

# PROGRESSION THROUGH CALCULATIONS FOR DIVISION

## MENTAL CALCULATIONS

(ongoing)

These are a **selection** of mental calculation strategies:

See NNS Framework Section 5, pages 52-57 and Section 6, pages 58-65

### Doubling and halving

Knowing that halving is dividing by 2

### Deriving and recalling division facts

*Tables should be taught everyday from Y2 onwards, either as part of the mental oral starter or other times as appropriate within the day.*

Year 2      2 times table  
              5 times table  
              10 times table

Year 3      2 times table  
              3 times table  
              4 times table  
              5 times table  
              6 times table  
              10 times table

Year 4      Derive and recall division facts for all tables up to  $10 \times 10$

Year 5 & 6   Derive and recall quickly division facts for all tables up to  $10 \times 10$

### Using and applying division facts

Children should be able to utilise their tables knowledge to derive other facts.

e.g. If I know  $3 \times 7 = 21$ , what else do I know?

$30 \times 7 = 210$ ,  $300 \times 7 = 2100$ ,  $3000 \times 7 = 21\ 000$ ,  $0.3 \times 7 = 2.1$  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

$378 \div 21$        $378 \div 3 = 126$                        $378 \div 21 = 18$   
                       $126 \div 7 = 18$

**Use related facts**

Given that  $1.4 \times 1.1 = 1.54$

What is  $1.54 \div 1.4$ , or  $1.54 \div 1.1$ ?

*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.

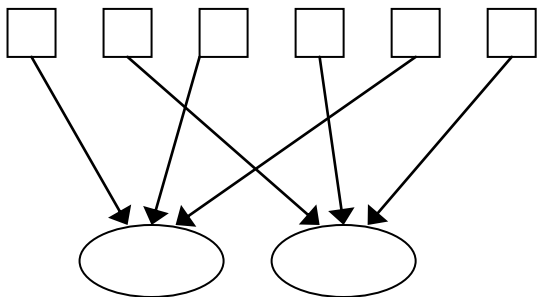


## Y2

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

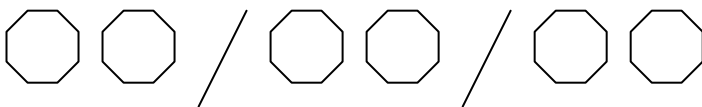
### ✓ **Sharing equally**

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



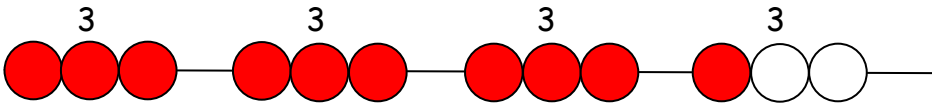
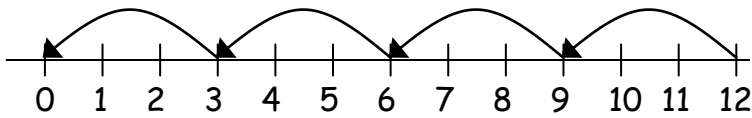
### ✓ **Grouping or repeated subtraction**

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



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

$$12 \div 3 = 4$$



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

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

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

**Y3**

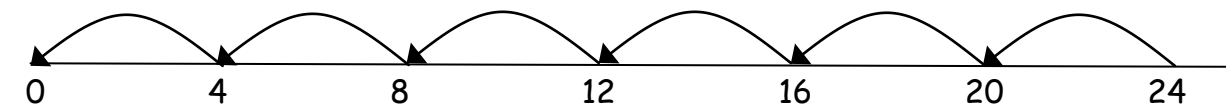
Ensure that the emphasis in Y3 is on grouping rather than sharing.

Children will continue to use:

✓ **Repeated subtraction using a number line**

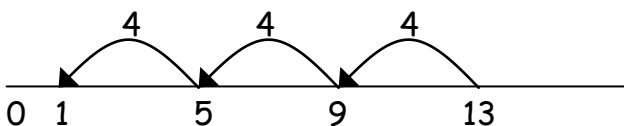
Children will use an empty number line to support their calculation.

$$24 \div 4 = 6$$



Children should also move onto calculations involving remainders.

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



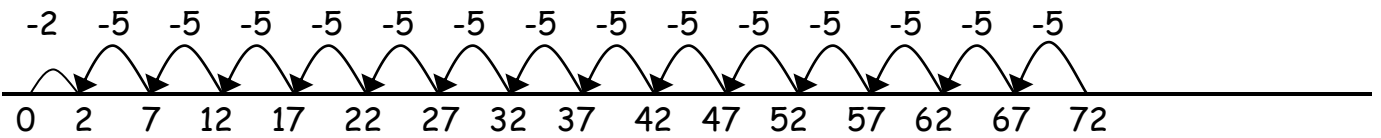
✓ Using symbols to stand for unknown numbers to complete equations using inverse operations

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

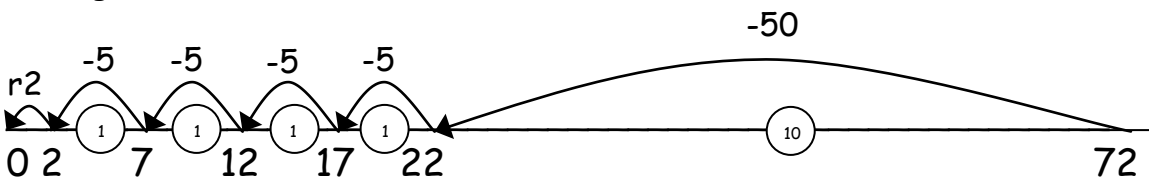
**Y4**

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.

$72 \div 5$



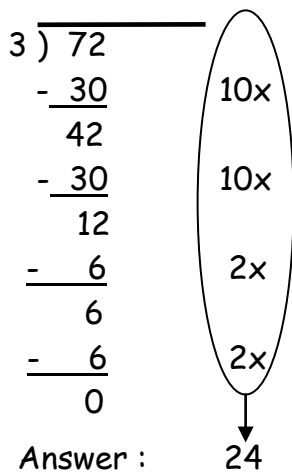
Moving onto:



Then onto the vertical method:

**Short division  $TU \div U$**

$72 \div 3$



Leading to subtraction of other multiples.

$$96 \div 6$$

$$\begin{array}{r} 16 \\ 6 \overline{) 96} \\ \underline{- 60} \\ 36 \\ \underline{- 36} \\ 0 \end{array}$$

10x  
6x

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  $62 \div 8$  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 will continue to use written methods to solve short division  $TU \div U$ .

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

### Short division $HTU \div U$

$$196 \div 6$$

$$\begin{array}{r} 32 \text{ r } 4 \\ 6 \overline{) 196} \\ \underline{- 180} \\ 16 \\ \underline{- 12} \\ 4 \end{array}$$

30x  
2x

Answer : 32 remainder 4 or 32 r 4

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  $240 \div 52$  is 4 remainder 32, but whether the answer should be rounded up to 5 or rounded down to 4 depends on the context.

## Y6


Children will continue to use written methods to solve short division  $TU \div U$  and  $HTU \div U$ .

### Long division $HTU \div TU$

$$972 \div 36$$

$$\begin{array}{r} 27 \\ 36 \overline{) 972} \\ \underline{- 720} \\ 252 \\ \underline{- 252} \\ 0 \end{array}$$

Answer : 27



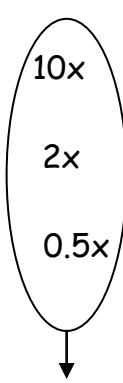
Any remainders should be shown as fractions, i.e. if the children were dividing 32 by 10, the answer should be shown as  $3 \frac{2}{10}$  which could then be written as  $3 \frac{1}{5}$  in its lowest terms.

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

$$87.5 \div 7$$

$$\begin{array}{r} 12.5 \\ 7 \overline{) 87.5} \\ \underline{- 70.0} \\ 17.5 \\ \underline{- 14.0} \\ 3.5 \\ \underline{- 3.5} \\ 0 \end{array}$$

Answer : 12.5



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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.