PROGRESSION THROUGH CALCULATIONS FOR DIVISION

MENTAL CALCULATIONS
(ongoing)
These are a **selection** of mental calculation strategies:

Doubling and halving
Knowing that halving is dividing by 2

Deriving and recalling division facts

Tables should be taught everyday from Y1 onwards, either as part of the mental oral starter or other times as appropriate within the day.

Year 1	2 times table	
	5 times table	Counting in
	10 times table	

Year 2	2 times table	
	3 times table	
	5 times table	Counting in 3s.
	10 times table	Recall of 2s, 5s & 10s.

Year 3	2 times table	
	3 times table	
	4 times table	Counting in 4s, 8s, 50s & 100s.
	5 times table	Recall of 3s, 4s & 8s.
	6 times table	
	8 times table	
	10 times table	

Year 4	Counting in 6s, 7s, 9s, 25s, 1000s.
	Derive and recall all division facts up to 12 x 12

Using and applying division facts
Children should be able to utilise their tables knowledge to derive other facts.
e.g. If I know 3 x 7 = 21, what else do I know?
30 x 7 = 210, 300 x 7 = 2100, 3000 x 7 = 21 000, 0.3 x 7 = 2.1 etc

Dividing by 10 or 100
Knowing that the effect of dividing by 10 is a shift in the digits one place to the right.
Knowing that the effect of dividing by 100 is a shift in the digits two places to the right.

Use of factors

378 ÷ 21   378 ÷ 3 = 126   378 ÷ 21 = 18
            126 ÷ 7 = 18

Use related facts

Given that 1.4 x 1.1 = 1.54
What is 1.54 ÷ 1.4, or 1.54 ÷ 1.1?

MANY MENTAL CALCULATION STRATEGIES WILL CONTINUE TO BE USED. THEY ARE NOT REPLACED BY WRITTEN METHODS.

THE FOLLOWING ARE STANDARDS THAT WE EXPECT THE MAJORITY OF CHILDREN TO ACHIEVE.

YR and Y1

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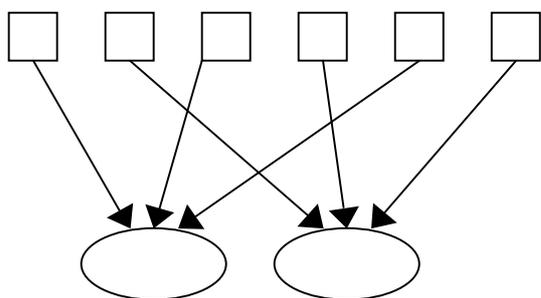They will count in 2s and 10s and later in 5s.

Y2

Children will develop their understanding of division and use jottings to support calculation
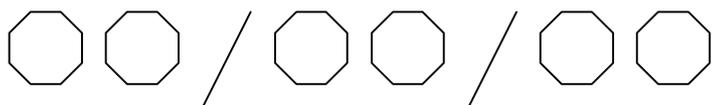
✓ **Sharing equally**

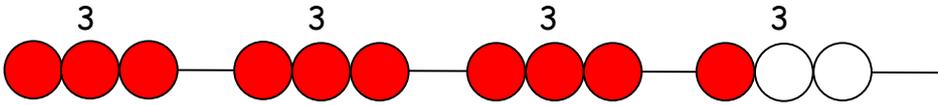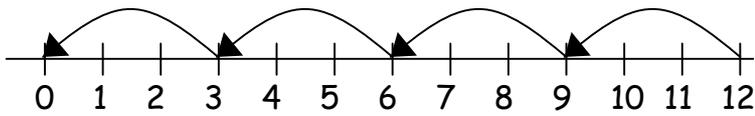6 sweets shared between 2 people, how many do they each get?

✓ **Grouping or repeated subtraction**

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

✓ **Repeated subtraction using a number line or bead bar**

12 ÷ 3 = 4

The bead bar will help children with interpreting division calculations such as 10 ÷ 5 as 'how many 5s make 10?'

✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

□ ÷ 2 = 4   20 ÷ △ = 4   □ ÷ △ = 4
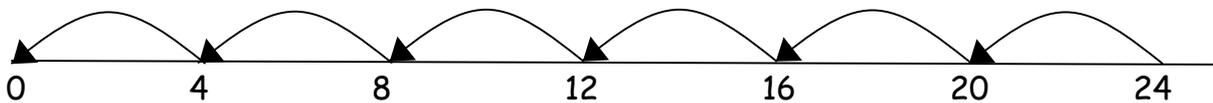
Y3

Ensure that the emphasis in Y3 is on grouping rather than sharing.

Children will continue to use:
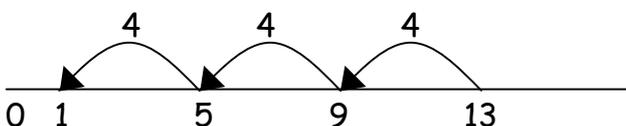
✓ **Repeated subtraction using a number line**

Children will use an empty number line to support their calculation.

24 ÷ 4 = 6

Children should also move onto calculations involving remainders.
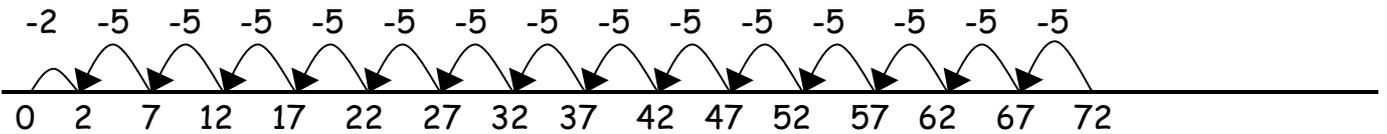
13 ÷ 4 = 3 r 1

✓ **Using symbols to stand for unknown numbers to complete equations using inverse operations**

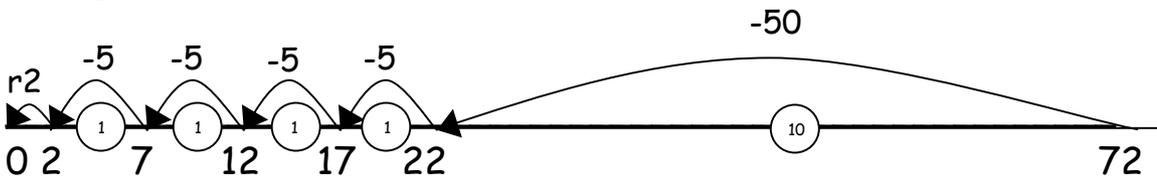$26 \div 2 = \square$ $\qquad$ $24 \div \triangle = 12$ $\qquad$ $\square \div 10 = 8$

Children will develop their use of repeated subtraction to be able to subtract multiples of the divisor. Initially, these should be multiples of 10s, 5s, 2s and 1s – numbers with which the children are more familiar, moving onto multiples of 3s and 8s.

$72 \div 5$

-2	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5

0 2 7 12 17 22 27 32 37 42 47 52 57 62 67 72

Moving onto:

-50

r2 -5 -5 -5 -5

0 2   7   12   17   22   10   72
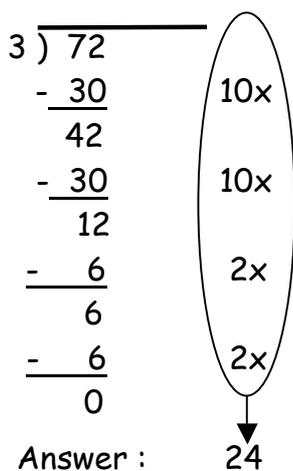
Then onto the vertical method:

Short division TU ÷ U - **Children should estimate the answer before carrying out the calculation**

Chunking

$72 \div 3$

```
  3 ) 72
    - 30      10x
      42
    - 30      10x
      12
    -  6       2x
       6
    -  6       2x
       0
  Answer :    24
```
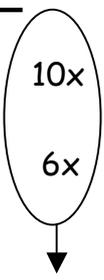
Year 4

Developing on from the year 3 vertical method, children should subtract other multiples.

96 ÷ 6   **Children should estimate the answer before carrying out the calculation**

```
           1 6
    ┌─────────
  6 )  96
      - 60        10x
        36
      - 36         6x
         0
```

Answer :   16

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 or down accordingly. They should make sensible decisions about rounding up or down after division. For example 62 ÷ 8 is 7 remainder 6, but whether the answer should be rounded up to 8 or rounded down to 7 depends on the context.

e.g. 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)

Y5

Children can start to subtract larger multiples of the divisor, e.g. 30x

Short division HTU ÷ U - Children should estimate the answer before carrying out the calculation

196 ÷ 6

```
          32 r 4
    ┌──────────
  6 )  196
      - 180       30x
         16
      -  12        2x
          4
```

Answer :   32   remainder 4   or   32 r 4

Any remainders should be shown as integers, i.e. 32 remainder 4 or 32 r 4 or fractions 32 $^4/_6$ or 32 $^2/_3$.

Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division. For example 240 ÷ 52 is 4 remainder 32, but whether the answer should be rounded up to 5 or rounded down to 4 depends on the context.

Leading onto
Short division   - **Children should estimate the answer before carrying out the**
Bus Stop Method   **calculation**

$$
\begin{array}{r}
1\ \ 2\ \ 5 \\
\hline
7)\ 8\ ^17\ ^35
\end{array}
$$
       Answer 125

Y6

Children will continue to use written methods to solve short division TU ÷ U, HTU ÷ U and dividing decimal numbers by a single digit.

Short division
Bus Stop Method   - **Children should estimate the answer before carrying out the**
                  calculation

$$
\begin{array}{r}
1\ \ 2\ .\ 5 \\
\hline
7)\ 8\ ^17\ .\ ^35
\end{array}
$$
       Answer 12.5

Long division HTU ÷ TU - Children should estimate the answer before carrying out the
                              calculation

972 ÷ 36

$$
\begin{array}{r}
27 \\
\hline
36\ )\ \ 972 \\
-\ \ 720 \quad 20x \\
\hline
252 \\
-\ \ 252 \quad 7x \\
\hline
0
\end{array}
$$

Answer :   27

Leading to the most compact version of long division

$$\begin{array}{r} 017\text{ r }10 \\ 25\overline{\smash{\big)}435} \\ 0\downarrow \\ \overline{43} \\ 25\downarrow \\ \overline{185} \\ 175 \\ \overline{010} \end{array}$$

Any remainders should be shown as fractions, i.e. in the example above, dividing 435 by 35, the answer should be shown as 17 $^{10}/_{25}$ which could then be simplified to 17 $^{2}/_{5}$. It could also be converted to a decimal answer 17.4.

Extend to decimals with up to two decimal places. Children should know that decimal points line up under each other.

Children need to be able to decide what to do after division and round up or down accordingly. They should make sensible decisions about rounding up or down after division. For example 240 ÷ 52 is 4 remainder 32, but whether the answer should be rounded up to 5 or rounded down to 4 depends on the context. If this was 240 people on a trip and coaches sat 52 people, then 5 coaches would be needed, not 4 as this would mean 32 people would not have a seat.

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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 be made to 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.
Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.