PROGRESSION THROUGH CALCULATIONS FOR DIVISION

MENTAL CALCULATIONS

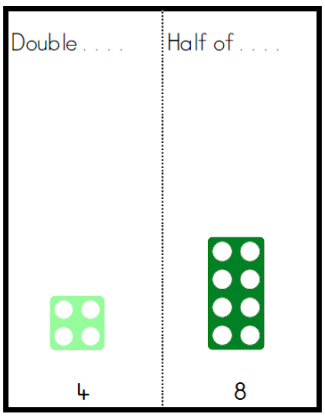
(Ongoing)

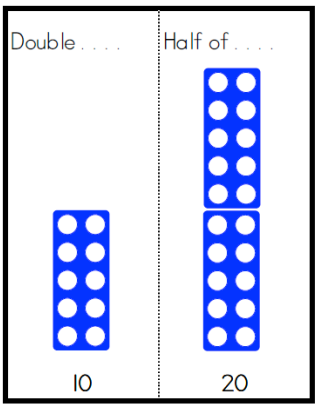
These are a **selection** of mental calculation strategies:

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

Doubling and halving

Knowing that halving is dividing by 2





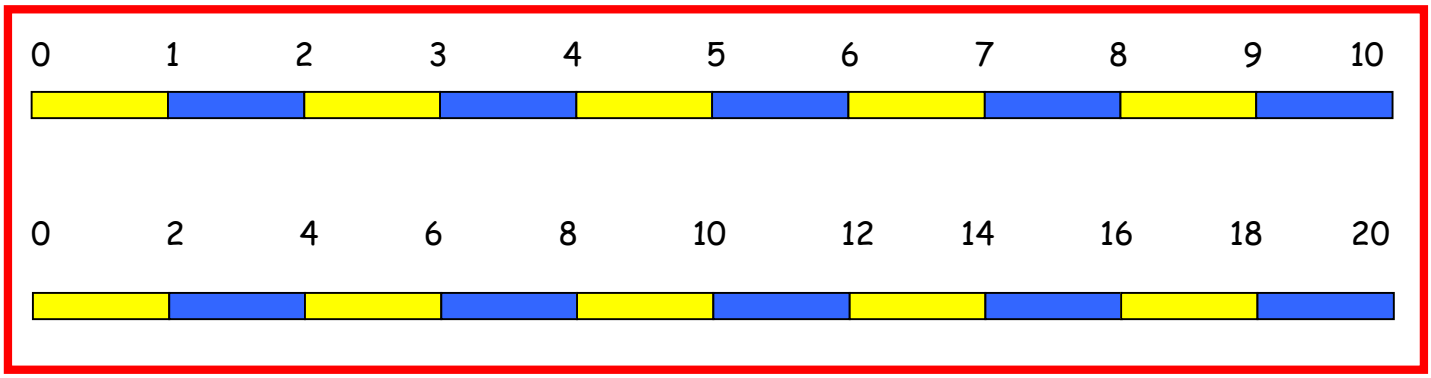
Deriving and recalling division facts

Tables should be taught regularly from Year 2 onwards, either as part of the mental oral starter or other times as appropriate within the day.

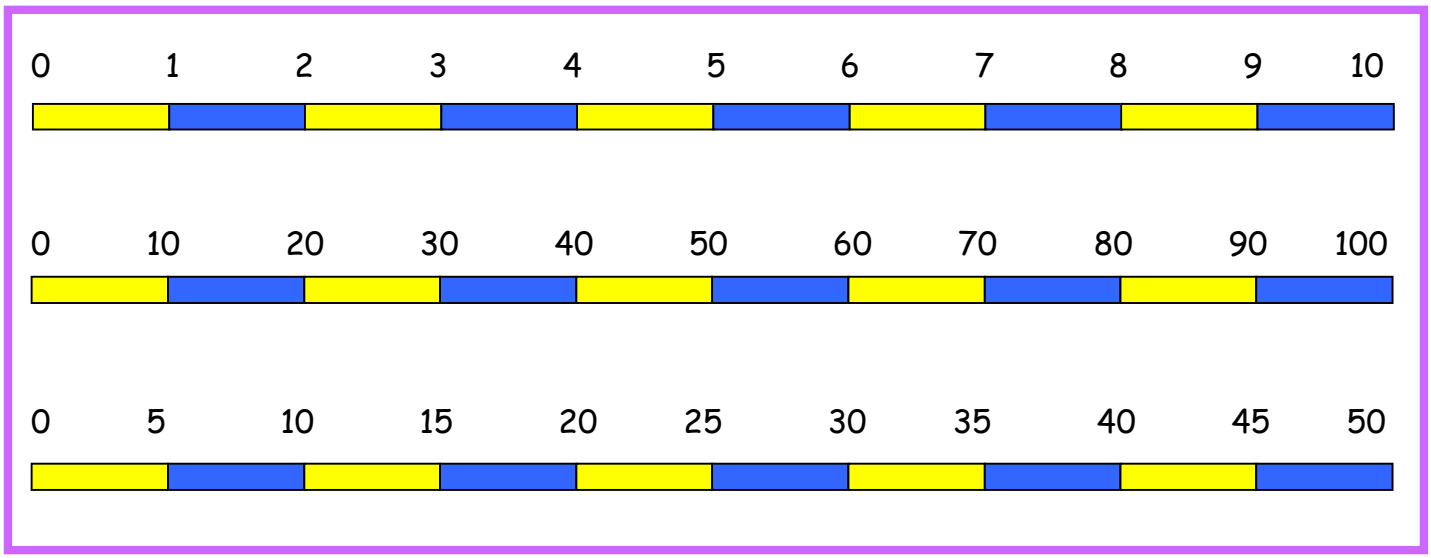
Year 2

1 times table
2 times table

1 times table
10 times table
5 times table



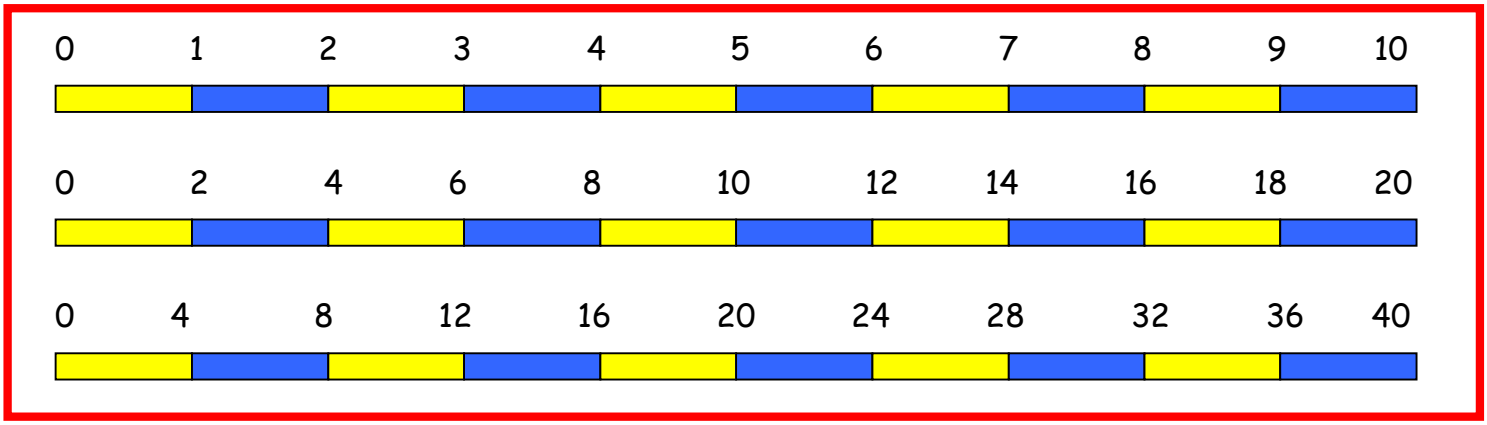
- How many 1s are there in 8?
- How many 1s are there in 3?
- How many 2s are there in 14?
- How many 2s are there in 8?



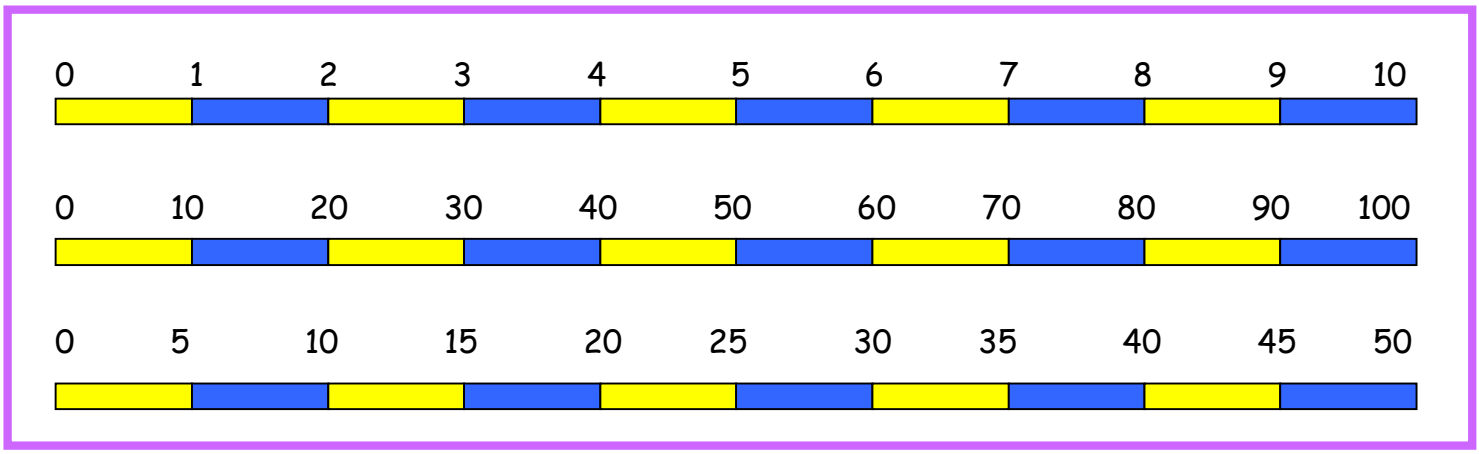
- How many 1s are there in 9?
- How many 1s are there in 5?
- How many 10s are there in 70?
- How many 10s are there in 40?
- How many 5s are there in 25?
- How many 5s are there in 50?

Year 3

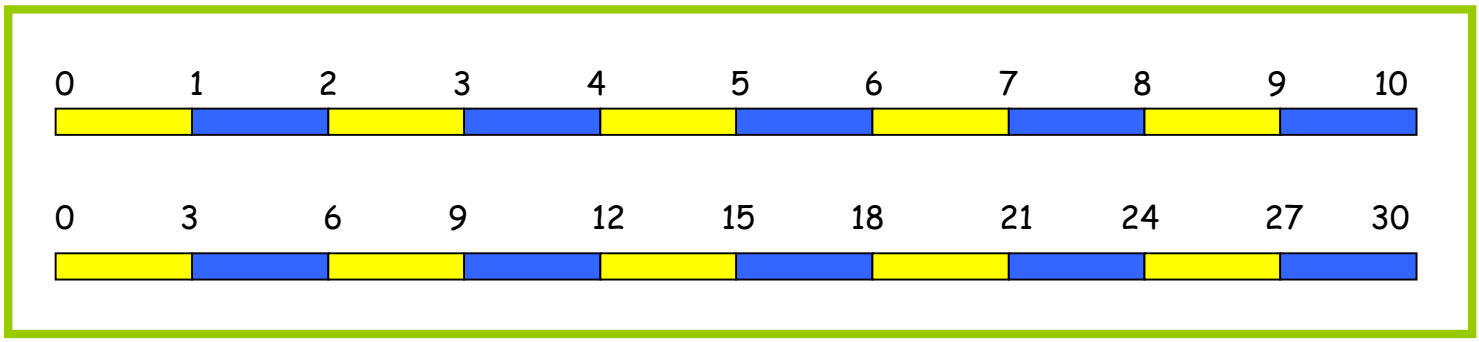
1 times table	1 times table	1 times table
2 times table	10 times table	3 times table
4 times table	5 times table	



- How many 1s are there in 6?
- How many 1s are there in 8?
- How many 2s are there in 12?
- How many 2s are there in 20?
- How many 4s are there in 16?
- How many 4s are there in 32?



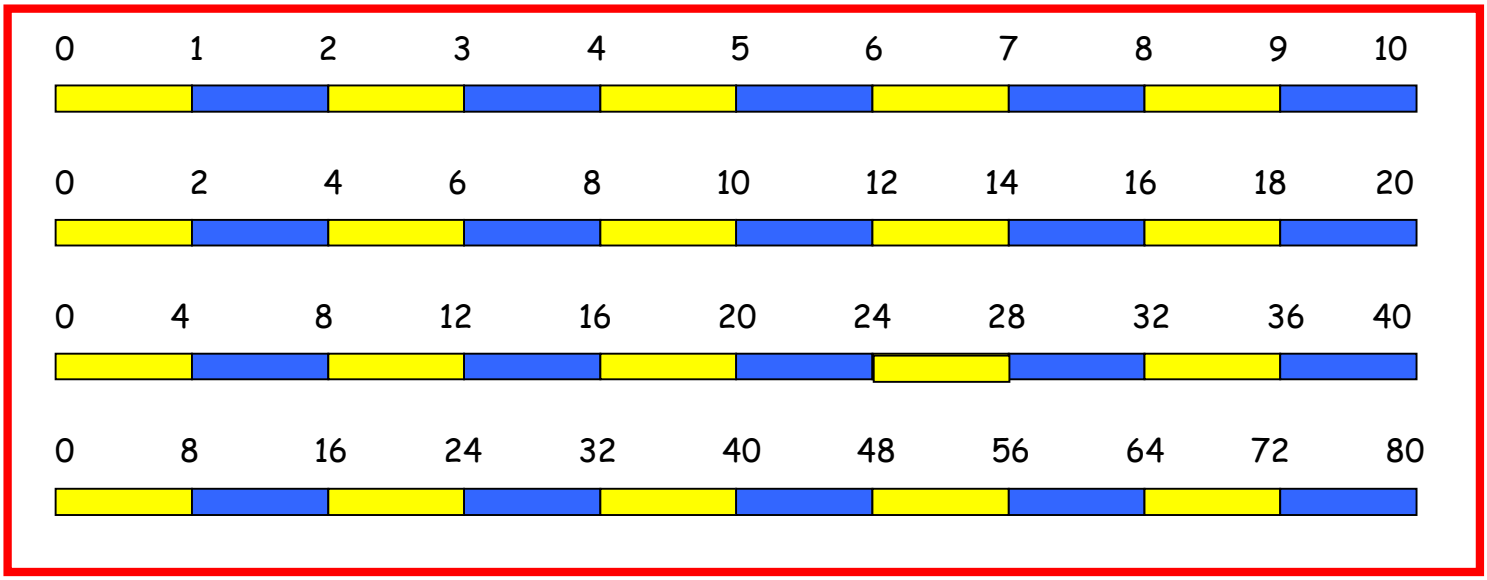
- How many 1s are there in 9?
- How many 1s are there in 5?
- How many 10s are there in 70?
- How many 10s are there in 40?
- How many 5s are there in 25?
- How many 5s are there in 50?



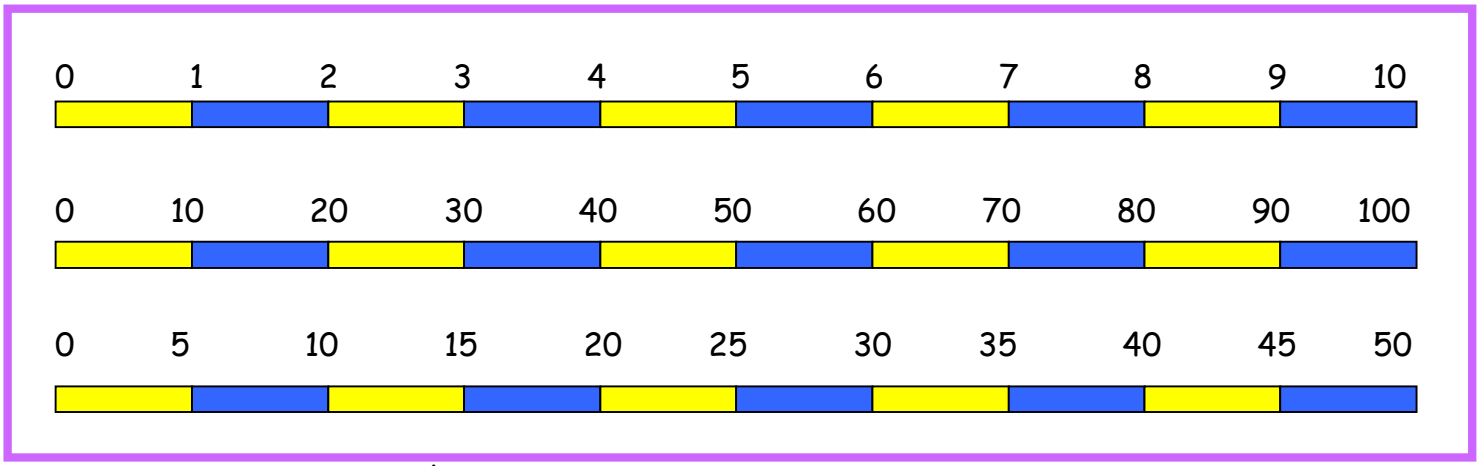
- How many 1s are there in 8?
- How many 1s are there in 2?
- How many 3s are there in 21?
- How many 3s are there in 9?

Year 4

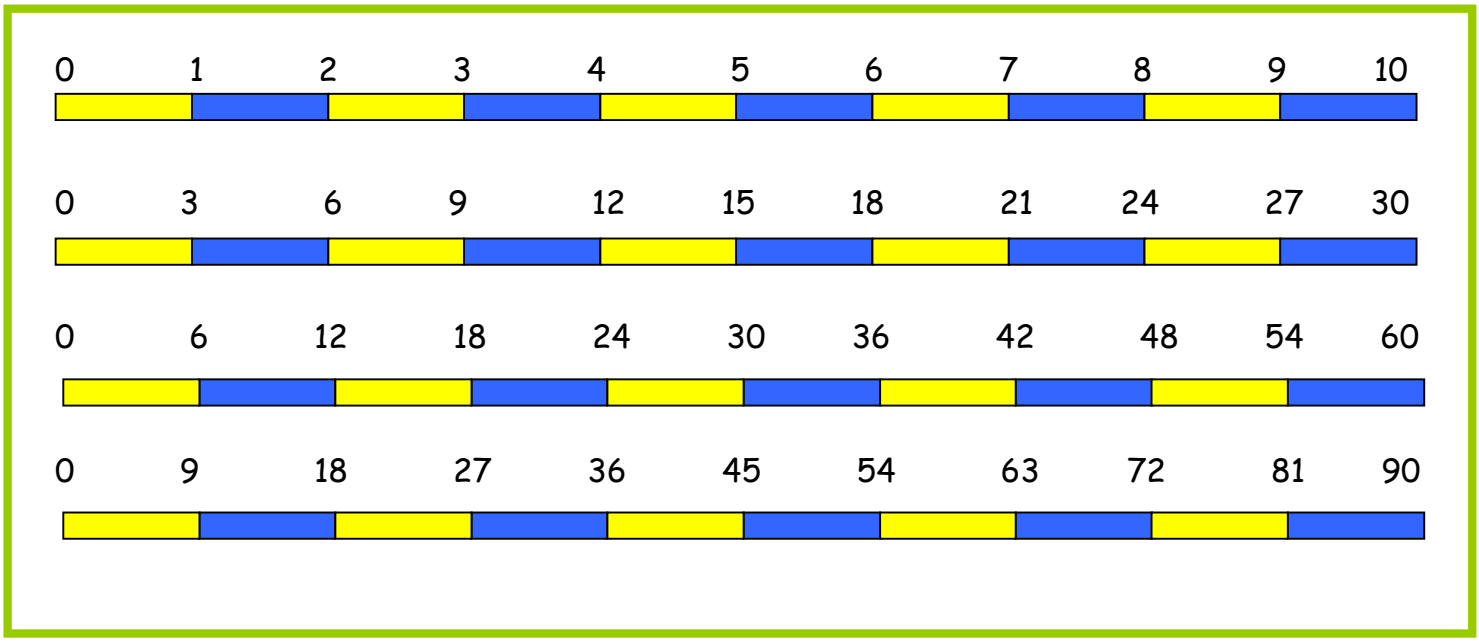
1 times table	1 times table	1 times table
2 times table	10 times table	3 times table
4 times table	5 times table	6 times table



- How many 1s are there in 6?
- How many 1s are there in 8?
- How many 2s are there in 12?
- How many 2s are there in 20?
- How many 4s are there in 16?
- How many 4s are there in 32?
- How many 8s are there in 48?
- How many 8s are there in 72?



- How many 1s are there in 9?
- How many 1s are there in 5?
- How many 10s are there in 70?
- How many 10s are there in 40?
- How many 5s are there in 25?
- How many 5s are there in 50?

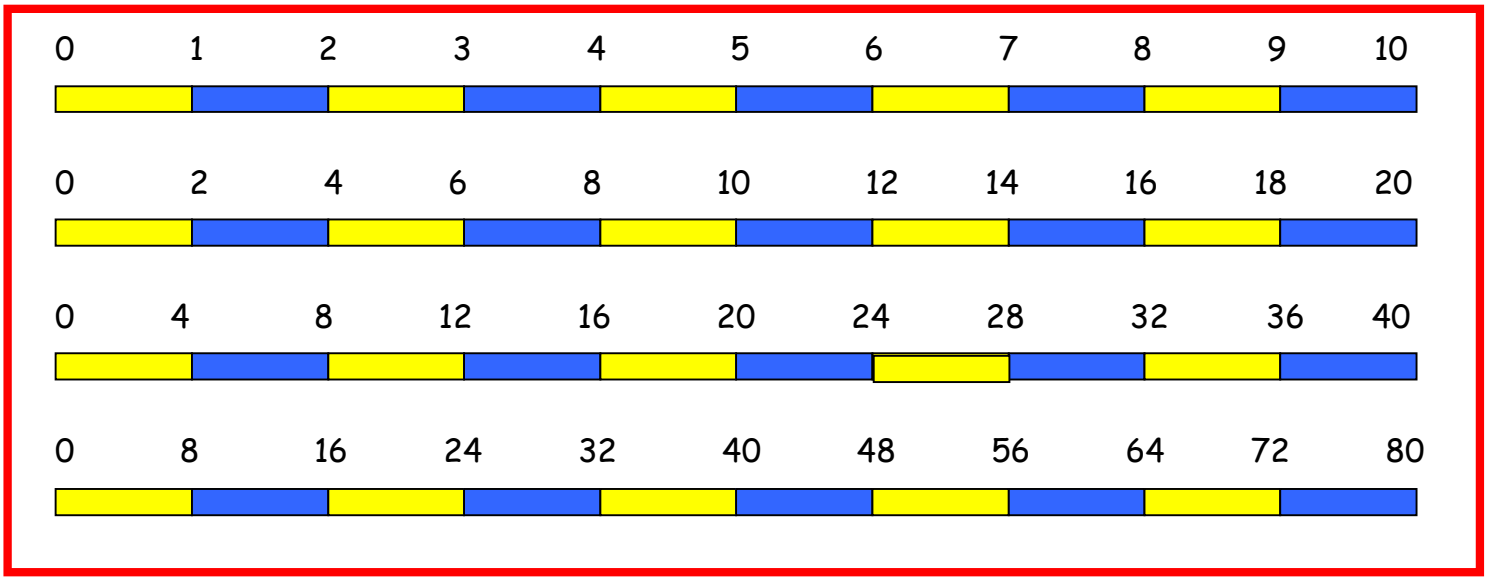


- How many 1s are there in 8?
- How many 1s are there in 2?
- How many 3s are there in 21?
- How many 3s are there in 9?
- How many 6s are there in 36?
- How many 6s are there in 54?
- How many 9s are there in 45?
- How many 9s are there in 90?

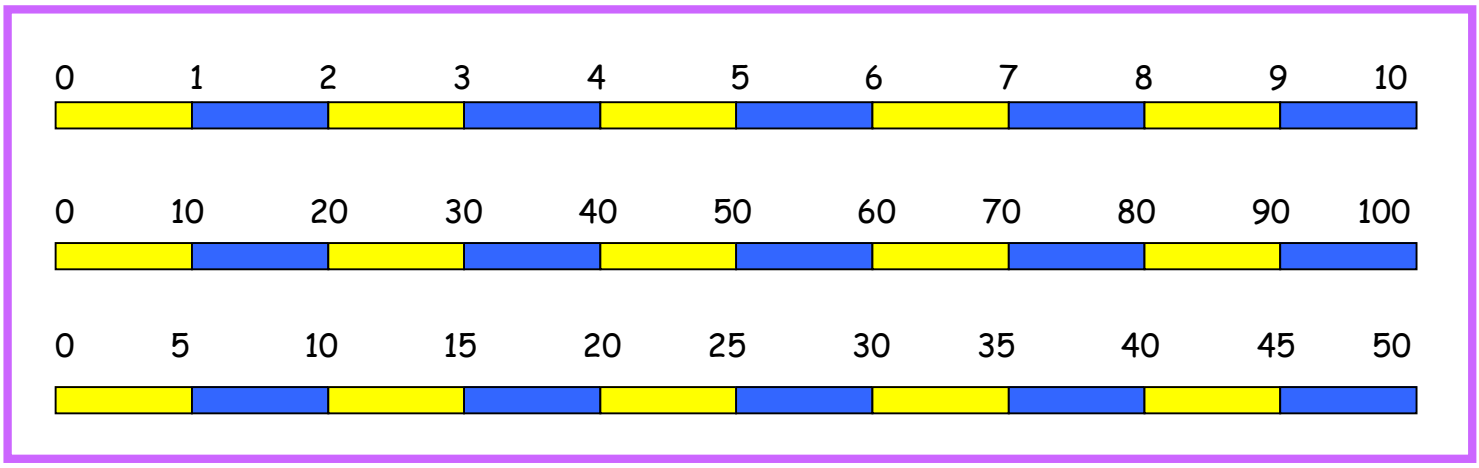
Years 5 and 6

Derive and recall quickly division facts for all tables up to 10 x 10

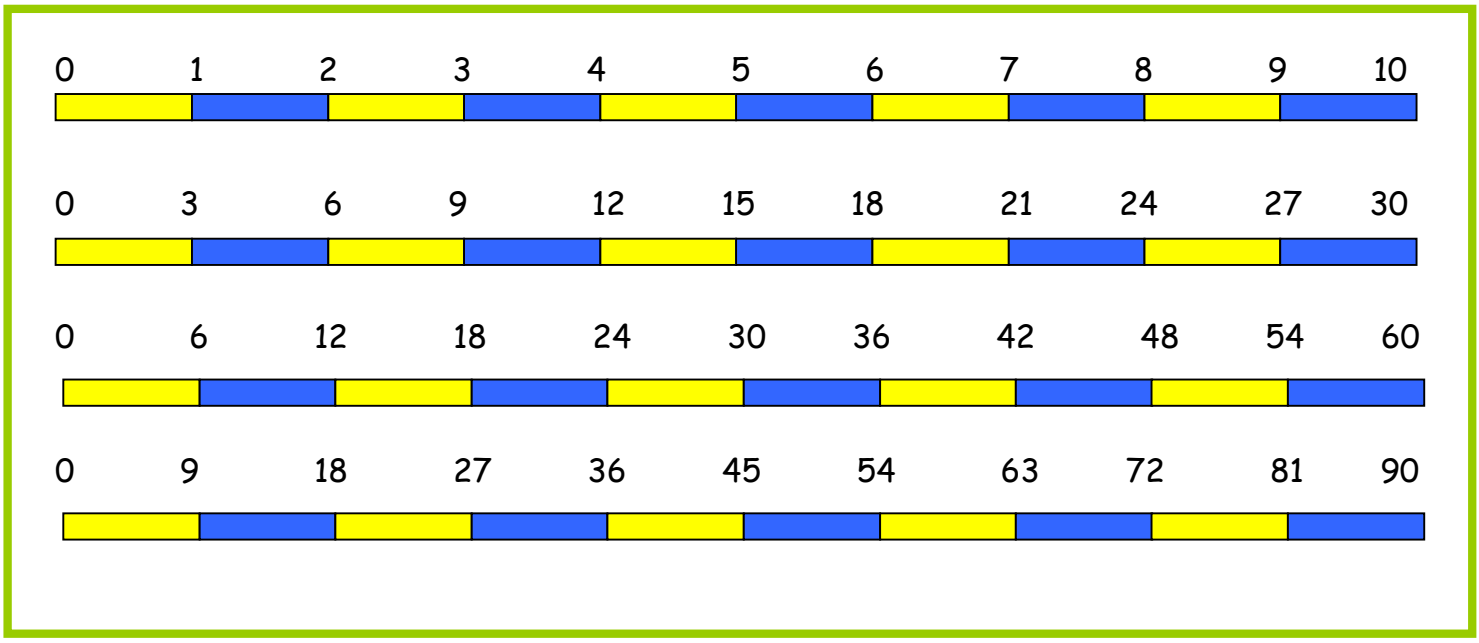
1 times table	1 times table	1 times table
2 times table	10 times table	3 times table
4 times table	5 times table	6 times table



- How many 1s are there in 6?
- How many 1s are there in 8?
- How many 2s are there in 12?
- How many 2s are there in 20?
- How many 4s are there in 16?
- How many 4s are there in 32?
- How many 8s are there in 48?
- How many 8s are there in 72?

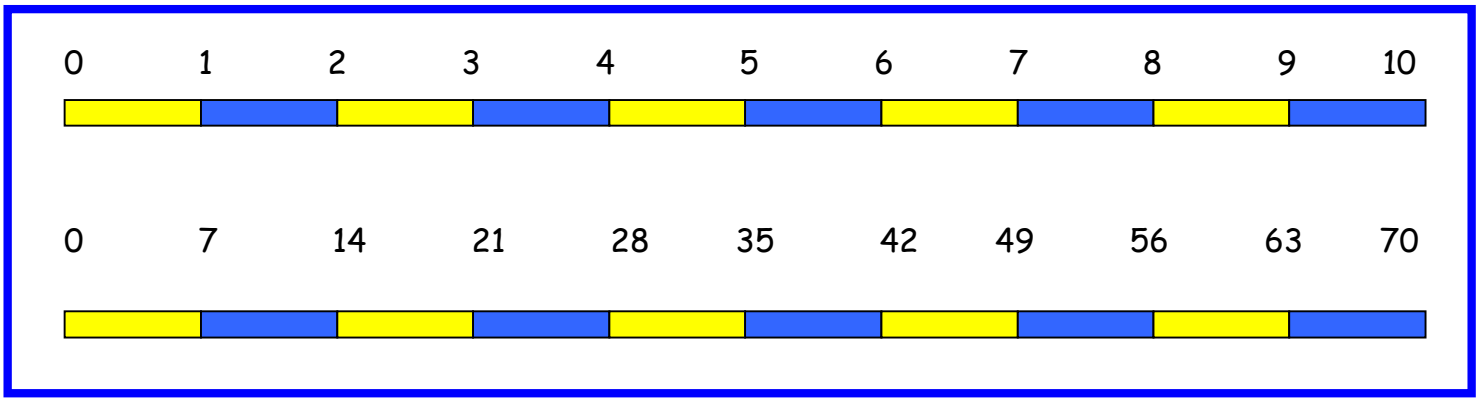


- How many 1s are there in 9?
- How many 1s are there in 5?
- How many 10s are there in 70?
- How many 10s are there in 40?
- How many 5s are there in 25?
- How many 5s are there in 50?



- How many 1s are there in 8?
- How many 1s are there in 2?

- How many 3s are there in 21?
- How many 3s are there in 9?
- How many 6s are there in 36?
- How many 6s are there in 54?
- How many 9s are there in 45?
- How many 9s are there in 90?



- How many 1s are there in 8?
- How many 1s are there in 2?
- How many 7s are there in 21?
- How many 7s are there in 49?

Using and applying division facts

Pupils 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 = 3 x 7 x 10 =210

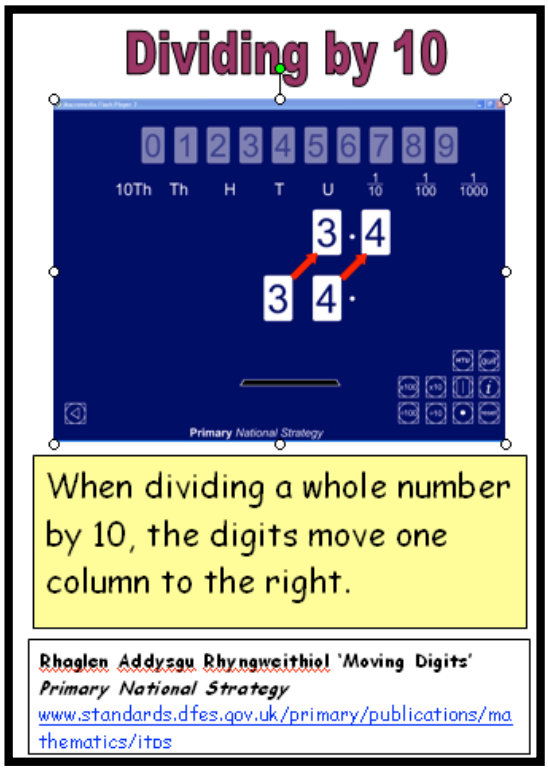
300 x 7 = 3 x 7 x 10 x 10 = 3 x 7 x 100 = 2100

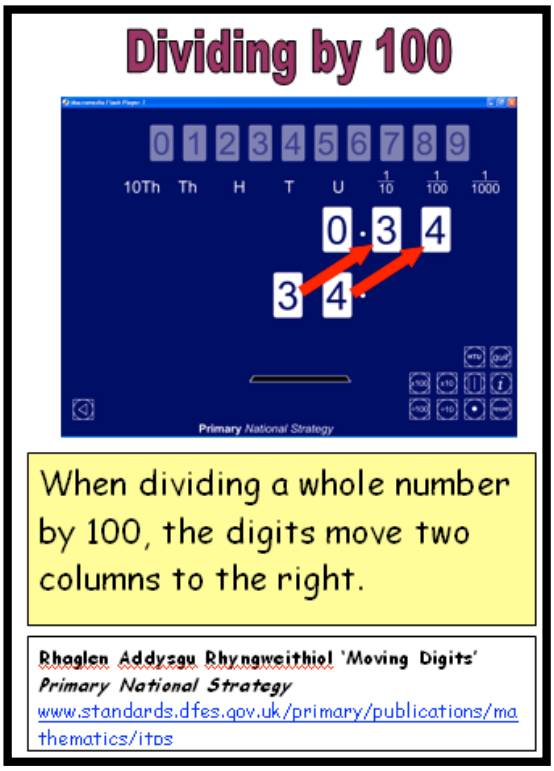
3000 x 7 = 3 x 7 x 10 x 10 x 10 = 3 x 7 x 10 x 100 = 3 x 7 x 1000 = 21 000

0.3 x 7 = (3 x 7) ÷ 10 = 2.1

Dividing by 10 or 100

Knowing that the effect of dividing by 10 is moving the digits one place to the right.
Knowing that the effect of dividing by 100 is moving the digits two places to the right.





Moving Digits 0.8.exe

Use of factors

550 ÷ 50 =
550 ÷ 10 = 55
55 ÷ 5 = 11

550 ÷ 50 = 11

378 ÷ 21 =
378 ÷ 3 = 126
126 ÷ 7 = 18

378 ÷ 21 = 18

Use related facts

Given that 124 x 8 = 992

What is 992 ÷ 8?
or
992 ÷ 124?

Given that 1.4 x 1.1 = 1.54

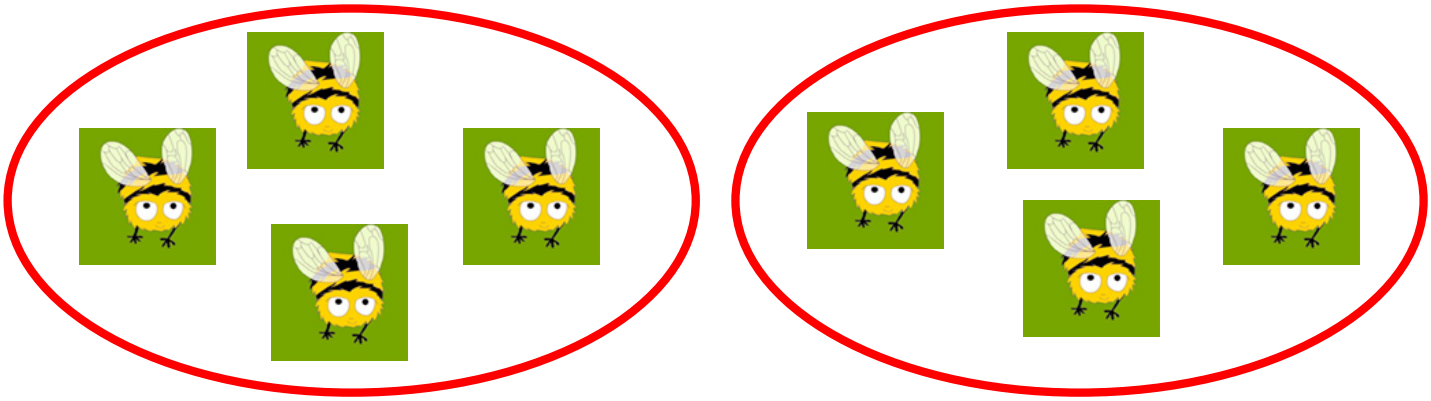
What is 1.54 ÷ 1.4?
or
1.54 ÷ 1.1?

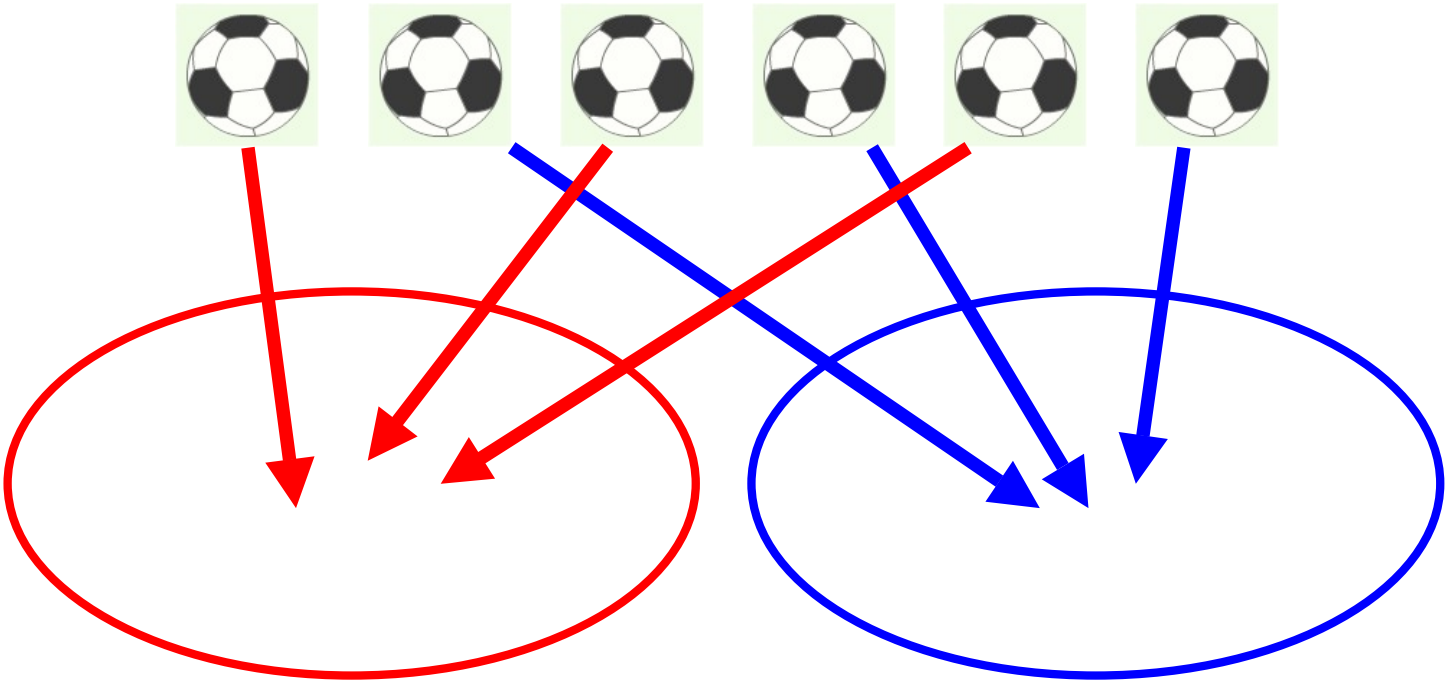
MANY MENTAL CALCULATION STRATEGIES WILL CONTINUE TO BE USED.
THEY ARE NOT REPLACED BY WRITTEN METHODS.

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

Reception and Year 1

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



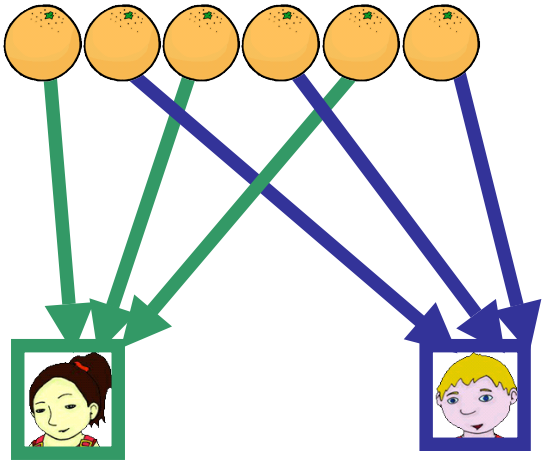


Year 2

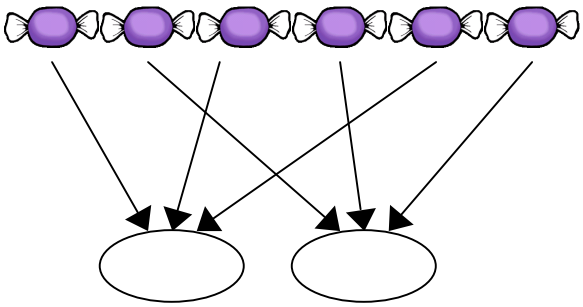
Pupils will develop their understanding of division and use jottings to support calculation

✓ **Sharing equally**

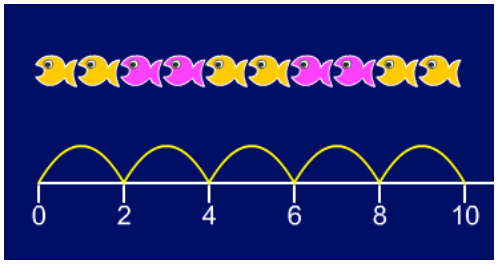
6 oranges shared between 2 people, how many do they each get?

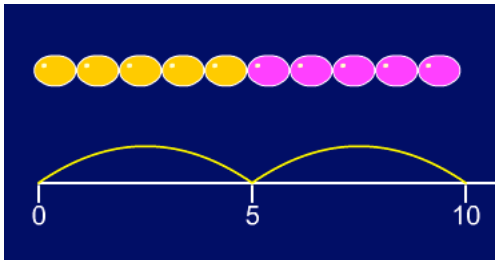


6 sweets shared between 2 people, how many do they each get?



✓ **Grouping or repeated subtraction**



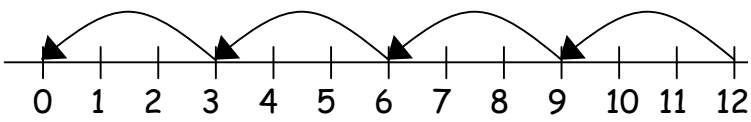


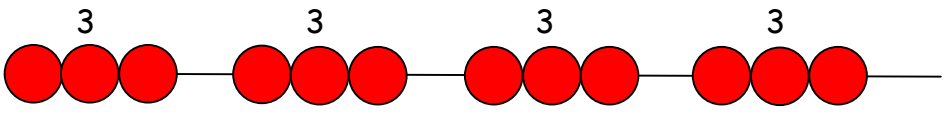
Grouping 1.3.exe

There are 6 bars of chocolate, how many people can have 2 chocolate bars each?

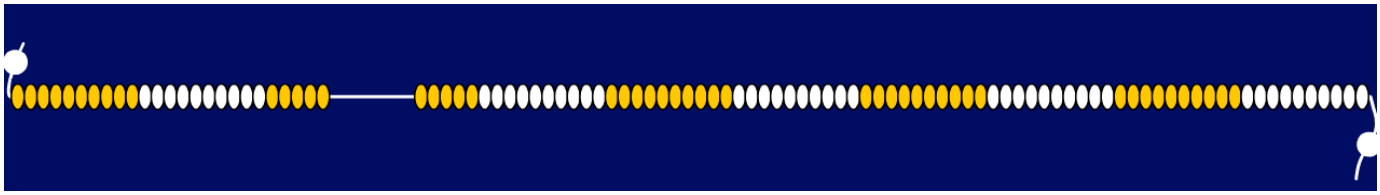
✓ **Repeated subtraction using a number line or bead bar**

12 ÷ 3 = 4





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



Counting On and Back 1.1.exe

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

□ ÷ 2 = 4

4 x 2 = 8
2 x 4 = 8
8 ÷ 2 = 4
8 ÷ 4 = 2

20 ÷ △ = 4

□ ÷ △ = 4

Year 3

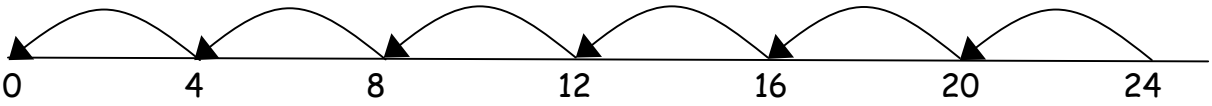
Ensure that the emphasis in Year 3 is on grouping rather than sharing.

Pupils will continue to use:

✓ **Repeated subtraction using a number line**

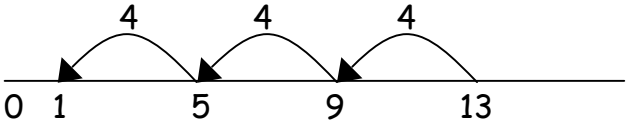
Pupils will use an empty number line to support their calculation.

24 ÷ 4 = 6



Pupils 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 ÷ 2 = □

24 ÷ △ = 12

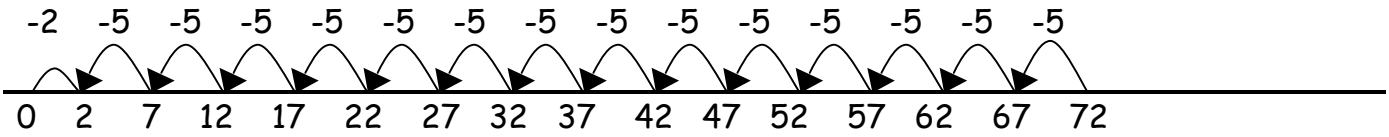
12 x 2 = 24
2 x 12 = 24
24 ÷ 12 = 2
24 ÷ 2 = 12

□ ÷ 10 = 8

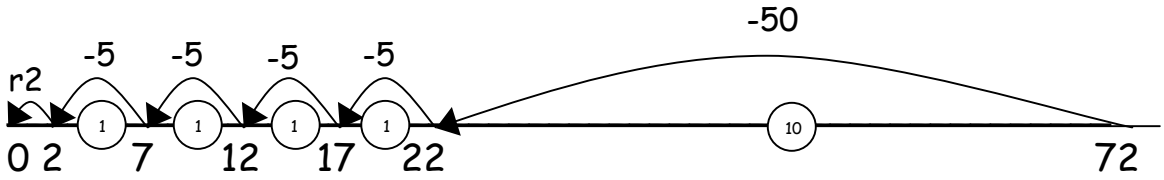
Year 4

Pupils 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 pupils are more familiar.

72 ÷ 5



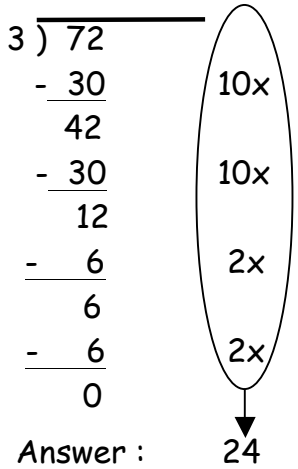
Moving onto:

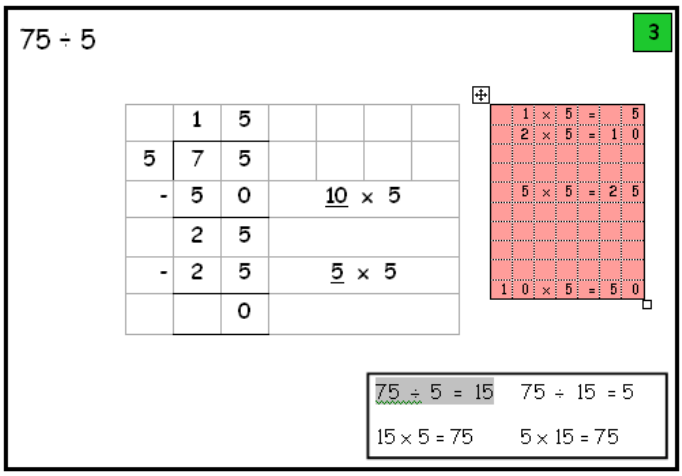


Then onto the vertical method:

Short division TU ÷ U

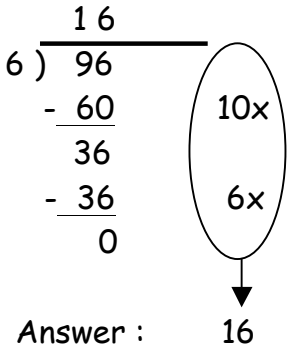
72 ÷ 3



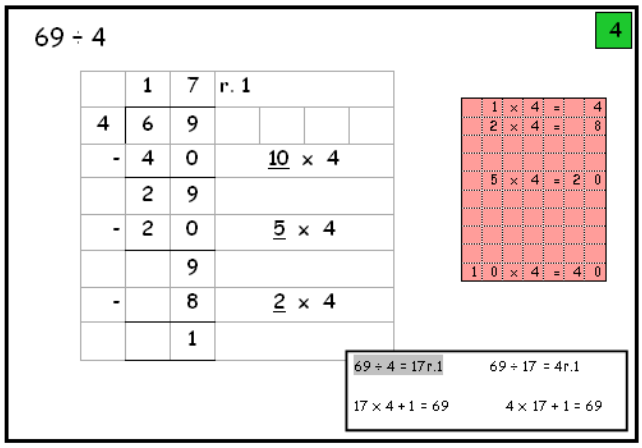


Leading to subtraction of other multiples.

96 ÷ 6



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



Pupils 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)

Year 5

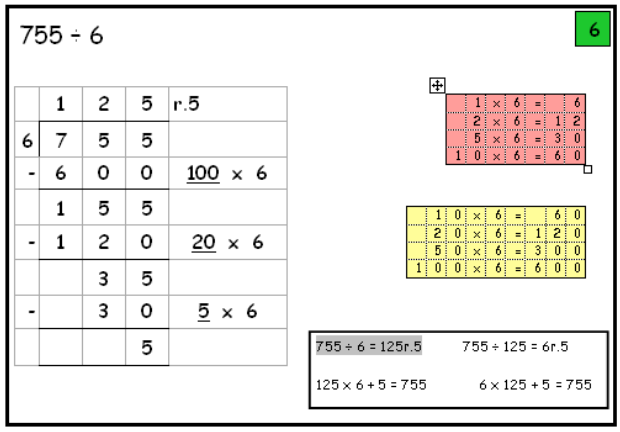
Pupils will continue to use written methods to solve short division TU ÷ U.

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

Short division HTU ÷ U

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

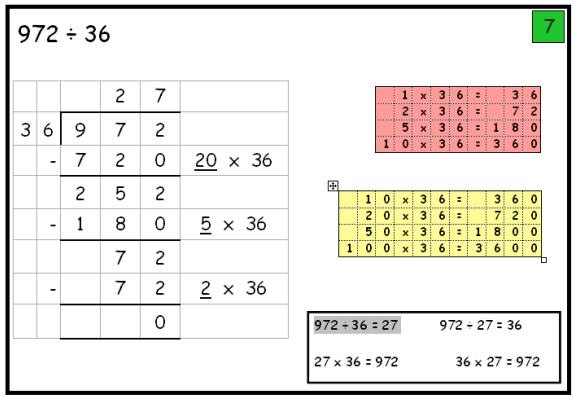
Year 6

Pupils will continue to use written methods to solve short division TU ÷ U and HTU ÷ U.

Long division HTU ÷ TU

972 ÷ 36

```
      27
36 ) 972
  - 720      20x
    252
  - 252       7x
      0
```



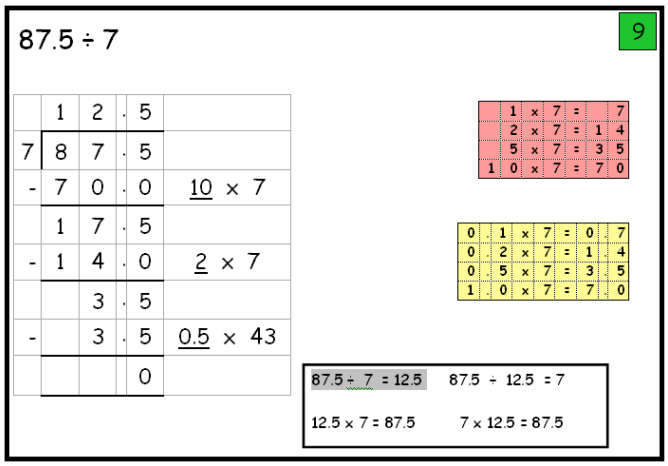
Answer: 27

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

Extend to decimals with up to two decimal places. Pupils should know that decimal points line up under each other.
87.5 ÷ 7

```
      12.5
7 )  87.5
   - 70.0      10x
     17.5
   - 14.0       2x
      3.5
   -  3.5      0.5x
      0
```

Answer : 12.5



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

Pupils should not be made to go onto the next stage if:

- **they are not ready.**
- **they are not confident.**

Pupils should be encouraged to approximate their answers before calculating.
Pupils should be encouraged to check their answers after calculation using an appropriate strategy.
Pupils should be encouraged to consider if a mental calculation would be appropriate before using written methods.

A COMPLETE SET OF WRITTEN METHODS POSTERS FOR THE FOUR RULES ARE AVAILABLE FROM THE LEA.