

Moor Nook Community Primary School
Progression Towards a Written Method for Division
2021-2022

In developing a written method for division, it is important that children understand the concept of division, in that it is:

- repeated subtraction

They also need to understand and work with certain principles, i.e. that it is:

- the inverse of multiplication
- not commutative i.e. $15 \div 3$ is not the same as $3 \div 15$
- not associative i.e. $30 \div (5 \div 2)$ is not the same as $(30 \div 5) \div 2$

YR (EYFS)

Early Learning Goal:

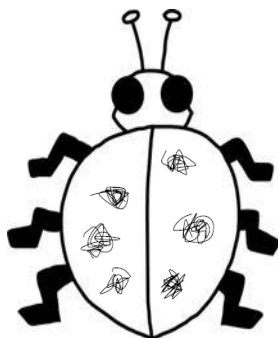
Children solve problems, including halving and sharing.

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of equipment, including small world play, role play, counters, cubes etc.

Children may also investigate sharing items or putting items into groups using items such as egg boxes, ice cube trays and baking tins which are arrays.



They may develop ways of recording calculations using pictures, etc.



A child's jotting showing halving six spots between two sides of a ladybird.



A child's jotting showing how they shared the apples at snack time between two groups.

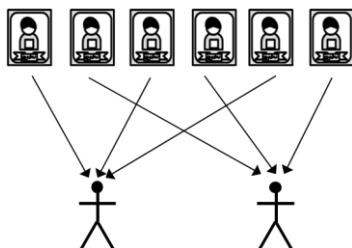


YEAR 1

End of Year Objectives:

- Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- Recognise and solve division problems.

In year one, children will continue to solve division problems using practical equipment (Cuisenaire rods, beadstrings, counters etc.) and jottings. They should use the equipment to share objects and separate them into groups, answering questions such as 'If we share these six apples between the three of you, how many will you each have? How do you know?' or 'If six football stickers are shared between two people, how many do they each get?' They may solve both of these types of question by using a 'one for you, one for me' strategy until all of the objects have been given out.



Children should be introduced to the concept of simple remainders in their calculations at this practical stage, being able to identify that the groups are not equal and should refer to the remainder as '... left over'.

YEAR 2

End of Year Objectives:

- **Calculate mathematical statements for division within the multiplication tables and write them using the division (\div) and equals ($=$) signs.**
- **Solve practical problems involving division.**
- **Calculate (abstract) mathematical statements for division e.g. $25 \div 5$.**
- **Recognise and solve word problems (out of context) involving division using number sentences.**
- **Solve worded division problems.**

Children will utilise practical equipment to represent division calculations as grouping (repeated subtraction) and use jottings to support their calculation, e.g.

$$12 \div 3 =$$

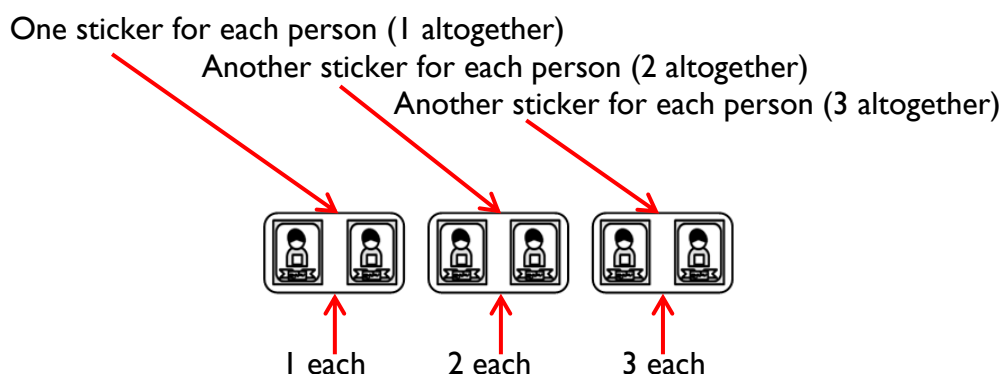


Children need to understand that this calculation reads as 'How many groups of 3 are there in 12?'

The link between sharing and grouping can be modelled in the following way:

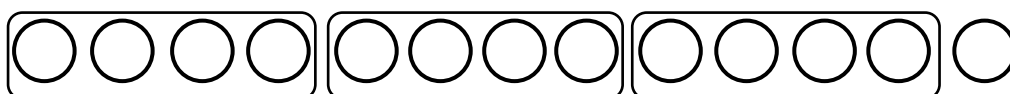
To solve the problem 'If six football stickers are shared between two people, how many do they each get?'

Place the football stickers in a bag or box and ask the children how many stickers would need to be taken out of the box to give each person one sticker each (i.e. 2) and exemplify this by putting the cards in groups of 2 until all cards have been removed from the bag.



Children should also continue to develop their knowledge of division with remainders, e.g.

$$13 \div 4 =$$



$$13 \div 4 = 3 \text{ remainder } 1$$

Children need to be able to make decisions about what to do with remainders after division and round up or down accordingly. In the calculation $13 \div 4$, the answer is 3 remainder 1, but whether the answer should be rounded up to 4 or rounded down to 3 depends on the context, as in the examples below:

I have £13. Books are £4 each. How many can I buy?

Answer: 3 (the remaining £1 is not enough to buy another book)

Apples are packed into boxes of 4. There are 13 apples. How many boxes are needed?

Answer: 4 (the remaining 1 apple still need to be placed into a box)

YEAR 3

End of Year Objectives:

- **Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one-digit numbers, progressing to formal written methods.***
- **Solve practical problems involving division.**
- **Explain and calculate (abstract) mathematical statements for division within the times tables e.g. $32 \div 4$.**
- **Recognise and solve word problems (out of context) involving division using number sentences.**
- **Represent and solve division word problems.**

**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study." p4*

It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.

Initially, children will continue to use division by grouping (including those with remainders), where appropriate linked to the multiplication tables that they know (2, 3, 4, 5, 8 and 10), e.g.

$$43 \div 8 =$$



$$43 \div 8 = 5 \text{ remainder } 3$$

Children may represent their working out using a number-line e.g.

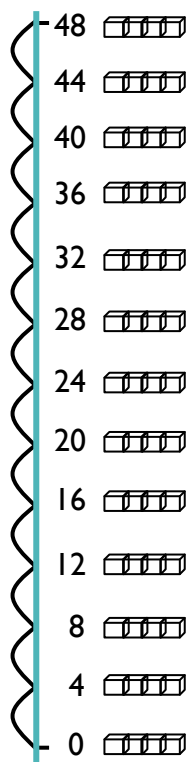
Stage 1 – repeatedly subtracting individual groups of the divisor

Stage 2 – subtracting multiples of the divisor (initially 10 groups and individual groups, then 10 groups and other multiples in line with tables knowledge)

After each group has been subtracted, children should consider how many are left to enable them to identify the amount remaining on the number line.

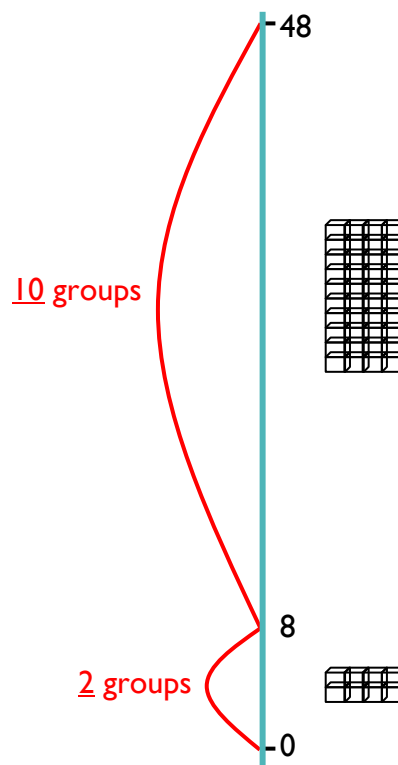
Stage 1

$$48 \div 4 = 12 \text{ (groups of 4)}$$

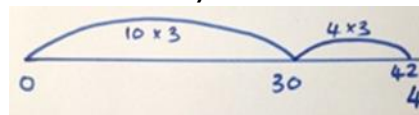


Stage 2

$$48 \div 4 = 10 \text{ (groups of 4)} + 2 \text{ (groups of 4)} \\ = 12 \text{ (groups of 4)}$$



Or horizontally:



Partitioning the number may also be used:

$$\begin{array}{r} 42 \div 3 \\ 30 \div 3 \quad + \quad 12 \div 3 \\ 10 \quad \quad + \quad 4 \\ 14 \end{array}$$

Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

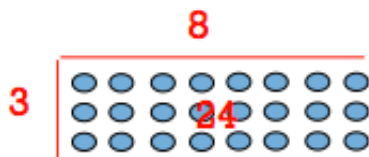
YEAR 4

End of Year Objectives:

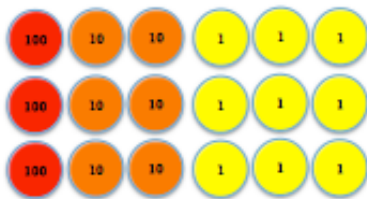
- Divide numbers up to 3 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.
- Recognise and solve a simple division problem.
- Solve missing number problems involving multiplication and division.

Representation could include:

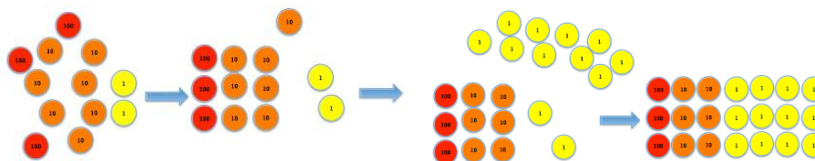
For a calculation $p \div q$, grouping a set of p counters into groups of size q , arranging these groups as an array. For example, for $24 \div 3$, count out 24 counters and arrange in columns of 3.... then read off the answer of 8 as the number of columns



Building a number using place value counters and grouping them into groups that are the size of the divisor, before arranging these groups as an array to explore the partitioning approach. For example, $369 \div 3$



Repeating the above, but exchanging remaining counters for 10 counters of the next size down before continuing to group. For example, $372 \div 3$



Recording these methods to arrive at compact division:

$$362 \div 7 =$$

$$\begin{array}{r} 51 \text{ r}5 \\ 7 \overline{) 362} \end{array}$$

$$362 \div 7 = 51 \text{ r}5$$

Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

YEAR 5

End of Year Objectives:

- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.
- Recognise and solve a simple division problem, interpreting any remainders in the context as appropriate.
- Solve word problems involving a multiplication and/or division.

Children will use the method of compact division in Year 5:

$$\begin{array}{r} 1142 \\ 4 \overline{) 4568} \end{array}$$

including numbers with remainders.

Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.

YEAR 6

End of Year Objectives:

- Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.
- Use written division methods in cases where the answer has up to two decimal places.
- Recognise and solve a simple division problem, interpreting any remainders in the context as appropriate.
- Solve missing number problems involving division.

Children will use the formal compact method for division in Year 6, including when working with decimals:

$$\begin{array}{r} 2191 \\ 4 \overline{) 8764} \\ \underline{8} \\ 07 \\ \underline{4} \\ 36 \\ \underline{36} \\ 04 \\ \underline{4} \\ 0 \end{array}$$

$$\begin{array}{r} 21 \\ 216 \overline{) 4536} \\ \underline{432} \\ 216 \\ \underline{216} \\ 0 \end{array}$$

$$\begin{array}{r} 17 \text{ r } 19 \\ 31 \overline{) 546} \\ \underline{31} \\ 236 \\ \underline{217} \\ 19 \end{array}$$

$$\begin{array}{r} 12.3 \\ 31 \overline{) 381.3} \\ \underline{-31} \\ 71 \\ \underline{-62} \\ 93 \\ \underline{-93} \\ 0 \end{array}$$

Children should be able to solve real life problems including those with money and measures. They need to be able to make decisions about what to do with remainders after division and round up or down accordingly.