DIVISION

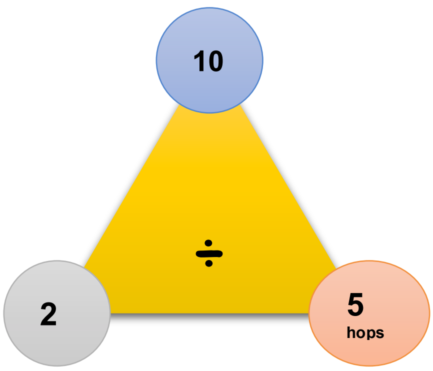
At the beginning of primary school, children have experience of sharing concrete objects. Sharing out equally will be modelled by the teacher.

For example: *Do you all want sequins?*
I'll put 5 each on your trays. Can you give everybody the same number of these? Have you got the same?
Objects are given out 1 at a time, fairly and equally.

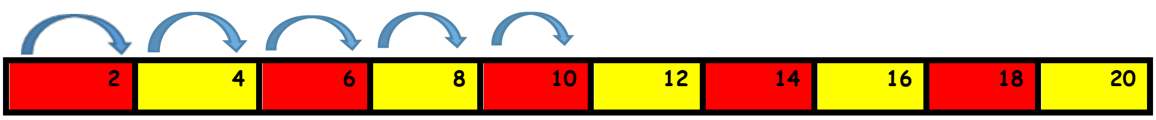
Practical folding activities, explore the concept of halving being the same as dividing by 2.

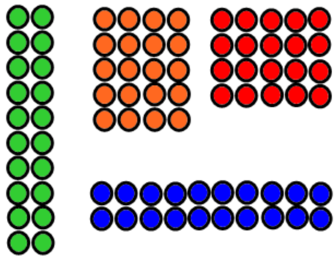
Children will continue to develop the concept that division is the **inverse** or **opposite** of multiplication.

Children will experience equal groups of objects and will use what they know about counting in 2s, 5s and 10s, to work out division calculations. They will work on practical problem solving activities involving equal sets or groups.

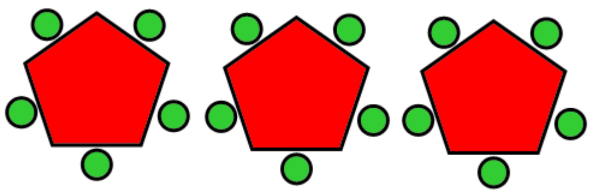


e.g. If the frog hops in 2s, how many hops will there be before he reaches 10?



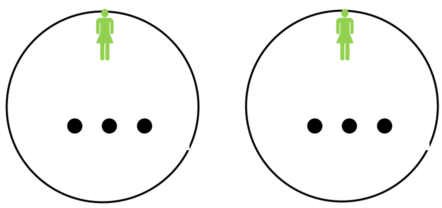


Here are 20 counters.
Arrange them in equal rows.
Is there a different way to arrange them in equal rows?



15 children sit at 3 tables. There is the same number of children at each table. How many children sit at each table?

Millie had 6 toffees, she gave half to her friend. How many toffees did they each get?

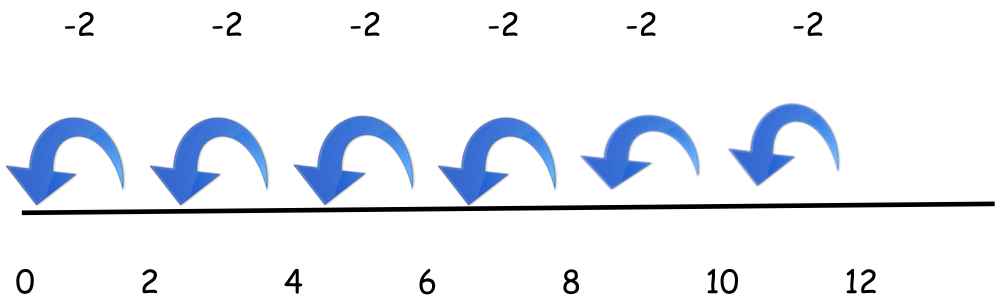


Children will experience divisions that give rise to remainders, such as:
Three friends share 16 marbles equally. How many marbles does each friend get? How many marbles are left over?

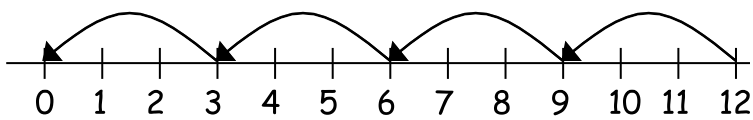
Division as repeated subtraction

They will use practical equipment or objects such as unifix cubes in different colours to answer questions such as: *How many 2s make 12?*
They will relate this to the division 12 ÷ 2.
They may also use objects or a number line to support, record or explain this.
For example, starting from 12, jump back in steps of 2, or starting with 12 counters, keep on taking away 2 counters.
Record this as **repeated subtraction** and as **division**:

12 - 2 - 2 - 2 - 2 - 2 - 2 =0
12 ÷ 2 = 6
12 divided by 2 equals 6



Show me on a number line how you could do: 12 ÷ 3 = 4



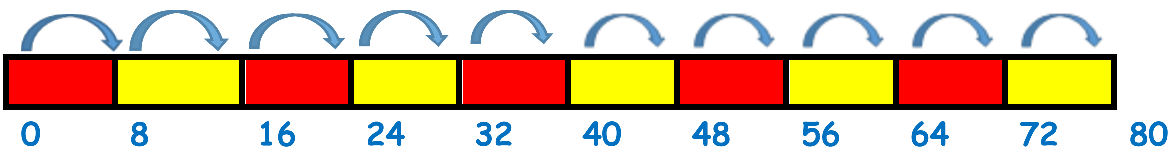
The number line will help children with interpreting division calculations such as 12 ÷ 3 as 'how many 3s make 12?'

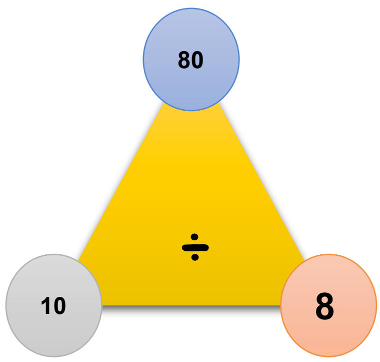
The link between x and ÷ facts is extensively emphasised at this point to ensure children are secure in their understanding, before moving on to more formal written methods.

Finding 'lots' by counting up.

Counting up in 'lots of a number – e.g. How many 8s fit into 80?

Children explain how they use equipment, objects or a number line to count up in 'lots' of a number.





What is the missing number?

80 ÷ 10 = 8

Working towards an efficient written method

- *42 crayons are divided equally between six pots. How many crayons are there in each pot?*
  42 ÷ 6
- *Three children want to buy their grandmother a present costing £1.50. They each give the same amount. How much does each child give?*
  £1.50 ÷ 3
- *An 80 cm length of ribbon is cut into four equal pieces. How long is each piece?*
  80 ÷ 4

Short division of HTU ÷ U

The short division method is recorded like this:

$$\begin{array}{r} 23 \\ 3\overline{)69} \end{array}$$

Divide 3 into the first digit - how many 3s in 6? The answer is 2 so place the 2 above the first digit. How many 3s in 9? The answer is 3, so record 3 above the second digit.

The answer is 23.

The short division method *with carrying* is recorded like this:

$$\begin{array}{r} 2\ 7 \\ 3\overline{)8\ {}^{2}1} \end{array}$$

Divide 3 into the first digit - how many 3s in 8? The answer is 2 so place the 2 above the first digit and place the remainder of 2 in front of the next digit. The next digit now reads 21. How many 3s in 21? The answer is 7, so record 7 above the second digit.

The answer is 27.

The carry digit '2' represents the 2 tens that have been exchanged for 20 ones. It is written in front of the 1 to show that 21 is to be divided by 3.

Remainders

The hundred square is used to visually reinforce the concept of a remainder.

'Where's Mully?' is a game that is played to help children master division, which is traditionally the most challenging of the four operations. He hides behind numbers in a number square and the children have to find him. The word division is never used !

eg. He's hiding behind the biggest multiple of 3

without going over 40 - he's on 39

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

The children can see visually that there is 1 left over to get to 40 , or a remainder of 1.

Dividing by 2 and 4

Children learn that $\frac{1}{2}$ of an amount is equivalent to dividing by 2.
They find $\frac{1}{4}$ of an amount by halving and halving again.
They partition the number into tens and ones for example and halve each part individually.

$\frac{1}{2}$ of 28 = 28 ÷ 2 = 14

$\frac{1}{2}$ of 20 = 10 $\frac{1}{2}$ of 8 = 4 10 + 4 = 14

Facts for the 4 times table can be derived from 2 times tables facts.

e.g. 3 x 4 = 3 x 2 doubled 6 x 4 = 6 x 2 doubled

Children then move towards dividing longer numbers by a single digit.

Example 1

For 1176 ÷7, we would ask, 'How many lots of 7 go into 1176?'

$$\begin{array}{r|cccc} & & 1 & 6 & 8 \\ \hline 7 & 1 & 1 & {}_{4}7 & {}_{5}6 \end{array}$$

Step One
Divide 7 into the first digit - how many 7s in 1? It is not possible so now divide into the first two digits.
How many 7s in 11? The answer is 1 so record 1 on the answer line at the top (above the second digit) and place the remainder of 4 in front of the next digit, making it 47.
Step Two
Now ask, how many 7s in 47? The answer is 6, so record 6 on the top and place the remainder of 5 in front of the next digit, making it 56.
Step Three
Now ask, how many 7s in 56?. The answer is 8 so record 8 on top.
The answer is 168.

Example 2

Sometimes when we divide by a whole number, the answer has a **remainder**.

'How many 4s in 394?' 394 ÷4

$$\begin{array}{r|l} & \;\;\;9\;\;8\;\;\;{}^{r\,1} \\ \hline 4 & 3\;\;9\;\;{}_{3}3 \end{array}$$

Step One

Divide 4 into the first digit - how many 4s in 3? It is not possible so now divide into the first two digits.

How many 4s in 39? The answer is 9 so record 9 on the answer line at the top (above the second digit) and place the remainder of 3 in front of the next digit, making it 33.

Step Two

Now ask 'How many 4s in 33? The answer is 8, so record 8 on the top and place the remainder of 1 at the end of the answer line as shown above.

As the children progress through second level, they will be encouraged to show their remainder as a fraction to start with, then as a decimal, possibly using a calculator as an aid.

$$\begin{array}{r|l} & \;\;\;9\;\;8\;\;\;{}^{r\,1} \\ \hline 4 & 3\;\;9\;\;{}_{3}3 \end{array}$$

The remainder of 1 can be shown as 1 out of 4 (the number you are dividing by) or $\frac{1}{4}$.

$\frac{1}{4}$ can then be converted to a decimal. $\frac{1}{4} = 0.25$

The answer can be shown as 98 r 1 or $98\frac{1}{4}$ or 98.25

Long Division

For the calculation 240 ÷ 16, children can apply their Learn Its and other mental calculation strategies such as multiplying by 10 or 100 and doubling and halving.

They learn to take off chunks of a sensible size until the full amount has been shared out.

$$
\begin{array}{rrrr|l}
 & & 1 & 5 & \\
\cline{2-4}
16 & \multicolumn{1}{|r}{2} & 4 & 0 & \\
- & 1 & 6 & 0 & 10 \quad (16 \times 10) \\
\cline{2-4}
 & & 8 & 0 & \\
- & & 8 & 0 & 5 \quad (16 \times 5) \\
\cline{2-4}
 & & & 0 &
\end{array}
$$

Step One

How many 16s go into 240? Can I share out 10 lots of 16? Yes I can because 16 x 10 = 160.

Step Two

Record 10 lots (16 x 10) next to the 160.

Step Three

Subtract 160 from 240 to work out how much still needs to be shared out.

Step Four

Now ask 'How many 16s in 80? If 10 lots = 160, then 5 lots must be half of 160 = 80.

Step Five

Record 5 lots (16 x 5) next to the 80.

Step Six

Subtract 80 from the remaining 80. There is now zero left to share out.

Step Seven

Add together the 10 lots and 15 lots to give a final answer of 15. Place this on the answer line on the top.