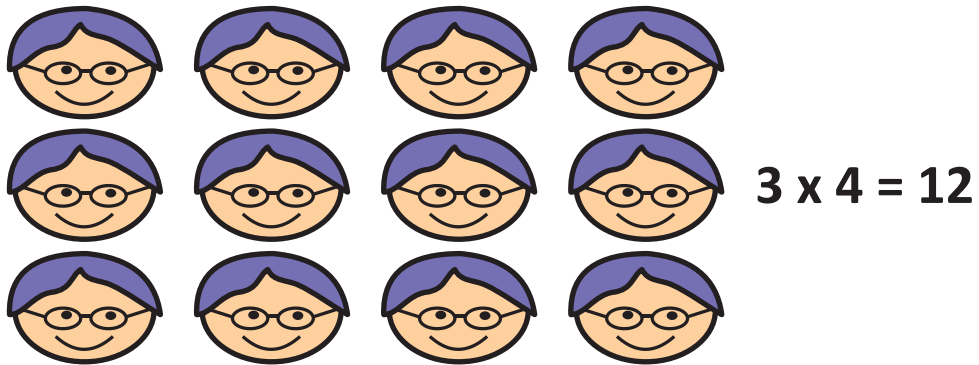

They will count in 2s, 5s, 10s with support.

They will work on practical problem solving activities involving equal sets or groups. They will be able to say whether sets are the same, larger or smaller.

6 + 6 + 6 + 6 = 6 four times = 6 × 4

4 x 3 = 12

3 x 4 = 12

This is an array. It shows 4 x 3 as three rows of four, or four columns of three.

Children should use number lines or bead bars to support their understanding.

Multiplication - Formal Written Method

Step 4: Grid Method

Students split the two digit number into tens and units and then multiplying each of them by the single digit number. The pupils can use their knowledge of tables to do this. If they know that 3 x 7 = 21, then they should know that 30 x 7 = 210. This method progresses to larger numbers and decimals.

23 x 8

x	20	3
8	160	24

So

160
+ 24
184 = (23 x 8)

72 x 38

x	70	2
30	2100	60
8	560	16

So

2100
560
60
+ 16
_____
2736 = (72 x 38)

4.9 x 3

x	4	0.9
3	12	2.7

So

12
+ 2.7
_____
14.7 = (4.9 x 3)

The grid method provides an extremely clear and flexible approach to multiplication which is much easier for children to understand and apply than any vertical methods.
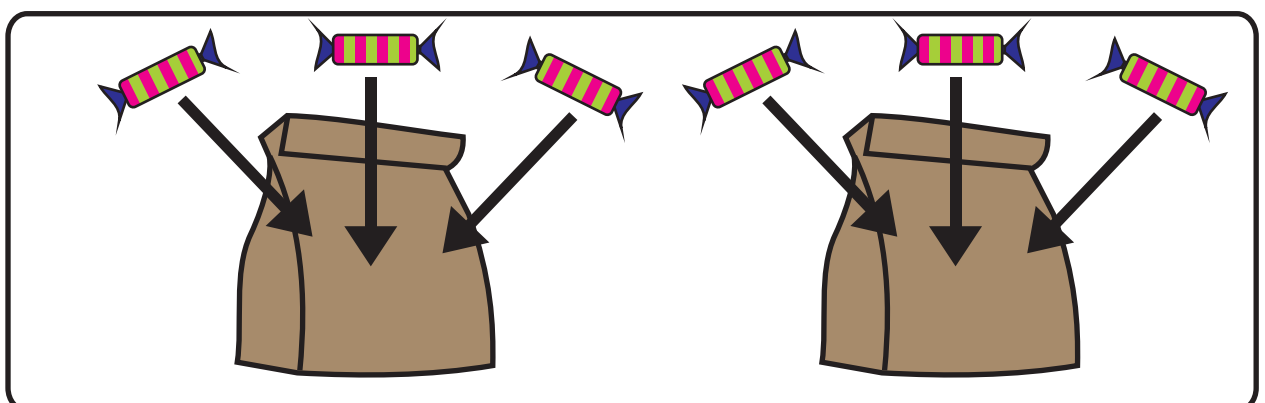
Division - Mental Methods

Step 1: Sharing

Children will be able to recognise equal groups and share items out in play and problem solving and count how many in each group.
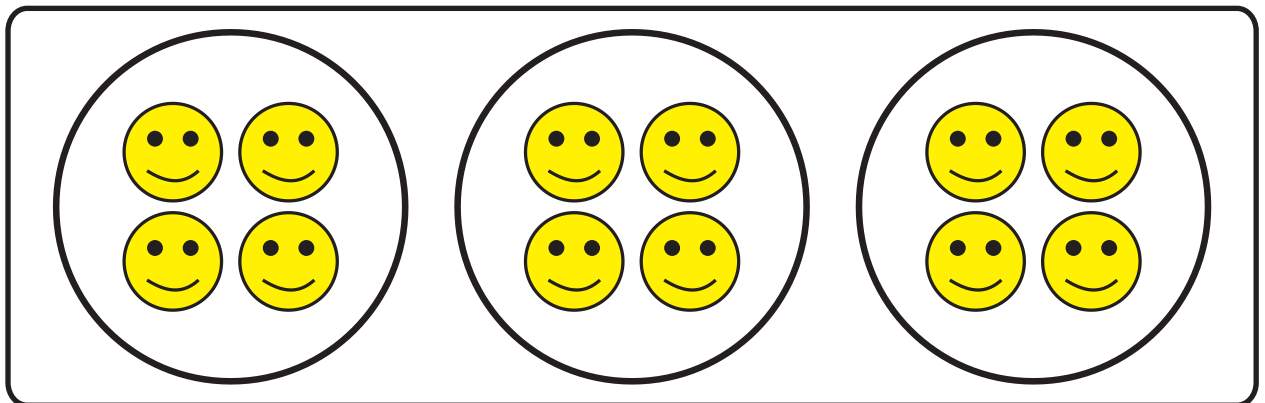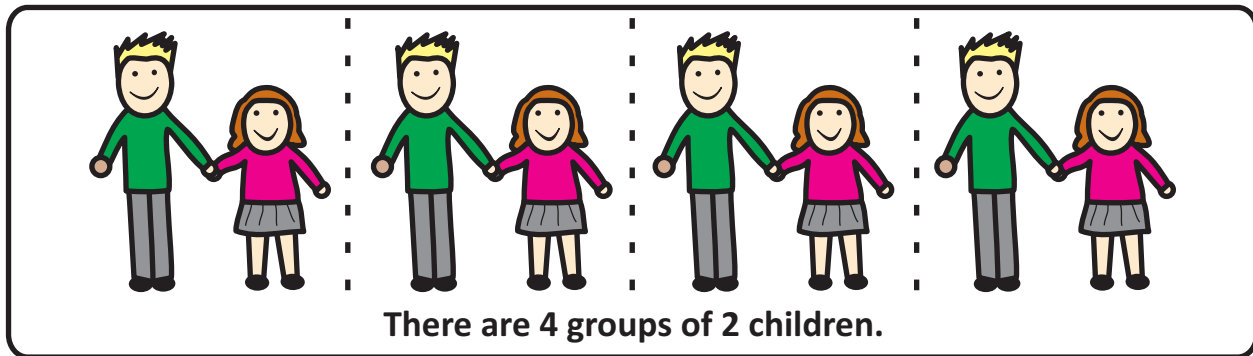

Six sweets are shared equally between 2 people. How many sweets does each child get?
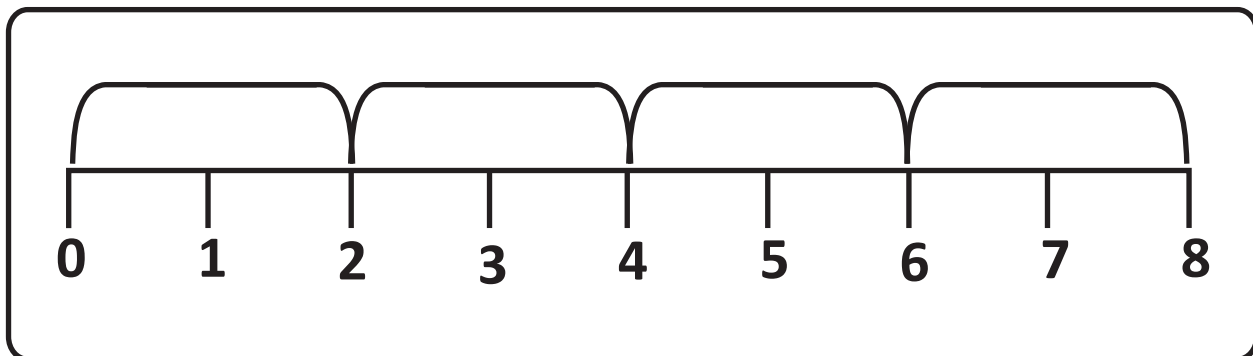
Step 2: Grouping

If there are 8 children how many groups of 2 are there?

There are 4 groups of 2 children.
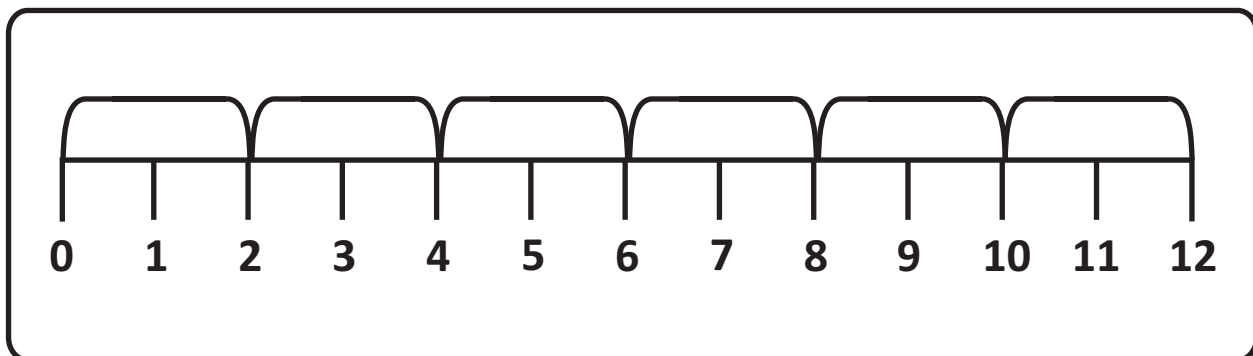
Multiplication: Informal Written Method

Step 3: Grouping can be shown more efficiently using a number line with repeated subtractions. For the example below, we are jumping back in groups of 2. To find the answer we count the number of jumps (i.e. 4 jumps, so 8 ÷ 2 = 4)

0 1 2 3 4 5 6 7 8

Repeated Subtraction

Repeated subtraction along a NUMBER LINE can be used easily to work out simple divisions.

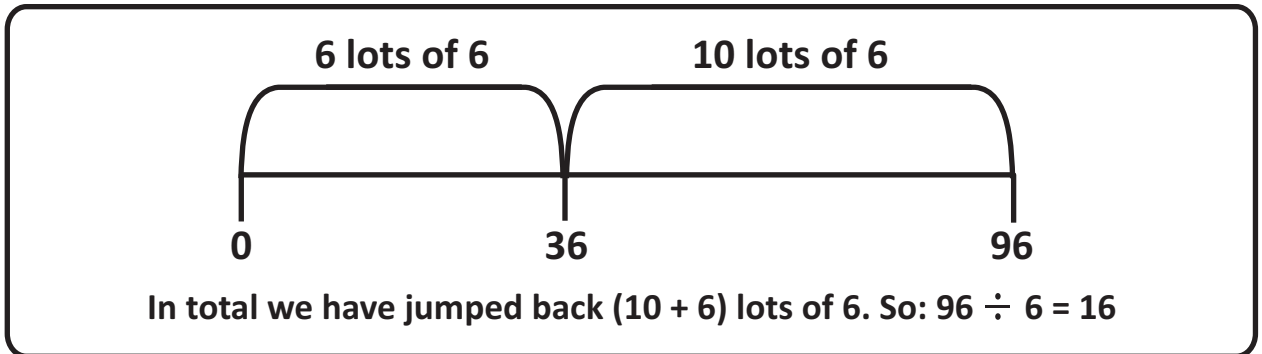**For example: 12 ÷ 2**

0 1 2 3 4 5 6 7 8 9 10 11 12

In this method we are jumping back in groups or steps of 2. To find our answer, we count the number of jumps. In this case 6 jumps were required.

So: 12 ÷ 2 = 6

Division Formal Written Methods

Step 4: Chunking

A quicker approach subtracts known multiples of 6 each time (i.e. 10 lots of 6 followed by 6 lots of 6). This can be represented on a number line as:

6 lots of 6	10 lots of 6

0　　　　　　　　　　36　　　　　　　　　　96

In total we have jumped back (10 + 6) lots of 6. So: 96 ÷ 6 = 16

Step 5: An alternative approach records the number line information vertically. How many times does 6 go into 96? (use tables 10,5,2 and 1 to start).

```
6 │  9    6
- │  6    0      10 x
  │  3    6
- │  3    6      6 x
  │       0
```

In total (10 + 6) lots of 6 have been taken out of 96 and we arrive at the same answer, that is:

$$96 \div 6 = 16$$

By subtracting larger chunks we have arrived at the answer quicker. This method, called CHUNKING, makes difficult division questions easy. As the pupil becomes confident, they will use other known multiplication facts.

196 ÷ 6

```
6 │  1    9    6
- │  1    8    0     30 x
  │       1    6
- │       1    2     2 x
  │            4
```

In total (30 + 2) lots of 6 have been taken out of 196 with a remainder of 4. So:

$$196 \div 6 = 32 \text{ r } 4$$

Step 6: Short Division: Short Division / The Bus Stop Method

963 ÷ 3

$$\begin{array}{c}3\ 2\ 1\\ \hline 3\,|\,9\ 6\ 3\end{array}$$

To work this out, divide 963 by 3, one digit at a time, starting from the left.

252 ÷ 4

25 divided by 4 = 6

remainder 1

$$\begin{array}{c}6\ 3\\ \hline 4\,|\,2\ ^2 5\ ^1 2\end{array}$$

12 divided by 4 = 3

To work this out, divide 252 by 4, one digit at a time, starting from the left.

GLOSSARY

Number sentence: calculation with an answer

Number bond: pairs of numbers that add up to a target number

Sum: the answer to an addition question

Product: the answer to a multiplication question

Quotient: the answer to a division question

Re-combine: put back together

Partition: splitting the number into parts according to the digits' place value 324 = 300 + 20 + 4

WEBSITES

www.sumdog.com

Free maths games, covering 122 numeracy topics which support the curriculum, split into 10 levels of increasing difficulty.

www.mathletics.co.uk

Mathletics covers the key stage 1 to A level National Curriculum Framework. There are lots of activities to support youngsters learning and live challenges.

www.bbc.co.uk/schools

This is the official BBC website for schools. It contains learning resources for children, parents and teachers including interactive games and revision guide.

www.gridclub.com

Over 500 activities closely linked to the curriculum. Designed for pupils between 5 and 12.

www.mathsphere.co.uk

A site dedicated to maths with fun games, activities and advice.

www.mmp.maths.org

This project supports the mathematics education of people of all ages and abilities. The site links to: www.nrich.maths.org – a monthly magazine containing maths puzzles, challenges and games for 5-18.

www.funbrain.com

This is a great site with educational games for kids of all ages. (maths, grammar, science, spell, history)