

# Division

## Concrete resources:

Arrays

Multiplication squares

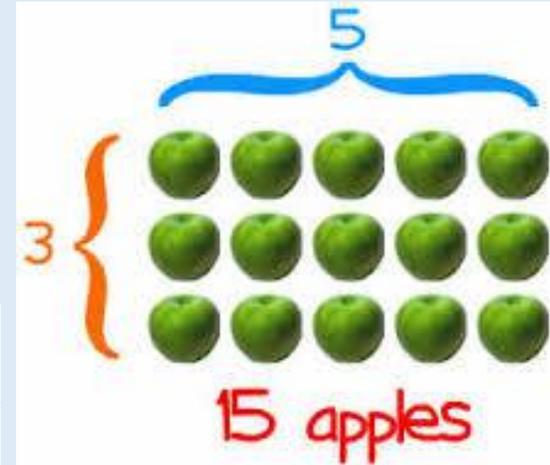
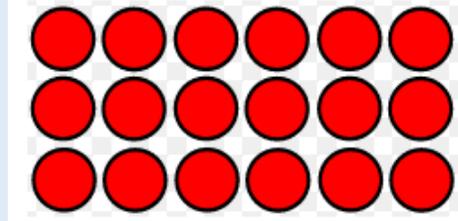
100 square

Number lines

Blank number lines

Counting stick

Place value apparatus



divided by group  
into lots of  $\div$  into groups of  
divisible remainder  
half factor

# Last but not least.....



- Many children can partition and multiply with confidence. But this is not the case for division. One reason for this may be that mental methods of division, stressing the correspondence to mental methods of multiplication, have not in the past been given enough attention.
- The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence.
- The stages building up to long division span Years 4 to 6 - first introducing  $TU \div U$ , then extending to  $HTU \div U$ , and finally  $HTU \div TU$ .

# Mental Strategies for Division

## **To divide successfully, children need to be able to:**

- partition two-digit and three-digit numbers into multiples of 100, 10 and 1
- recall multiplication and division facts to  $10 \times 10$  and recognise multiples of one-digit numbers
- know how to find a remainder working mentally - for example, find the remainder when 48 is divided by 5;
- understand and use multiplication and division as inverse operations.
- understand and use the vocabulary of division - for example in  $18 \div 3 = 6$ , the 18 is the dividend, the 3 is the divisor and the 6 is the quotient;

# Written methods for Division

**To carry out written methods of division successful, children also need to be able to:**

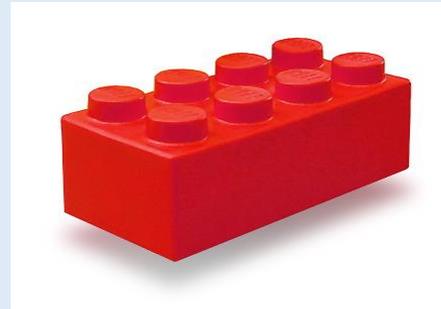
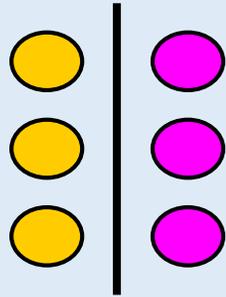
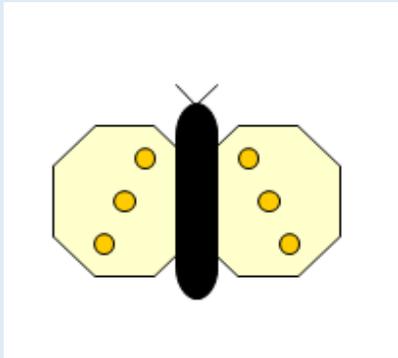
- understand division as repeated subtraction;
- estimate how many times one number divides into another - for example, how many 6s there are in 47, or how many 23s there are in 92;
- multiply a two-digit number by a single-digit number mentally;
- subtract numbers using the column method.

# Division: Reception

Early learning goal statutory requirement:

✓They solve problems, including halving and sharing.

Use pictorial representations and concrete resources to halve numbers to 10.



Begin to share quantities using practical resources, role play, stories and songs.



**Role play example:**

***It is the end of the party and the final two teddies are waiting for their party bags. Provide empty party bags and a small collection of items such as gifts, balloons and slices of cake. Ask the children to share the objects between the two bags.***

# Division: Year 1

Year 1 statutory requirement:

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

Understand division as **sharing** using concrete resources.



Pictorial representation of sharing **12 gold coins** between 2, 3 and 4 pirates!



$$12 \div 2$$



$$12 \div 3$$



$$12 \div 4$$

Begin to understand division as **grouping** using concrete resources.

12 into groups of 2

$$12 \div 2 = 6$$

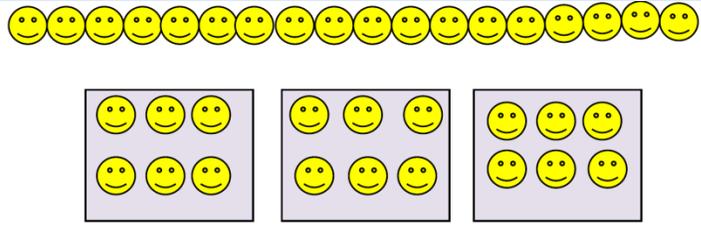


# Division: Year 2

Year 2 statutory requirement:

- ✓ Recall and use division facts for 2, 5 and 10 multiplication tables.
- ✓ Calculate mathematical statements for multiplication and division within the multiplication tables and write then using the multiplication (x), division ( ) and equals (=) signs.
- ✓ Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.
- ✓ **Find  $1/3$ ;  $1/4$ ;  $2/4$ ;  $3/4$  of a length, shape, set of objects or quantity**

Further develop understanding of difference between **sharing** and **grouping** using concrete resources.



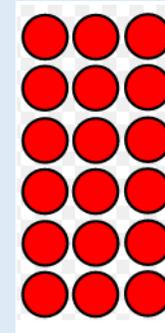
18 smiley faces shared between 3 classes.

Model division as grouping on a number line (ITP 'Grouping')



Children use numbered number lines to divide using grouping.

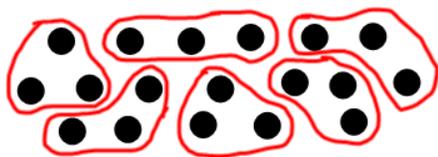
Reinforce division through the use of arrays.



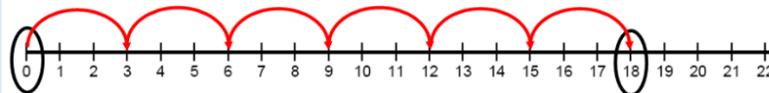
$$18 \div 3 = 6$$

$$18 \div 6 = 3$$

18 into groups of 3  
 $18 \div 3 = 6$



18 into groups of 3 = 6 groups  
18 into jumps of 3 = 6 jumps  
 $18 \div 3 = 6$



**Remember** to develop connections between fractions and division and rephrase this calculation as  $1/3$  of 18 is the same as  $18 \div 3 = 6$ .

# Division: Year 3 & 4

Year 3 statutory requirement:

- ✓ Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- ✓ Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
- ✓ Solve problems, including missing number problems, involving division including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Year 4 statutory requirement: **Note** - there isn't a statutory objective for division. However, Y4 statutory multiplication objectives are to (1) recall multiplication and division facts for multiplication tables up to  $12 \times 12$  and (2) multiply two-digit and three-digit numbers by a one-digit number using formal written layout so we will build on the connections between multiplication and division.

See video link in 'notes' to consider how to develop conceptual understanding of division using dienes.

$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

Limit numbers to NO remainders in the answer OR carried (each digit must be a multiple of the divisor).

$$\begin{array}{r} 18 \\ 4 \overline{) 732} \end{array}$$

Limit numbers to NO remainders in the final answer, but with remainders occurring within the calculation.

$$\begin{array}{r} 218 \\ 4 \overline{) 8732} \end{array}$$

Extend to 3-digit number first where the divisor can go into the first number and then progress to when the divisor cannot go into the first number.

$$\begin{array}{r} 037 \\ 5 \overline{) 1835} \end{array}$$

<https://www.youtube.com/watch?v=8IXAqXGDMXw>

# Division: Year 5

Year 5 statutory requirement:

✓ 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.

Further secure pupils' understanding of compact short division.

$$218 \div 8 =$$
$$27 \text{ r } 2$$
$$8 \overline{) 2158}$$

Extend to expressing results in different ways according to the context, including with remainders as fractions, as decimals or by rounding. For example:

- Whole number remainder =  $27 \text{ r } 2$
- Fraction remainder =  $27 \frac{2}{8} = 27 \frac{1}{4}$
- Decimal remainder =  $27 \frac{1}{4} = 27 \frac{25}{100} = 27.25$

# Division: Year 6

Year 6 statutory requirement:

✓ divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context

Continue to use compact short division to divide numbers up to 4 digits by a 1-digit whole number.

$$218 \div 8 =$$
$$27 \text{ r } 2$$
$$8 \overline{) 2158}$$

- Whole number remainder =  $27 \text{ r } 2$
- Fraction remainder =  $27 \frac{2}{8} = 27 \frac{1}{4}$
- Decimal remainder =  $27 \frac{1}{4} = 27 \frac{25}{100} = 27.25$

Use long division to divide numbers up to 4 digits by a 2-digit whole number.

$$24 \overline{) 588}$$
$$\begin{array}{r} 024 \text{ r } 12 \\ - 48 \\ \hline 108 \\ - 96 \\ \hline 12 \end{array}$$