



# PROGRESSION IN WRITTEN METHODS FOR MULTIPLICATION AND DIVISION

This document shows the progression in written methods for multiplication and division that are used in our school.

These written methods are based on mental strategies which provide the foundations for jottings, informal and formal methods of recording.

This is only a guide as all children progress at different rates and it is essential that the prerequisite skills for each step are in place before moving on.

Jenny Pearce & Louise Abbott  
June 2014

## Early Calculation

The children begin to use vocabulary involved in multiplying and dividing as they solve practical problems.

They begin to relate multiplication to counting objects in groups and division to sharing objects equally.

ELG - 'They solve problems, including doubling, halving and sharing.'

*Role play at the café: "I'd like a double scoop of chocolate ice cream please!"*

*Tommy and David are fighting over the toy dinosaurs. "Let's give half to David and half to Tommy."*

*"Here are the cherries for the top of our cakes. Can we share them out equally?"*

### Prior knowledge, understanding and skills to support early calculation

To say number names in order forward and backward to ten and then twenty and know numbers in counting system are always in same order.

Know that numbers identify how many objects are in a set.

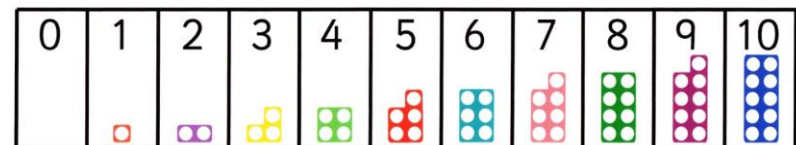
To count objects reliably saying one number name for each object. They know last number of count is number in set.

Match sets of objects to numerals that represent number of objects

Children develop ways to record calculations using pictures and words before symbols are introduced.



Children use a range of resources including number tracks to support counting with objects and oral counting.



Teaching division alongside multiplication helps children make connections and explore their inverse relationship.

## Using objects to solve problems

Practical activities where children count objects in equal groups to find out many altogether, focusing initially on groups of 2s, 5s and 10s.



*If every child in our colour group has 2 hands, how many hands do we have altogether?*

*How many apples are there altogether if we have 5 in each bucket?*

Ensure the language is reinforced: groups, lots of, altogether.



## Using objects to solve problems

Early division begins with sharing in practical activities. It is important, however, that children go on to recognise that division has another meaning besides sharing.

### SHARING

*Share a bag of 6 apples between 2 children - one for you, one for me...*

### GROUPING

*A bag of 6 apples, how many children can have 2 apples each?*

The concept must match the image so children understand if they are sharing or grouping. Ensure children understand the concept of 'equal'.



## **Pictorial recording**

Children solve simple problems by counting objects in equal groups and record with pictures. They begin to solve problems by drawing pictures to represent objects.

*There are three buckets with two balls in each bucket. How many altogether?*

*There are 3 teams competing at the sports gala. Each team has 5 children. How many children altogether?*

## **Pictorial recording**

Children solve simple problems by sharing or grouping objects and record with pictures. They begin to solve problems by drawing pictures to represent objects.

### **SHARING**

*There are six balls that need to be shared between three children. How many each?*

### **GROUPING**

*There are six balls which need to be put into buckets in groups of two. How many buckets will I need?*

## Multiplication as repeated addition

Children link counting objects in equal groups to repeated addition.

*There are five pairs of socks on the washing line. How many socks altogether?*



$$2 + 2 + 2 + 2 + 2 = 10$$

Five lots of two equals 10

## Division as repeated subtraction

Children link dividing by grouping objects to repeat subtraction.

*I have ten goldfish and can fit two goldfish in a bowl. How many bowls will I need?*

$$10 - 2 - 2 - 2 - 2 - 2$$

5 groups of 2. You will need 5 bowls.

## Multiplication as repeated addition on a numberline

Children link repeated addition to counting on in equal steps on a structured numberline

*If I have 6 bicycles, how many wheels will there be altogether?*

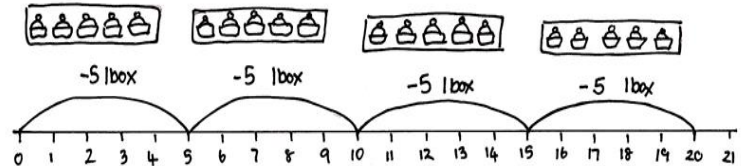
Children need to be able to count on in equal steps of a number (2,5,10)



## Division as repeated subtraction on a numberline

Children link repeated subtraction to counting back in equal steps on a structured numberline

*20 cakes need to be put into boxes. Each box holds 5 cakes. How many boxes will we need?*



20 cakes divided into boxes of 5,  
I need 4 boxes.

$$20 \div 5 = 4 \text{ boxes}$$

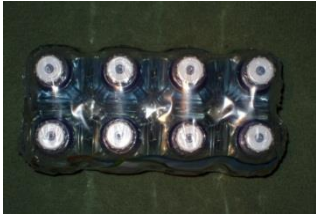
There are 4 groups of 5 in 20.

Children need to be able to count back in equal steps of a number (2,5,10)



## Introducing and exploring arrays

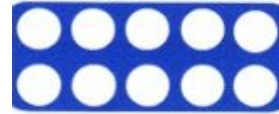
Children explore arrays in a range of real life contexts. They explore what an array can show - e.g. the water bottles are arranged as 2 lots of 4 and 4 lots of 2. Children create their own arrays with objects and pegboards.



## Beginning to use arrays to solve problems

Children begin to use and draw arrays to solve multiplication problems. They make connections between practical resources, repeated addition on the numberline and arrays.

*My chocolate box has 2 rows of 5 chocolates. How many chocolates altogether?*



## Language and symbols for multiplication

Children use arrays to show that multiplication can be done in any order (commutative)

This array shows 5 lots of 3 and 3 lots of 5. The number of objects stays the same.

Children begin to use the correct mathematical language and symbols to describe and record multiplication.

5 lots of 3  
3 multiplied 5 times  
 $5 \times 3 = 15$

Language must be used carefully.  
Make sure you are clear about the problem you are asking the children.  
Are you asking them to find out what 5 lots of 3 is or 3 lots of 5?  
To avoid confusion be careful when using the term 'multiplied' - 3 multiplied 5 times is different to 5 multiplied by 3.



## Language and symbols for division

Children learn that division can not be done in any order.

15 divided by 5  
5 divided by 15

Children begin to use the correct mathematical language and symbols to describe and record division.

15 divided by 5  
 $15 \div 5 = 3$

They recognise that division is the inverse of multiplication.

Children notice that not all numbers can be divided equally and may begin to discuss remainders.

Language must be used carefully.  
Use the term 'divided' rather than 'shared' when using the division symbol  $\div$  as  $\div$  represents both sharing and grouping.





## Using multiplication and division facts to solve problems

Children will learn first to halve and double practically and then to memorise doubles and halves as number facts.

I have 8 sweets and I give you half - how many will you have?

The children move from counting in steps to learning to instantly recall multiplication and division facts for 2,5, and 10 times table to help them begin to solve multiplication and division problems more efficiently including 'empty box' problems. As they move into Key Stage 2 they will continue to memorise multiplication facts as 'times tables'.

$$2 \times \square = 10 \quad 10 \div \square = 5$$

As Children need to understand the link between division and multiplication (they are exact opposites - the inverse of each other), they need to be taught division facts alongside multiplication facts. '3 for free' is a way of showing the link between multiplication and division.

$$\boxed{5} \times \boxed{8} = \boxed{40}$$

$$\boxed{8} \times \boxed{5} = \boxed{40}$$

$$\boxed{40} \div \boxed{5} = \boxed{8}$$

$$\boxed{40} \div \boxed{8} = \boxed{5}$$

If I Know...  
then I know  
these number  
facts as well

It is important that children eventually memorise 'times tables' but they must have a good understanding of practical multiplication first - the foundations outlined in this progression document.

