# PROGRESSION THROUGH CALCULATION FOR DIVISION

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 mental calculation strategies taught will continue to be used and developed and should not be replaced by written methods.*

The following stages are standards that we expect the majority of our children to achieve.

Step 1

Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.
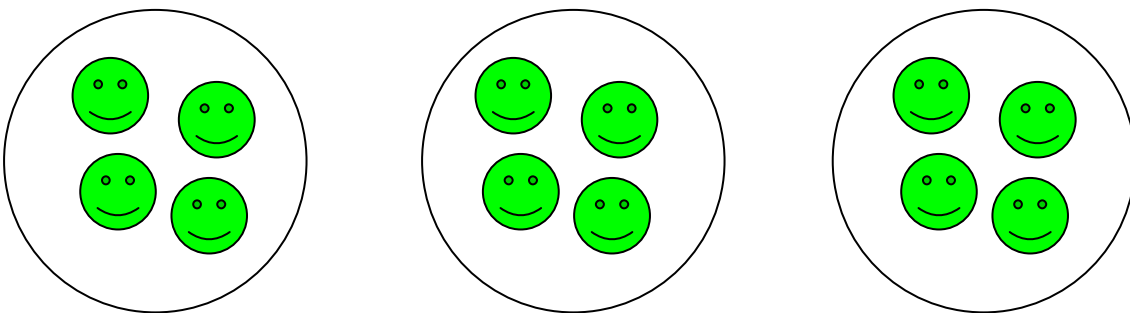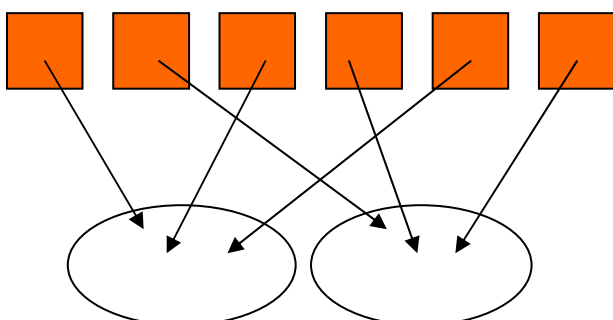

Step 2

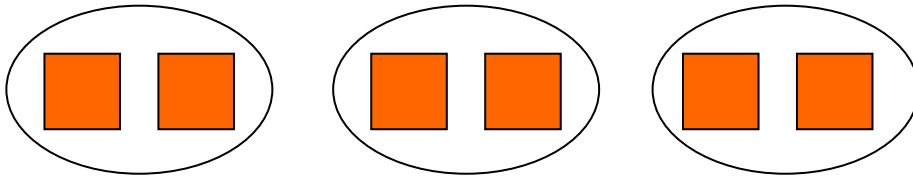Children will develop their understanding of division and use jottings to support calculation:

➢ Sharing Equally

6 sweets shared between 2 people, how many do they get each?
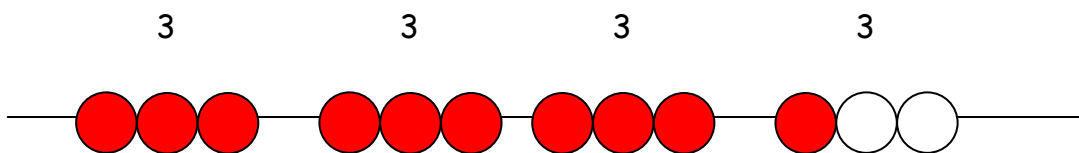
> Grouping or repeated subtraction

There are 6 sweets, how many people can have 2 sweets each?

Step 3

> Repeated subtraction using a numbered line or bead string or bead bar.

$12 \div 3 = 4$

0   1   2   3   4   5   6   7   8   9   10   11   12

3   3   3   3
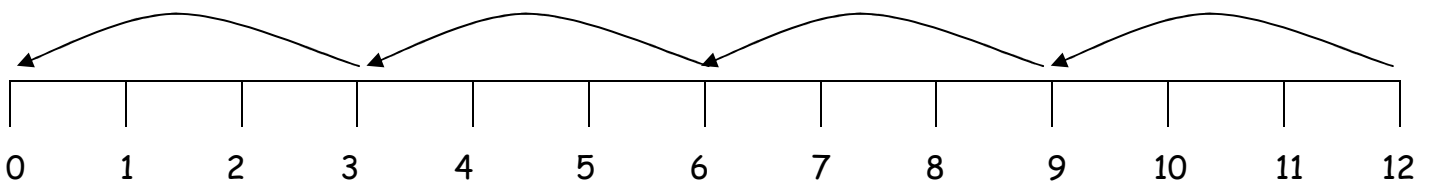
The bead string can help children with interpreting division calculations such as $10 \div 3$ as 'how many 3s make 10?'

> Using symbols to stand for unknown numbers to complete equations using inverse operations.

$\square \div 2 = 4$ $20 \div \triangle = 4$ $\square \div \triangle = 4$

Step 4

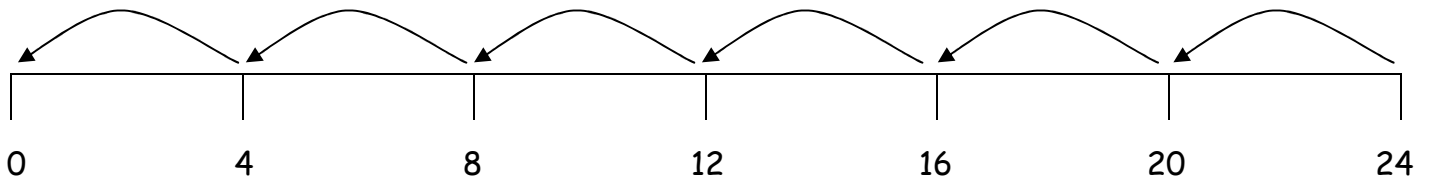Ensure that a lot of emphasis from this point onwards is on grouping rather than sharing.

Children will continue to use:

➢ Repeated subtraction using a number line

24 ÷ 4 = 6

| 0 | 4 | 8 | 12 | 16 | 20 | 24 |

➢ Children should also move onto calculations involving remainders

13 ÷ 4 = 3 r 1

r 1   -4   -4   -4

| 0 | 1 | 5 | 9 | 13 |
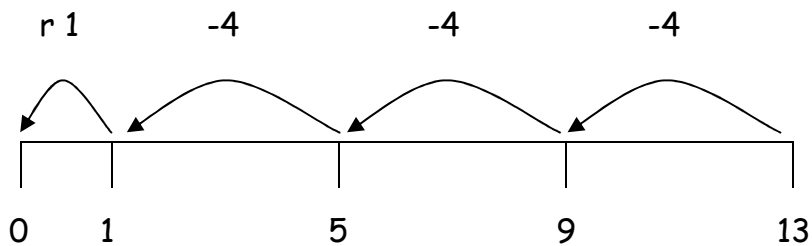
Step 5

➢ Vertical method (Chunking)

 - Short division TU ÷ U

72 ÷ 3

```
3 | 7  2
  -  3  0      3  ×  10
  ─────────
     4  2
  -  3  0      3  ×  10
  ─────────
     1  2
  -     6      3  ×  2
  ─────────
        6
  -     6      3  ×  2
  ─────────
        0
```

Answer: 24

Then help the children become more efficient by using their times tables knowledge

72 ÷ 3

```
3 | 7  2
  -  3  0      3  ×  10
     4  2
  -  3  0      3  ×  10
     1  2
  -  1  2      3  ×  4
        0                    Answer:  24
```

Any remainders should be shown as integers, i.e. 14 remainder 2 or 14 r 2.

Children need to be able to decide what to do after division and round up and down accordingly – this will depend on the context of the problem.

For example:

I have 62p. Sweets are 8p each. How many can I buy?
Answer: 7 (the remaining 6p is not enough to buy another sweet).

Apples are packed into boxes of 8. There are 62 apples. How many boxes are needed?
Answer: 8 (the remaining 6 apples still need to be placed into a box).

Children will continue to use written methods to solve short division TU ÷ U.

Children need to start to subtract larger multiples of the divisor.

- Short division (Chunking) HTU ÷ U

196 ÷ 6

```
6 | 1  9  6
  -  1  8  0      6  ×  30
        1  6
  -     1  2      6  ×  2
           4                 Answer:  32 r 4
```

- Long Division (Chunking) HTU ÷ TU

972 ÷ 36

```
              2   7
    3   6 | 9   7   2
        -   7   2   0      36  x  20
            2   5   2
        -   1   8   0      36  x  5
                7   2
                7   2      36  x  2
                    0
```

Any remainders should be shown as fractions, i.e. if the children were dividing 32 by 10; the answer should be shown as 3 2/10 which could be written as 3 1/5 in its simplest term.

- Using decimals (Chunking)

87.5 ÷ 7

```
          1   2  .  5
    7 | 8   7  .  5
    -   7   0  .  0      7  x  10
        1   7  .  5
        1   4  .  0      7  x  2
            3  .  5
            3  .  5      7  x  0.5
                0
```

Children need to be able to decide what to do after division and round up and down accordingly – this will depend on the context of the problem.

Step 6

> ➢ Formal Method

- Short Division TU ÷ U

72 ÷ 3

$$
\begin{array}{r}
2\ \ 4 \\
\hline
3\ \overline{|\ 7\ \ {}^{1}2}
\end{array}
$$

- Short Division TU ÷ U with remainders

71 ÷ 4

$$
\begin{array}{r}
1\ \ 7\ \ r\ 3 \\
\hline
4\ \overline{|\ 7\ \ {}^{3}1}
\end{array}
$$

Children should:

- Be able to divide numbers with at least HTU ÷ U
- Use this method to divide decimals

For Example:

87.5 ÷ 7

$$
\begin{array}{r}
1\ \ 2\ \ .\ \ 5 \\
\hline
7\ \overline{|\ 8\ \ {}^{1}7\ \ .\ \ {}^{3}5}
\end{array}
$$

67.5 ÷ 6

$$
\begin{array}{r}
1\ \ 1\ \ .\ \ 2\ \ 5 \\
\hline
6\ \overline{|\ 6\ \ 7\ \ .\ \ {}^{1}5\ \ {}^{3}0}
\end{array}
$$

Children need to be able to decide what to do after division and round up and down accordingly – this will depend on the context of the problem.

By the end of Year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.

Children should not go onto the next stage if:
   1. they are not ready.
   2. they are not confident.

Children should be encouraged to approximate their answers before calculating. Children should be encouraged to check their answers after calculation using an appropriate strategy.