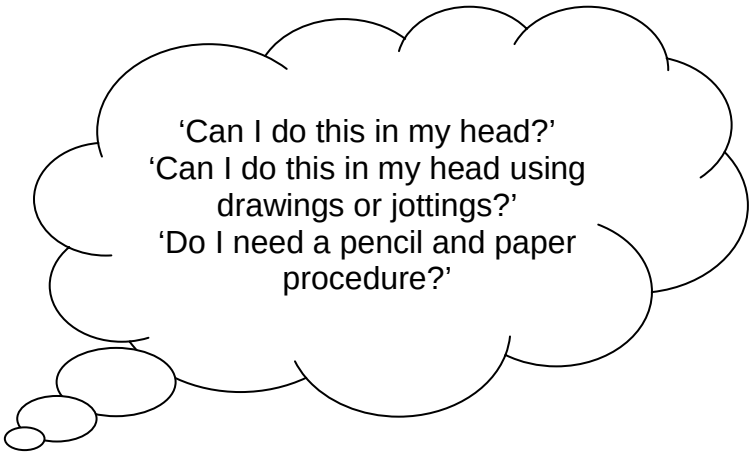
Progression in Division

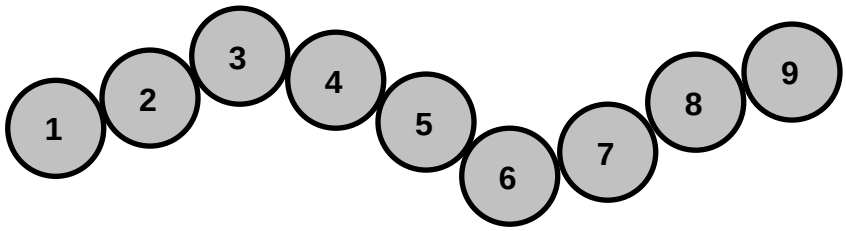
At Cobham Primary School, we have developed a consistent approach to the teaching of written calculation methods in order to establish continuity and progression through the school.

This calculation policy outlines the progression in mathematical strategies and skills from Foundation to Year 6, and the typical year group children will be in when they are first introduced to particular concepts. However, this calculation policy is to be used flexibly, as children in each year group may draw from year groups above and below their own, according to their ability. It is imperative that visual images and manipulates are used alongside the teaching of each stage.

It is essential that, in all year groups, division is:
- taught alongside its inverse multiplication, as these important links will assist children in mastering the operation.
- involved in situations with real life contexts, rich problem solving activities and word problems.

We aim for all children to be able to use a reliable and efficient written method for each operation with confidence and understanding by Upper Key Stage 2. Children will be encouraged to consider the calculation and the most efficient method to reach the answer.

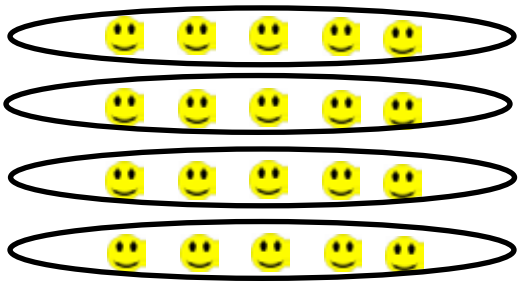


Strategy	Rationale
Practical experience of 'sharing' ***Example*** 10 fat sausages sizzling in a pan. (Encourages counting back in 2s)  ***Example*** Putting objects into pairs. 	Although division is not formally introduced until Year 1 the ground work is laid as early as the foundation stage. This includes songs that encourage jumping in equal amounts. The children will also share out toys, fruit and other materials in context. It is important that children have the opportunity to count repeatedly in groups of the same size.
Counting on in 'groups' ***Example*** Can you jump in 2s along the number track? Will you land on 7? Why not?  	Division is known as 'repeated subtraction' and it is also the opposite (inverse) of multiplication. The children will be encouraged to count forwards and backwards in 2s, 3s, 5s and 10s.

‘Groups’

Example

20 ÷ 5 = ☐
20 children get in to teams of 5 to play a game.
How many teams are there?



There will be 4 teams.

Giving visual images for division is important.

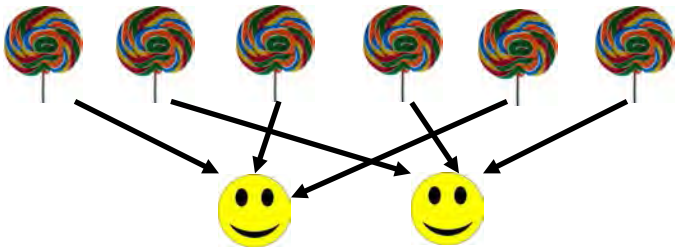
Grouping involves the children taking a larger quantity and grouping them using a particular number (the divisor).

Children are encouraged to draw simple illustrations (referred to as ‘jottings’) in order to help them with problems, where they have not been supplied with a picture.

‘Sharing’

Example

6 ÷ 2 = ☐
6 lollies are shared between 2 children.
How many lollies does each child get?



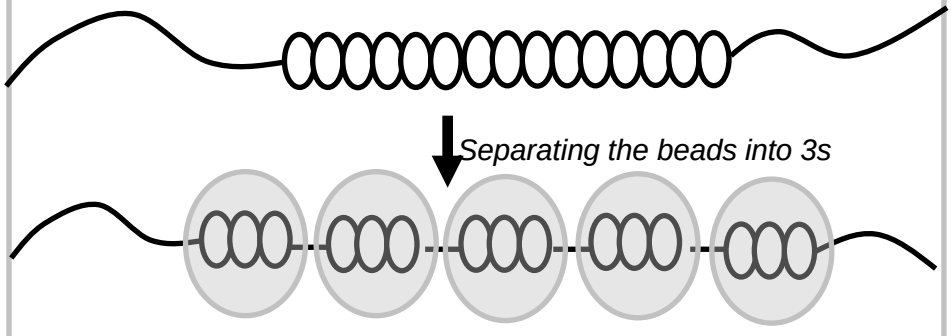
Sharing involves the children physically sharing objects (often sharing one object at a time, but this is then extended to larger amounts).

If 6 ÷ 2 = ☐ was solved by ‘grouping’ the children would think about how many groups of two there would be in 6, rather than how many each person would get.

More grouping using bead strings

Example

How many 3s are in 15?



There are 5 groups of 3 in 15.

Initially sharing is a powerful image for the children to use. However, when numbers increase this can no longer be carried out practically.

It is important that when grouping is used the children make links with counting in groups using a number line.

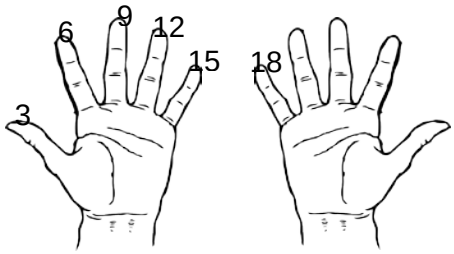
The children are also encouraged to count up using multiplication facts (repeated addition) linking to the inverse As confidence grows the children use facts to find ‘missing numbers’.

Use of times table facts

Example

18 ÷ 3 = ?

How many 3s are in 18?



There are six 3s in 18 (since I used six fingers)

Children count up in an amount equal to the divisor, using their fingers to help.

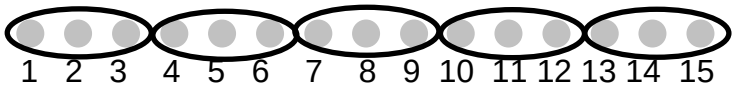
Using marked number lines

The children will combine their understanding of groupings and arrays to form an understanding of how they can use number lines to repeatedly subtract the divisor (and therefore find how many groups can be made).

Example

How many 3s are in 15?

15 ÷ 3 = ☐

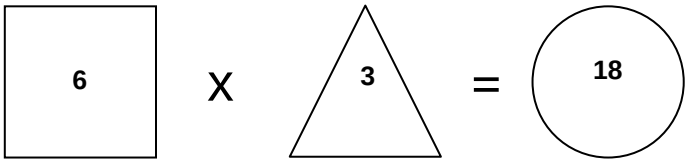


It is important that children can make a link between grouping and jumping on a number line.

The children will also need to understand the link between division and multiplication; they are exact opposites (the 'inverse' of each other).

Use of times table facts and the inverse to find division facts

The children will learn to use multiplication facts to find the inverse.



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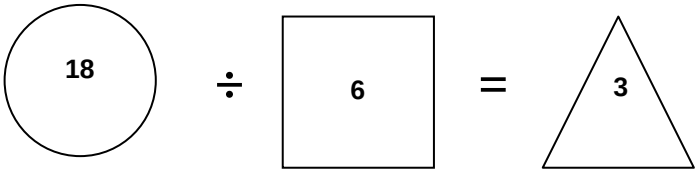


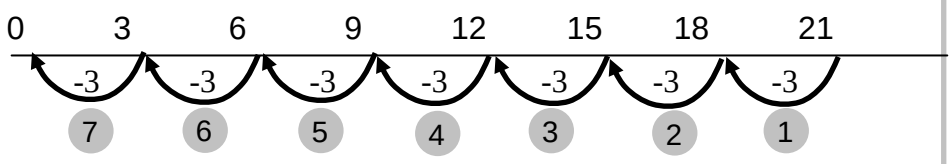
Opportunities to use practical resources to reinforce this process will be provided.

Using blank number lines

Using a number line the children will count on in an amount equal to the divisor. They will then count how many 'jumps' they made.

Example

How many 3s are in 21?



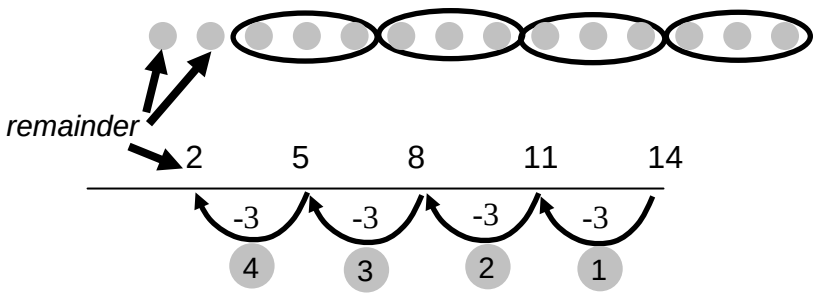
There are seven 3s in 21 (because I had to jump seven times)

Using number lines to find remainders

Children will learn how they can identify if a solution has a remainder and, if it has, what they need to do with this remainder.

Example

14 ÷ 3 = 4 remainder 2



Example

A box can hold 4 Cola bottles.

How many boxes can I fill if I have 14 bottles?

Here the answer needs to be **rounded down**.

Example

A box can hold 4 Cola bottles.

How many boxes will I need for 14 bottles?

Here the answer needs to be **rounded up**.

Children will use the language of 'remainder'.

Grouping objects and drawing number lines gives a good visual understanding of remainders.

Children will become familiar with interpreting the remainders, when faced with 'real life' problems.

Instead of writing 'remainder', children may also abbreviate this and write 'r.'

The ‘half a house’ method

As the children start to use more complex methods, these continue to be supported by jottings and use of the inverse. A more formal method of division will be introduced.

Example

36 ÷ 4 =

How many 4s are in 36?

$$4\overline{)36} \quad 0\,9$$

136 ÷ 5 =

How many 5s are in 136?

$$5\overline{)136} \quad 0\,2\,7\ r\ 1$$

Children will also learn to record a remainder as a fraction.

E.g. $27\ ^{1}/_{5}$

Children will be encouraged to check their answers by carrying out the inverse of the operation wherever necessary

The ‘half a house’ method (2)


Children will then extend upon this method, introducing decimals to 2 decimal places and then beyond.

Example

13 ÷ 5 =

How many 5s are in 13?

$$5\overline{)13.0} \quad 0\,2\,.\,6$$

Estimation will be encouraged first.

This will then be extended to decimals in the context of money.

£4.29 ÷ 4 =

$$4\overline{)£4.29} \quad £1.0\,7\,2\,5$$

Children will then be taught to continue to divide into further decimal places until it divides exactly. They will then be encouraged to apply what this means in the context of money.

Short division with a fraction

Children will then extend upon this method using a two digit divisor, using jottings once again to support them in this.

Example

$90 \div 7 = 12\ {}^{6}/_{7}$

How many 5s are in 13?

$$11\overline{)\,3\,{}^{3}9\,{}^{6}3} \quad 0\ 3\ 5\ \text{r}\ {}^{8}/_{11}$$