Key Stage 1 Multiplication and Division

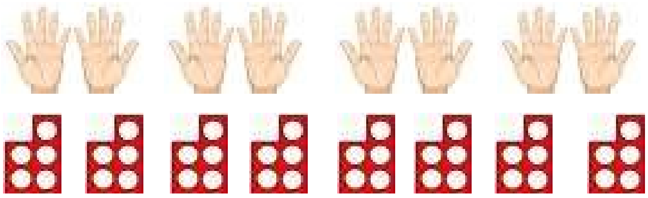
Year 1

Children are expected to:

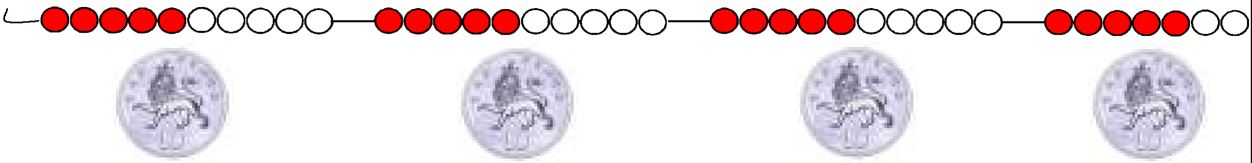
Count in multiples of twos, fives and tens.

A child's first introduction to multiplication will be through counting in steps of either 2, 5 or 10. Use of concrete objects will enable them to grasp this concept more quickly.

2, 4, ...

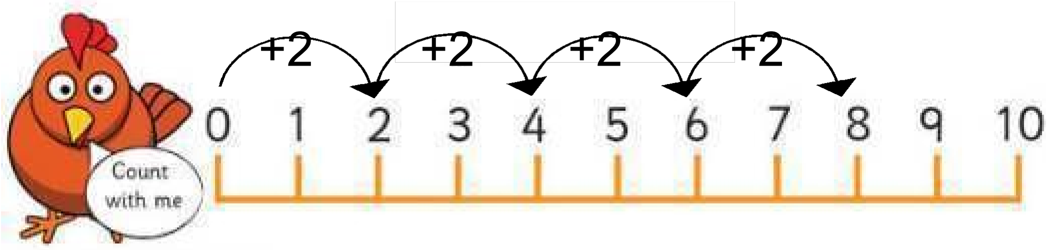


5, 10, 15, 20, 25, 30, 35, 40...



10, 20, 30, 40...

Number lines can also support children when they multiply, as a way to add on and count in steps.



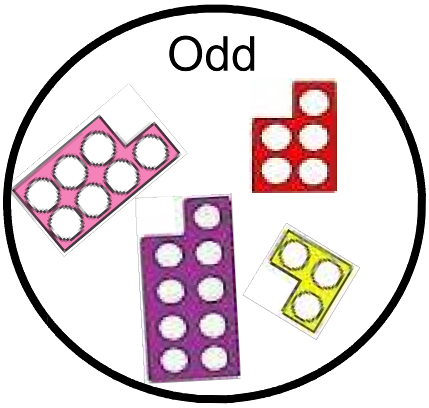
Children could use a counter, a finger or a pencil to help them 'hop' along the number line.

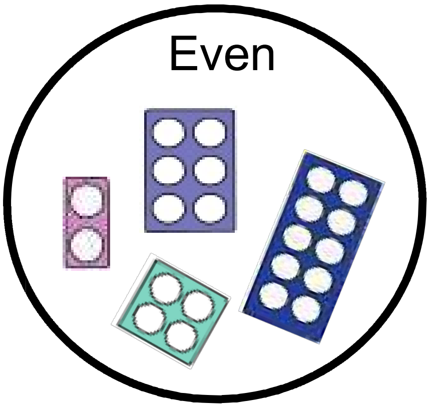
They should begin to look at counting backwards in these steps as well.

Key Stage 1 Multiplication and Division

Year 1

When counting in 2s, children may start to recognise the difference in structure between odd and even numbers.

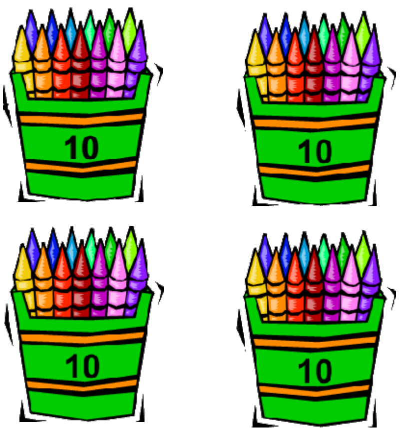




Solve one step multiplication or division problems using concrete objects, pictorial representations or number arrays.

By grouping or sharing small quantities, children should begin to gain some understanding of multiplication and division.

At this stage, they will solve simple problems using **repeated addition**, although the language of **multiplication** will also be introduced.



There are 10 crayons in each box. How many are there altogether?

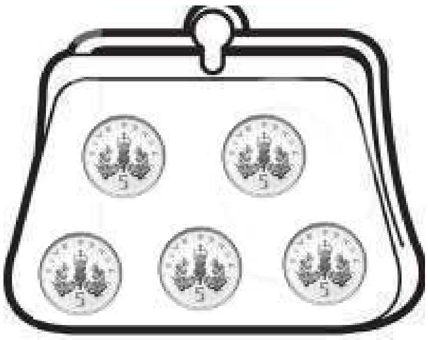
10 + 10 + 10 + 10 = 40 crayons

There 4 groups of 10

10 x 4 = 40

10 multiplied by 4 is 40

How much money do I have?



5 + 5 + 5 + 5 + 5 = 25p

The are 5 lots of 5p

5 x 5 = 25

Key Stage 1 Multiplication and Division

Year 1

Children will become familiar with the concept of **division** through **sharing** and **grouping** concrete objects **equally.**

Sharing:

Can you share the cows *equally* between the two fields?

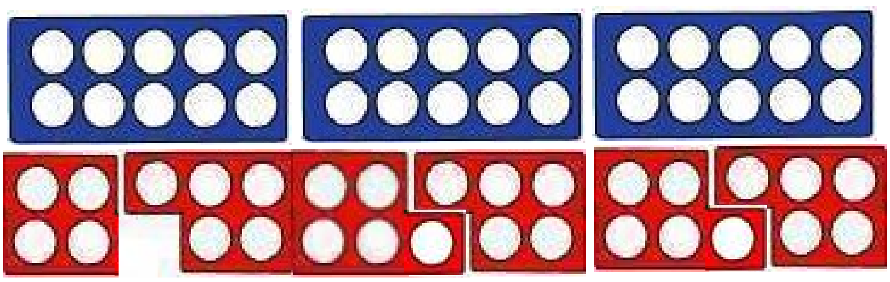
$$6 \div 2 = ?$$

$$6 \div 2 = 3$$

Grouping:

Organise these children into groups of 3.

$$9 \div 3 = 3$$

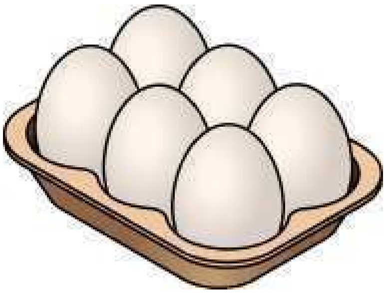


How many 5s are there in 30?

Key Stage 1 Multiplication and Division

Year 1

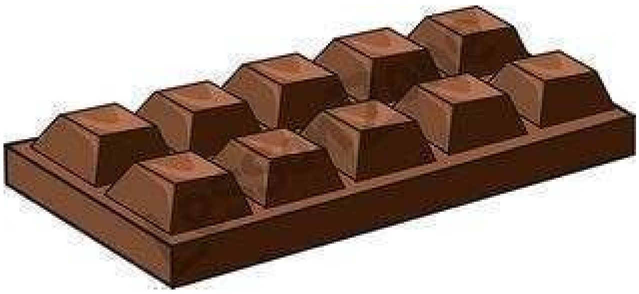
Arrays will also be used to help children visualise and understand **multiplication** and **division**.



2 x 3 is the same as 3 x 2

3 x 4 is the same as 4 x 3

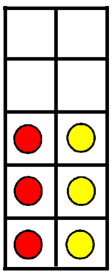
These everyday items, arranged in rows and columns, highlight an important multiplication fact to the children: that multiplication can be done in any order (**commutative**).

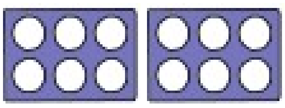


10 shared into 2 groups is 5.

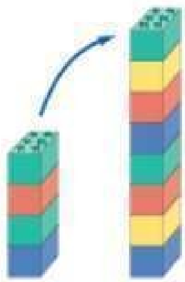
Find and name a half of a quantity as two equal parts, or a quarter of a quantity as four equal parts.

Children should begin to explore finding simple fractions of quantities, such as 1/2 and 1/4. In particular, they will be expected to have some understanding of **doubling** and **halving.**



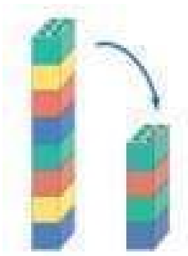


6 + 6 = 6 x 2 = 12



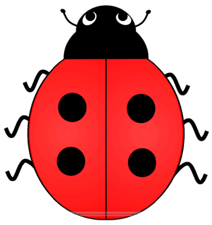
Key Stage 1 Multiplication and Division

Year 1



Half of 8 is 4.

8 ÷ 2 = 4

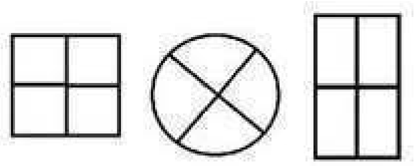


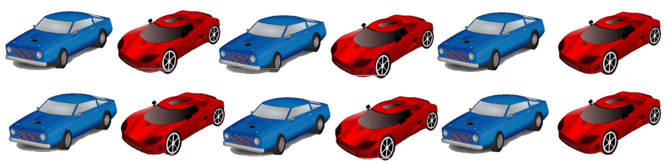
Half of 4 is 2.

8 ÷ 2 = 4

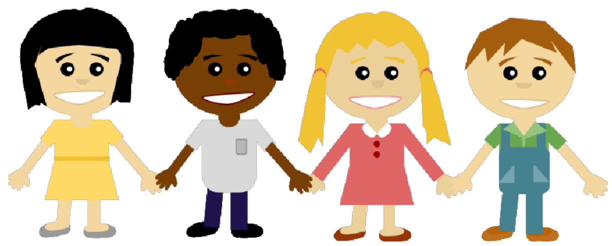
Children should be shown that **halving** and **dividing by 2** are the same.

Can you shade in one quarter of these shapes?





Four children share 12 toy cards equally. How many do they get each?



Vocabulary

Ones, groups, lots of, doubling repeated addition, groups of, lots of, times, columns, rows, longer, bigger, higher, times as (big, long, wide >etc), share, share equally, one each, two each, group, groups of, lots of, array.

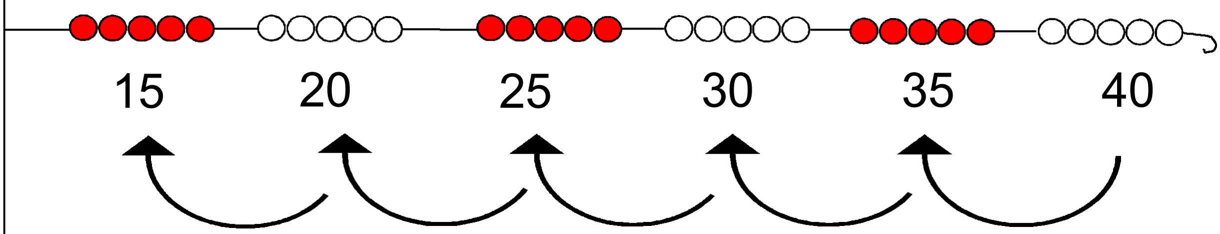
Key Stage 1 Multiplication and Division

Year 2

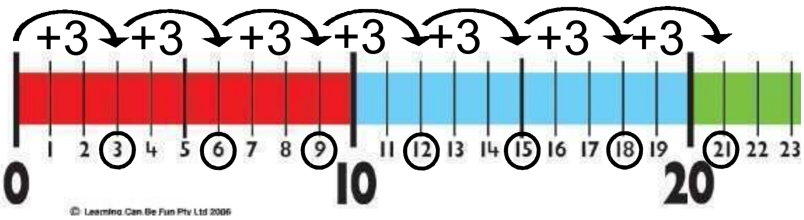
Children are expected to:

Count in multiples of two, three, five and ten, both forwards and backwards.

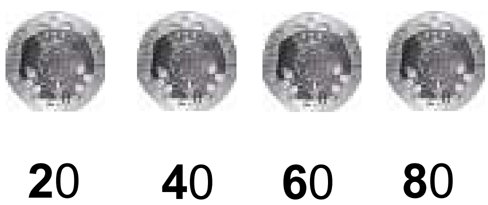
Children will continue to practise counting in steps of 2, 5 and 10, so that they become increasingly fluent at doing so. They will also be expected to count backwards from a given number in these steps.



Furthermore, they must now be able to count up from 0 in threes.



A clock face can help support counting in 5s, whilst money (2p, 5p, 10p, 20p, 50p) can be a great way to practise counting in other intervals.



Knowledge of the 2 times table will enable the children to count up in 20s as well.

Key Stage 1 Multiplication and Division

Year 2

Recall and use multiplication and division facts for the 2, 5 and 10 times tables.
The children should now be able to recall, from memory, multiplication facts for the 2, 5 and 10 times tables. They could use this knowledge to solve a variety of missing number problems:

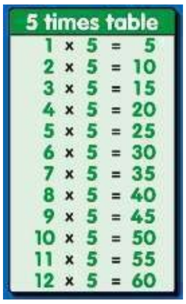
7 x 2 = □ □ x 2 = 14

7 x □ = 14 □ x ○ = 14

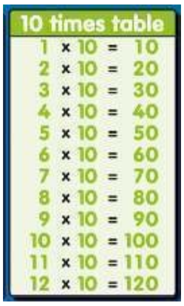
Children should also start to recognise patterns in these different multiplication tables.

Which of these numbers are in the 5 times table? How do you know?

72	45	53
80	69	95

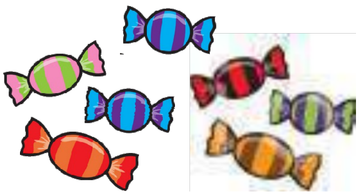


5 times table				
1	×	5	=	5
2	×	5	=	10
3	×	5	=	15
4	×	5	=	20
5	×	5	=	25
6	×	5	=	30
7	×	5	=	35
8	×	5	=	40
9	×	5	=	45
10	×	5	=	50
11	×	5	=	55
12	×	5	=	60



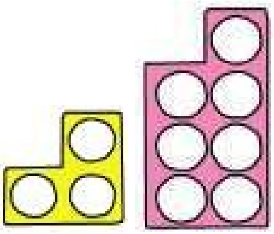
10 times table				
1	×	10	=	10
2	×	10	=	20
3	×	10	=	30
4	×	10	=	40
5	×	10	=	50
6	×	10	=	60
7	×	10	=	70
8	×	10	=	80
9	×	10	=	90
10	×	10	=	100
11	×	10	=	110
12	×	10	=	120

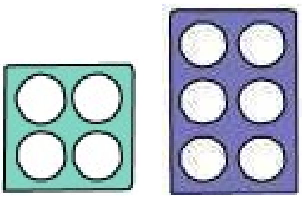
The 5 times table is half the 10 times table. So to find 6 x 5, I could work out 6 x 10 and then halve it!



An odd number can't be shared equally between two.

The use of Numicon can help children build internal, visual structures of numbers, and thus elicit a much more secure understanding of the difference between odd and even numbers.





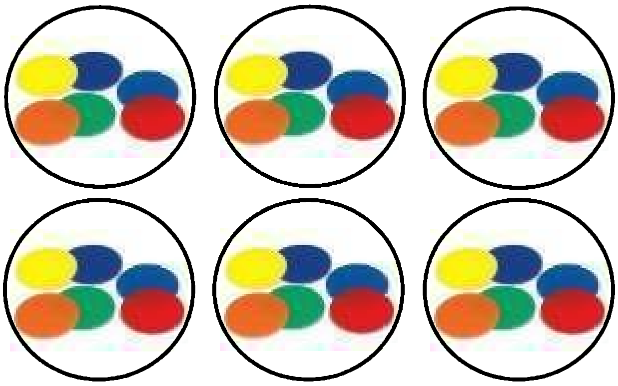
Key Stage 1 Multiplication and Division

Year 2

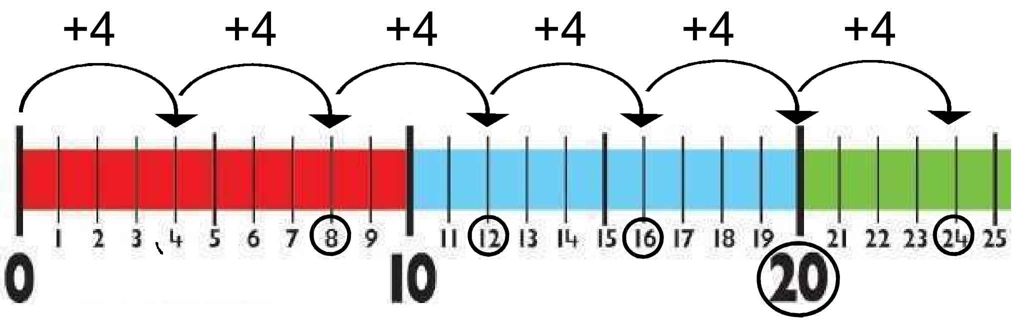
Calculate multiplication and division statements within the multiplication tables and write them using multiplication (x), division (÷) and equals (=) signs.

Multiplication:
Children should continue to use **grouping** or **number lines** to calculate other unknown multiplications, developing their understanding of multiplication as **repeated addition**.

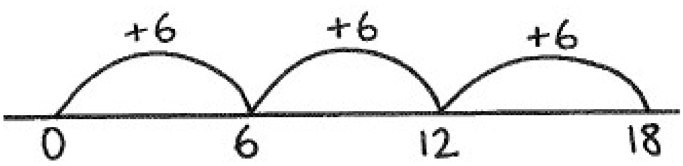
6 x 6 = ?
6 groups of 6
6 + 6 + 6 + 6 + 6 + 6 = 36
6 x 6 = 36



6 x 4 = ?
6 lots of 4
4 + 4 + 4 + 4 + 4 + 4 = 24
6 x 4 = 24



Some children may be able to use a blank number line to record their mental processes:



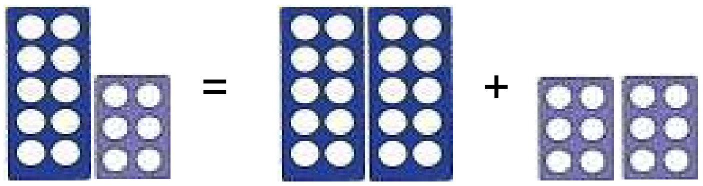
3 x 6 = ?
3 lots of 6
6 + 6 + 6 = 18
3 x 6 = 18

Key Stage 1 Multiplication and Division

Year 2

As well as knowing doubles up to 10 + 10, children should use these known facts to double bigger, 2-digit numbers.
So...

Double 16 = Double 10 + Double 6



= 20 + 12
= 20 + 10 + 2
= 30 + 2
= 32

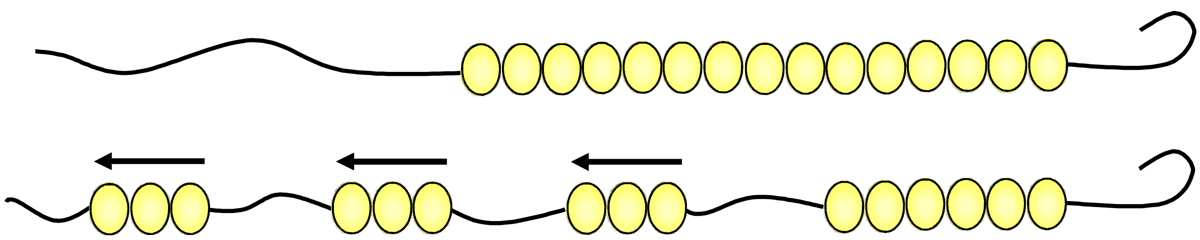
Children may want to use informal jottings when presenting this strategy:

16
10 6
x 2 x 2
20 12 = 32

Division:
The principles of division should continue to be taught through **grouping** and **sharing**.

Grouping: When grouping, you count the number of groups you have made.

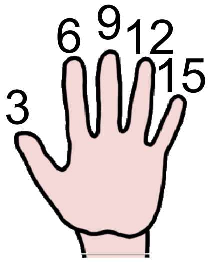
For instance, 15 ÷ 3 = 5 can be viewed as 'How many groups of 3 are there in 15?'

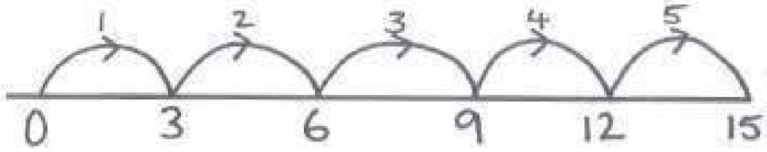


Key Stage 1 Multiplication and Division

Year 2

Blank number lines, or even fingers, can support the same line of thinking:



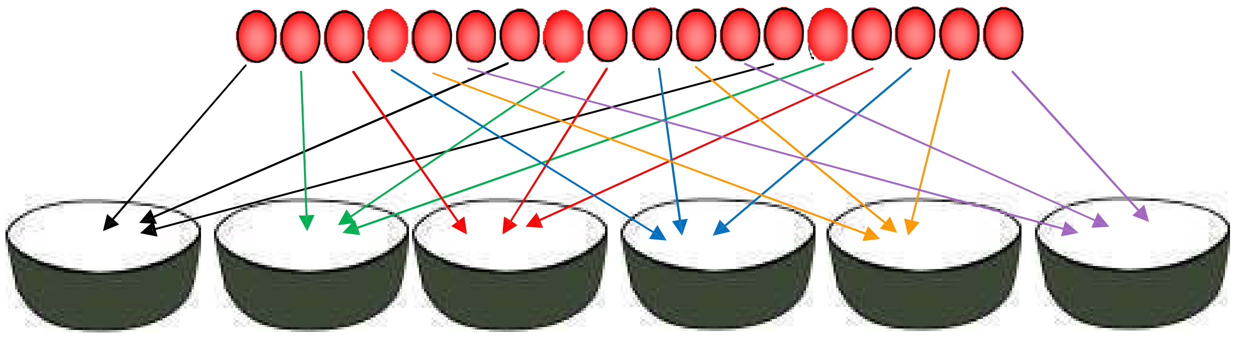


These strategies will also help children make the link between multiplication and division.

Sharing: When sharing, we count the number of objects in each group.

18 ÷ 6 = ?

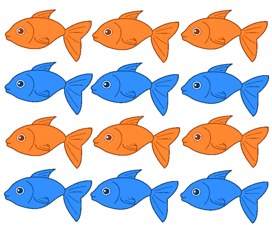
18 shared between 6 makes 3 in each group.



Children should also be given the opportunity to find a half, a quarter and a third of shapes and quantities. Finding a fraction of a number should be related to sharing and division.

Show that multiplication of two numbers can be done in any order (commutative) but that division of one number by another cannot.

By creating, and looking at, arrays, children will begin to recognise the inverse relationship between multiplication and division.



3 groups of 4 = 3 x 4 = 12

4 groups of 3 = 4 x 3 = 12

12 divided into 4 groups = 12 ÷ 4 = 3

12 divided into 3 groups = 12 ÷ 3 = 4

Eventually, children should be able to answer questions like:

"If 12 x 2 = 24, what is 24 ÷ 2?"

Key Stage 1 Multiplication and Division

Year 2

Vocabulary

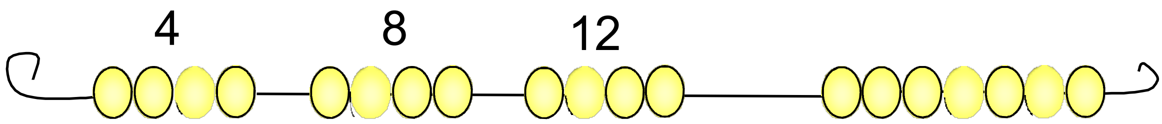
multiple, multiplication array, multiplication tables/facts, groups of, lots of, times, columns, rows, group in pairs, 3s D 10s etc, equal groups of, divide, ÷, divided by, divided into, shared into, remainder.

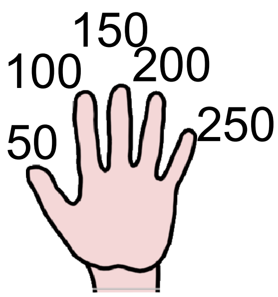
Key Stage 2 Multiplication and Division

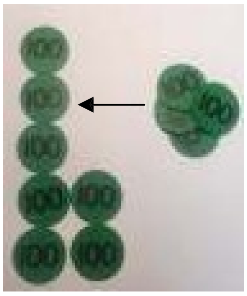
Year 3

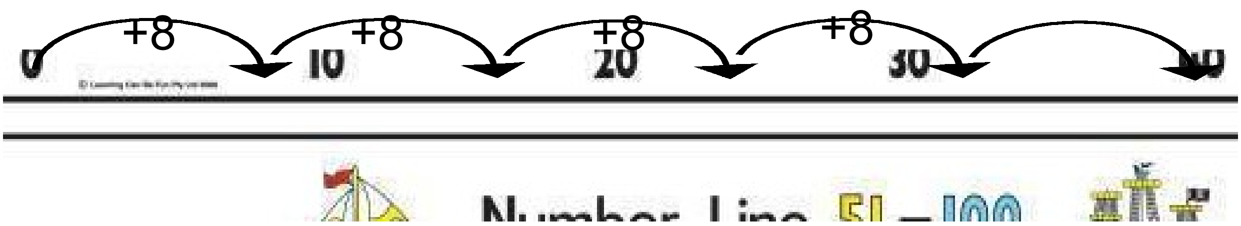
Children are expected to:

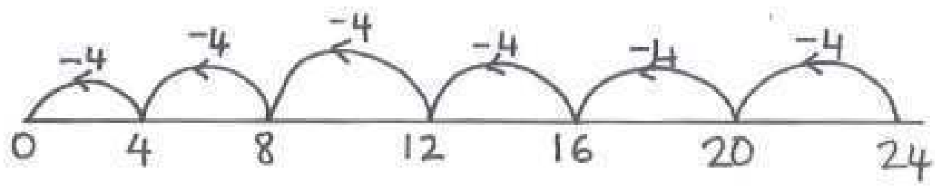
Count from 0 in multiples of 4, 8, 50 and 100, and in tenths (1/10 or 0.1)
There are a variety of resources that children can use to practise counting in these steps, both forwards and backwards.











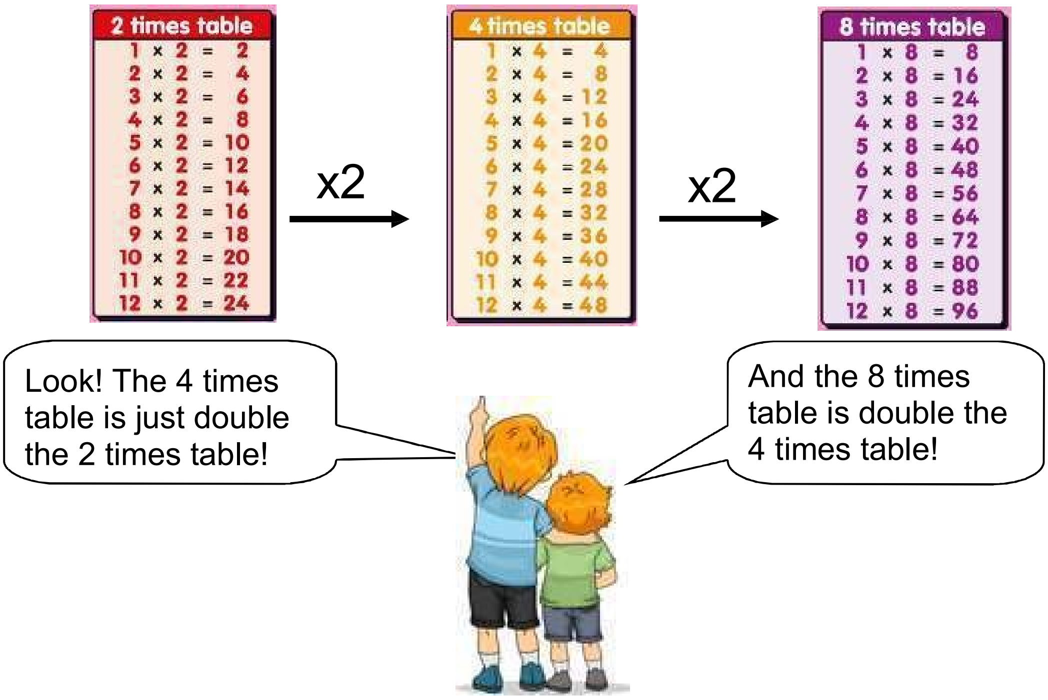
This process of counting in multiples will help reinforce the children's knowledge of times tables facts. For instance, *"I have counted up 5 lots of 4 to make 20. Therefore, 5 x 4 = 20."*

Key Stage 2 Multiplication and Division

Year 3

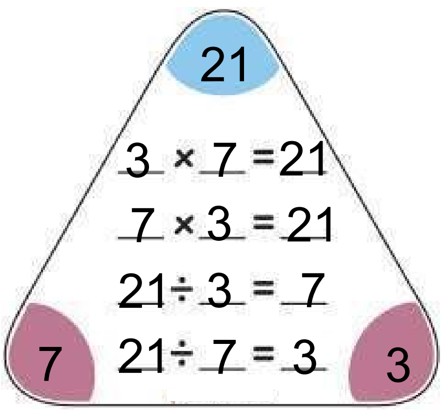
Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.

As children become more familiar with their multiplication and division facts, they should start to see the links between the different tables.



Once they are secure with their times tables facts up to x12, some children may be able to extend their knowledge to working out what x13, x14 is and so on.

Children should continue to develop their understanding of fact families.



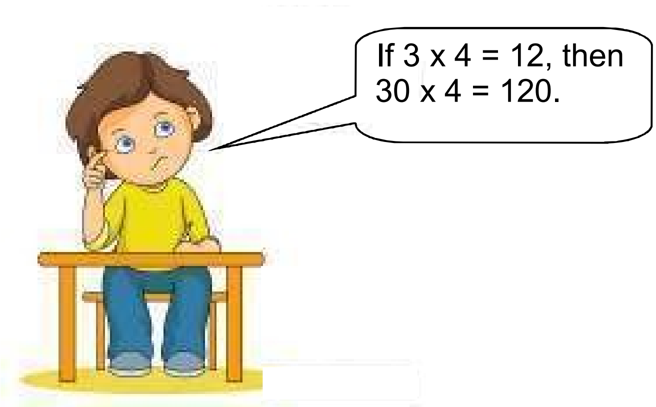
This will strengthen the children's awareness of the **commutativity of multiplication** (that is, when we swap the number over, we still get the same answer: 7 x 3 = 3 x 7).

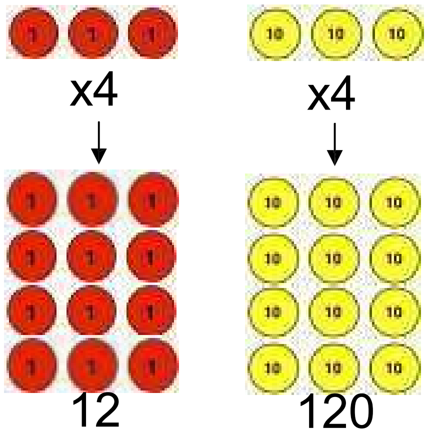
It will also help them grasp that multiplication and division are **inverse operations**.

Key Stage 2 Multiplication and Division

Year 3

Children should also start to use facts that they know to make links with other facts, for instance with numbers that are 10 times bigger (multiples of 10).





Place value counters can be used to demonstrate this idea.

The same principle can be applied to division facts.

If 6 ÷ 3 = 2, then 60 ÷ 3 = 20

Write and calculate multiplication and division statements using the multiplication tables that they know, including two-digit numbers multiplied by one-digit numbers, using mental methods before progressing to formal written methods.

Multiplication:

Once the children are ready to multiply bigger numbers, they are taught to partition them first. By breaking the number up into smaller parts, the calculation becomes much easier to deal with.

For example: 36 x 5 = ?

30 6

becomes... 30 x 5 + 6 x 5

150 + 30 = 180

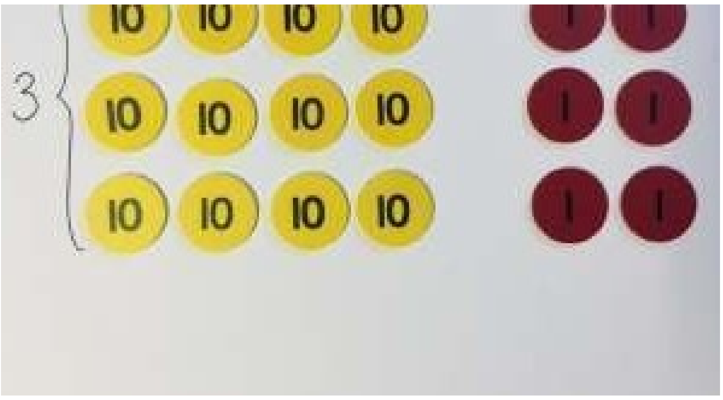
Children will use their knowledge of 3 x 5 = 15 to solve this.

Key Stage 2 Multiplication and Division

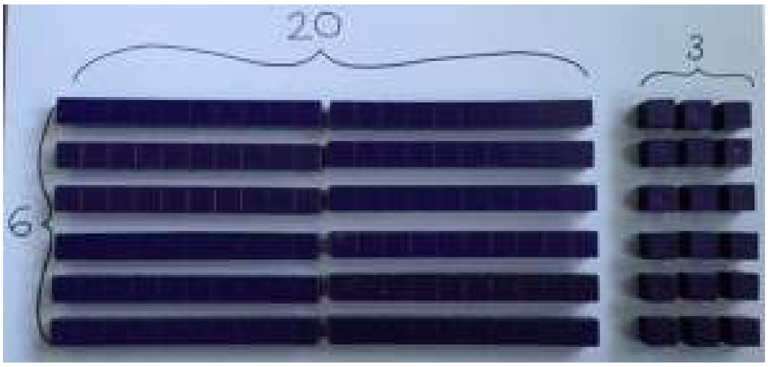
Year 3

Initially, **base 10 resources** or **place value counters** should be used to teach this procedure to ensure children gain a deep understanding of its principles.

42 x 3 = 126



120 6

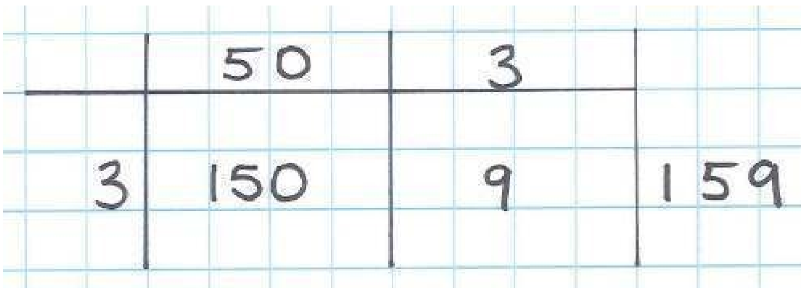


23 x 6 = 138

120 18

As children become more confident, they can move on to recording the same idea using pencil and paper on the **grid method**.

53 x 3 = 159



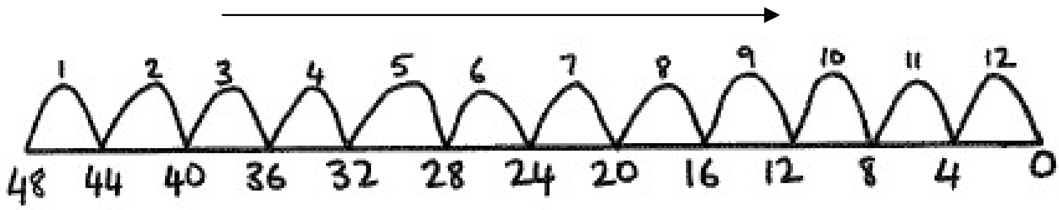
Key Stage 2 Multiplication and Division

Year 3

For **division**, children should develop a more efficient number line strategy, through the use of **repeated subtraction**.

To begin with, the children may 'jump back' along the number line in smaller steps.

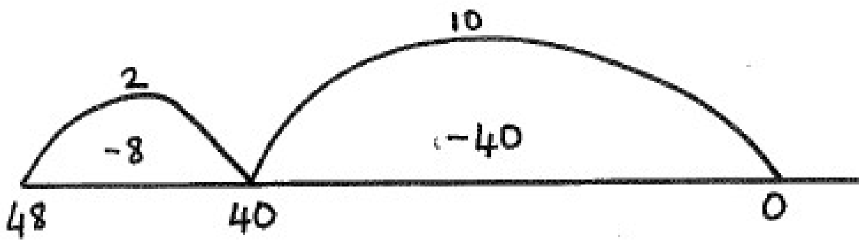
48 ÷ 4 = 12



But, as their times table knowledge improves, they will be able partition the dividend (the number being divided) into more workable chunks.

48 ÷ 4 = 12

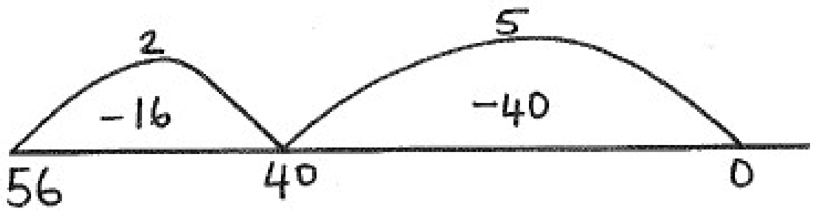
40 8



The dividend in the example above has been partitioned into its tens and ones. However, it is also possible to partition a number in a different way.

56 ÷ 8 = ?

In this example, children may prefer to partition 56 into two numbers that they know are divisible by 8 (in this case, 40 and 16)



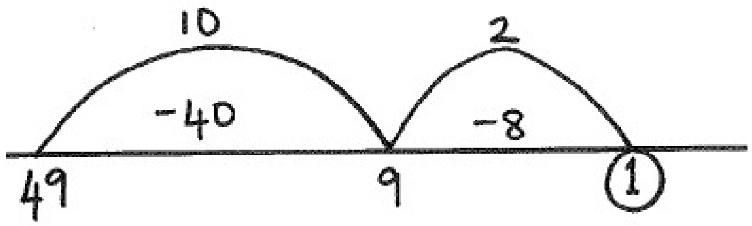
56 ÷ 8 = 7

Key Stage 2 Multiplication and Division

Year 3

Children should also be introduced to the concept of **remainders**. A **remainder** is any number left over, once an amount has been divided up equally.

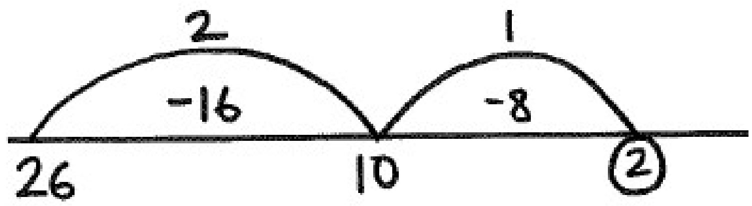
$$49 \div 4 = ?$$



$$49 \div 4 = 12 \text{ r1}$$

Again, the children may be presented with a calculation that they would like to partition in a different way.

$$26 \div 8 = ?$$



$$26 \div 8 = 3 \text{ r2}$$

Solve problems involving multiplication and division, including missing number problems, positive integer (whole number) scaling problems and correspondence problems (where n objects are linked to m objects).

Missing number problems can be a great way to ensure children know the expected multiplication tables.

6 x 4 = ☐ 32 ÷ ☐ = 4

☐ x ◯ = 48 ☐ ÷ 3 = 50

Key Stage 2 Multiplication and Division

Year 3

Children should be given practical problems where they will need to scale up.

"Harry's sunflower is 9cm tall. Alex's is 4 times taller. How tall is Alex's sunflower?"

Problems where there is a remainder but the answer needs to be given as a whole, should also be provided.

"Pencils are sold in packs of 10. How many packs will I need to buy for 24 children?"

Vocabulary
See Year 1 & 2; partition, grid method, inverse

Key Stage 2 Multiplication and Division

Year 4

Children are expected to:

Count in steps of 6, 7, 9, 25 and 1000, and in hundredths (1/100 or 0.01). Children should be able to count in multiples of 6, 7, 9, 25 and 1000, and in hundredths mentally. Counting resources (see Year 3) may be used to support children if necessary. It is equally import that children can count backwards in these intervals as well.

Recall multiplication and division facts for multiplication tables up to 12 x 12. Missing number problems can help assess children's knowledge of multiplication and division facts up to 12 x 12.

8 x 9 = ☐

64 ÷ ☐ = 8

☐ x 12 = 84

☐ ÷ 11 = 66

Knowing their **factor pairs** (which two numbers multiply together to make a particular value) is another skill the children need to acquire.

Use place value, known and derived facts to multiply and divide mentally, including multiplying by 0 and 1; dividing by 1; and multiplying together three numbers.

Using known multiplication and division facts, children should be able to derive other associated facts for multiples of 10 and 100.

7 x 7 = 49 →

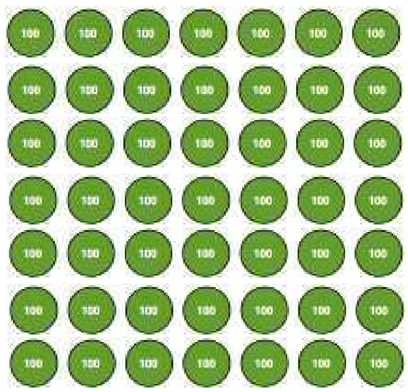
70 x 7 = 490

70 x 70 = 4,900

7 x 700 = 4,900

70 x 700 = 49,000

7 x 700 = 4,900



Place value counters can be used to support the children with this.

Key Stage 2 Multiplication and Division

Year 4

63 ÷ 7 = 9

→ 630 ÷ 7 = 90 | 630 ÷ 90 = 7

→ 630 ÷ 70 = 9 | 630 ÷ 9= 70

→ 6300 ÷ 7 = 900 | 6300 ÷ 900 = 7

→ 6300 ÷ 70 = 90 | 6300 ÷ 90 = 70

For some calculations, children may be able to mentally partition the numbers and work the answer out by jotting bits down.

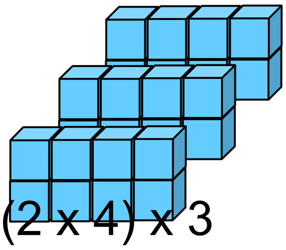
For example:

6 x 17
= 6 x 10 + 6 x 7
= 60 + 42
= 102

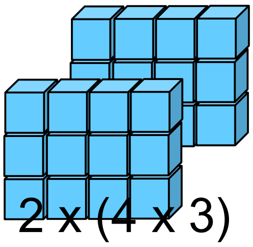
Children must also be able to tell you what happens when you multiply a number by 0, or when you multiply or divide a number by 1.

They should master how to multiply three numbers together too. Through practise, they will notice that, no matter how they group the numbers, they will always get the same answer.

2 x 4 x 3 = ?



(2 x 4) x 3
8 x 3 = 24



2 x (4 x 3)
2 x 12 = 24

For this reason, when they are presented with a problem which requires multiplying three numbers together, they will be able to choose which order they do it in.

6 x 5 x 9 = (6 x 9) x 5 = 54 x 5 = 270

Key Stage 2 Multiplication and Division

Year 4

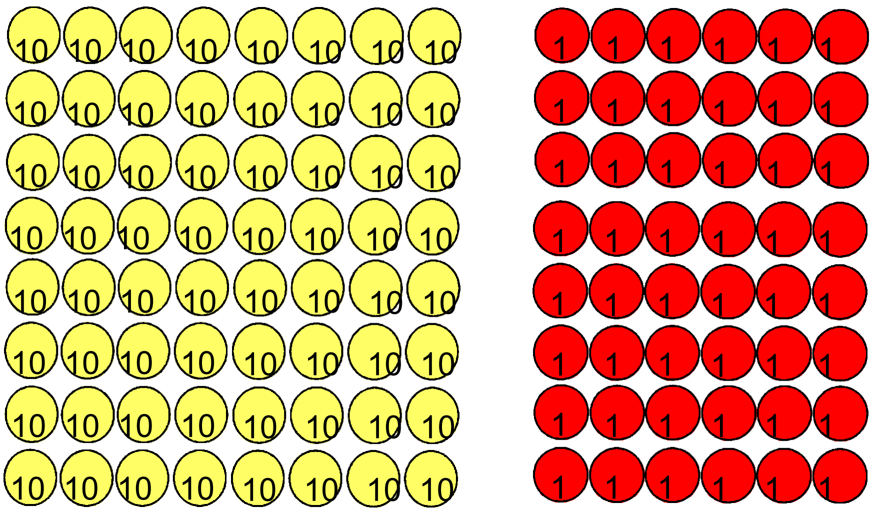
Multiply two-digit and three-digit numbers by a one-digit number using a formal, written layout.

Children should focus on deepening their understanding of the grid method to multiply a two-digit number by a one-digit number. Place value apparatus can be used to embed this.

86 x 8

80 6

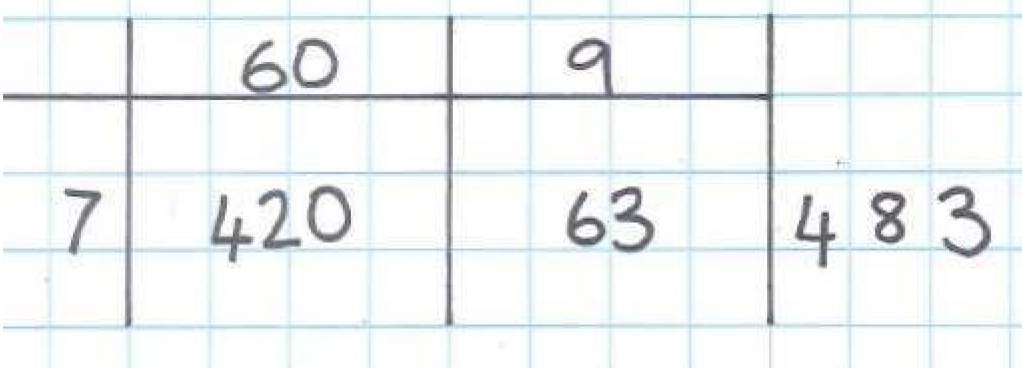
8



640 48 = 688

When children are ready, they can move away from using place value counters and record this method on paper using a grid instead.

69 x 7 = ?



69 x 7 = 483

Key Stage 2 Multiplication and Division

Year 4

The grid method can be used to multiply a three-digit number as well.

453 x 6 = 2718

	400	50	3	
6	2400	300	18	2718

The children should then progress to using the **expanded column method**, whereby the same process is used, only now the information is recorded in columns.

```
    6 9
 x    7
    6 3   (7 x 9)
  4 2 0   (7 x 60)
  4 8 3
```

Children may find it helpful to record the calculations they are doing in order to keep track.

```
    4 5 3
 x      6
      1 8   (6 x 3)
    3 0 0   (6 x 50)
  2 4 0 0   (6 x 400)
  2 7 1 8
```

When they are ready, children reduce their recordings even further and start using **short multiplication**.

```
    4 5 3
 x      6
  2 7 1 8
    3 1
```

In this calculation, first we multiply the 3 by the 6. 3 x 6 = 18, which has 1 ten and 8 ones. We write down the 8 in the ones column and then carry over the ten into the tens column. The ‘carry digits’ are recorded below the line. Next, we multiply the 5 (which is really 50) by 6. 5 x 6 lots of 10 = 30 lots of 10. With the 10, which was carried over, added on, we now have 31 lots of 10. The 1 is written in the tens column and the 3 is carried over into the hundreds column. Finally, we can calculate 4 x 6 = 24. Add on the 3 carried over to get 27. This is written down to the left of the 1.

NB: If children are finding this method too difficult, they should revert back to the expanded method.

Key Stage 2 Multiplication and Division

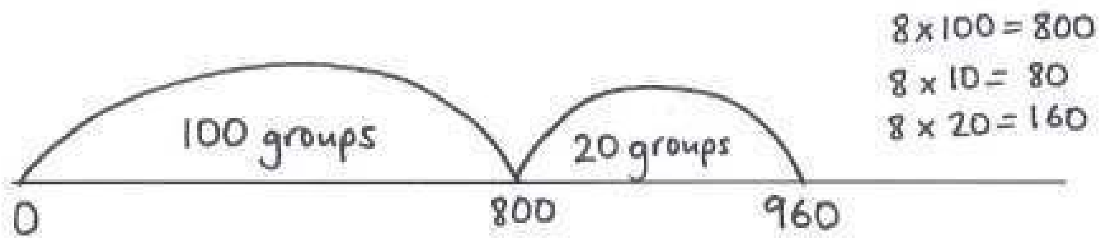
Year 4

Until they have a secure understanding of **division** as **sharing** and **grouping**, children should continue to explore the concept of division using a number line. As such, they should view a division calculation like this one:

$$960 \div 8 = ?$$

"How many 8s are there in 960?"

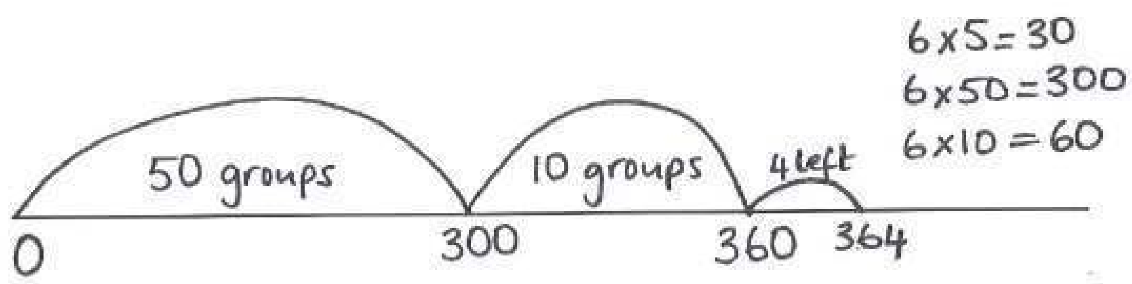
A well established times table knowledge will help them identify larger 'chunks' to take away.



$$960 \div 8 = 120$$

Another example with remainders:

$$364 \div 6 = ?$$



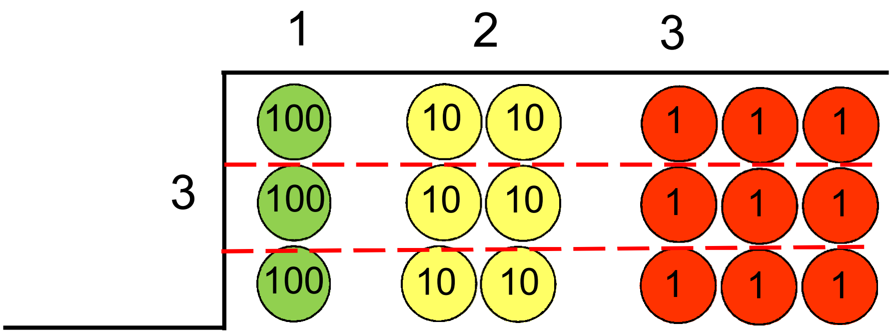
$$364 \div 6 = 60 \text{ r4}$$

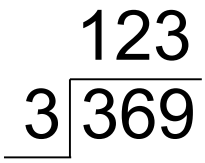
Key Stage 2 Multiplication and Division

Year 4

Eventually, the formal short division method can be introduced. Manipulatives, such as place value counters, could be used at first for a more visual experience.

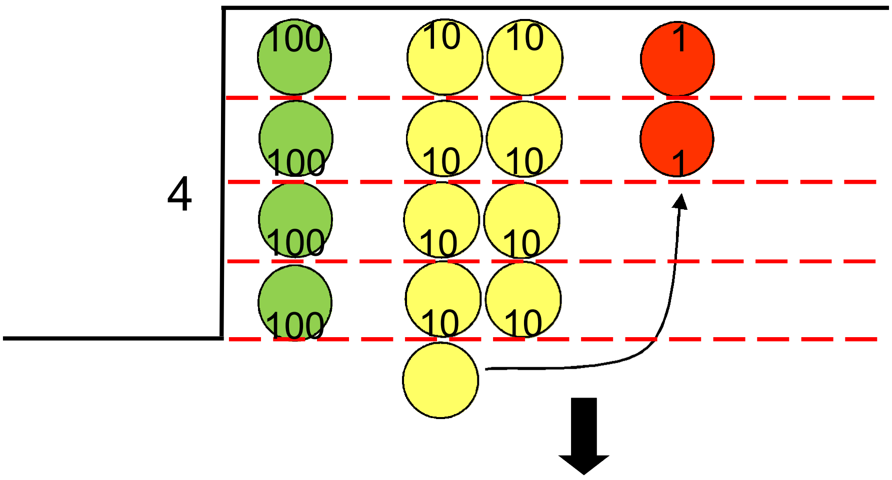
$$369 \div 3 = 123$$



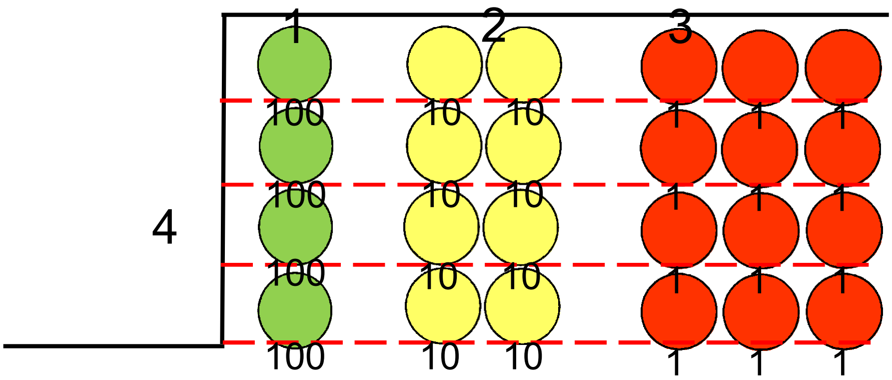


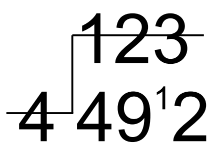
They should then record it in the **formal, short division format**.

Examples where exchange is required should also be provided: $492 \div 4 = ?$



becomes...





Key Stage 2 Multiplication and Division

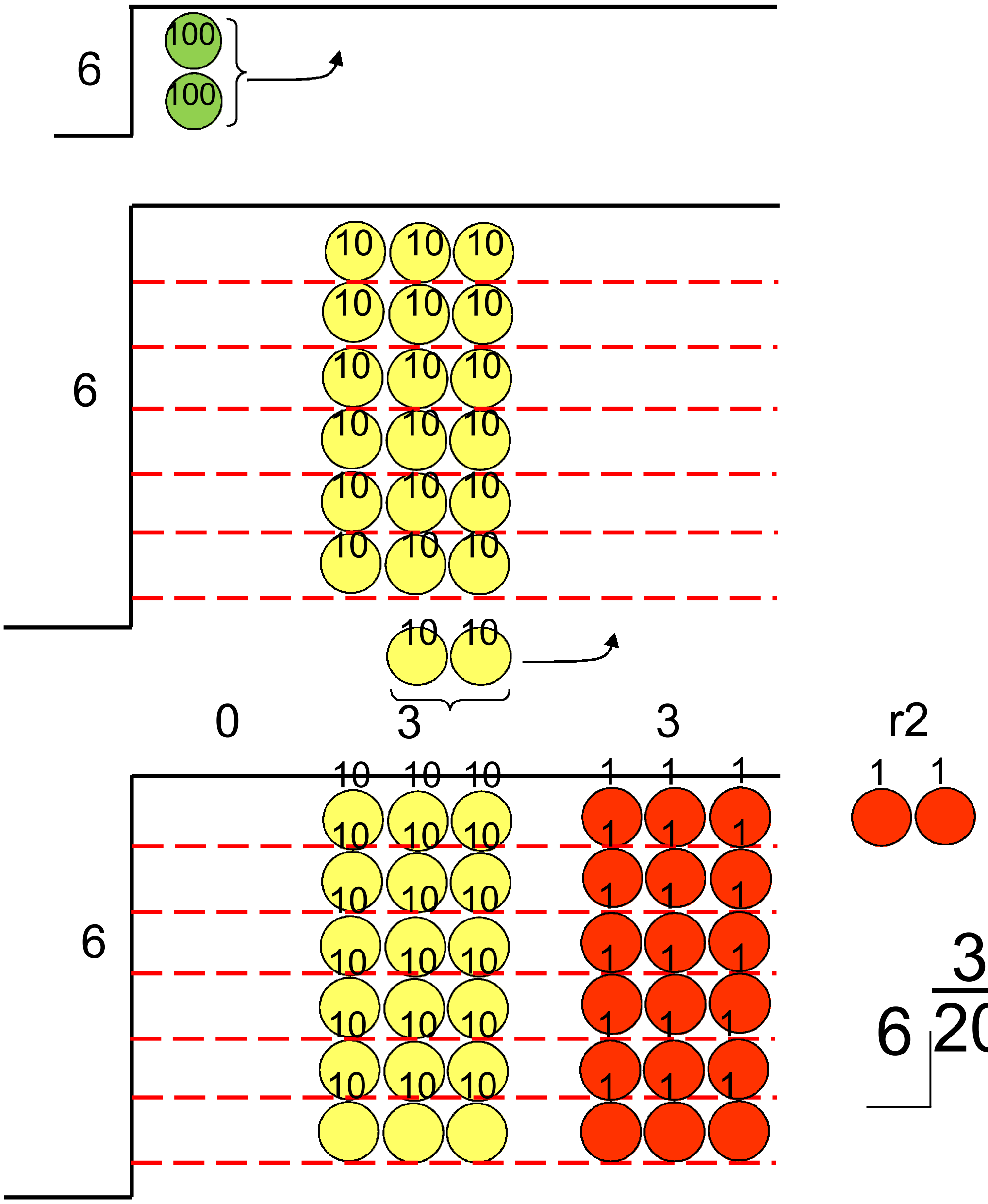
Year 4

By the end of the year, children should have also encountered examples where there is a remainder. Initially, this idea can be introduced using simple calculations where knowledge of their times tables facts will suffice.

For example: $17 \div 4 = 4 \text{ r}1$

They should then progress to bigger numbers:

$200 \div 6 = ?$



$$6\overline{)2\,0\,{}^{2}0}\quad 33 \text{ r}2$$

Key Stage 2 Multiplication and Division

Year 4

Vocabulary
See Year 1-3.

divide, divided by, divisible by, divided into, share between, groups of, factor, factor pair, multiple, times as (big, long, wide 6etc), equals, remainder, quotient, divisor, inverse, factor

Key Stage 2 Multiplication and Division

Year 5

Children are expected to:

Identify multiples and factors, including finding all factor pairs of a number and common factors of two numbers.

Children should be able to use the vocabulary **multiple** and **factor** correctly and consistently.

Factors are numbers you can multiply together to make another number.

6 x 4 = 24

Factor Factor

6 and 4 are both factors of 24 because they multiply together to make it.

A number can have several factors:

24

1 24

2 12

3 8

4 6

The factors of 24 are 1, 2, 3, 4, 6, 8,12, 24.

A number can have some of the same factors as another number:

21

1 21

3 7

14

1 14

2 7

1 and 7 are common factors of 21 and 14.

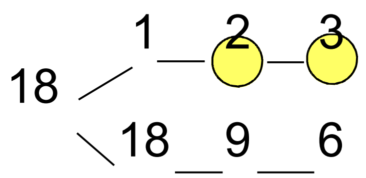
Key Stage 2 Multiplication and Division

Year 5

Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers; establish whether a number up to 100 is a prime number and recall prime numbers up to 19.

Children must be able to explain, and find examples of, **prime numbers**. These are whole numbers that can only be divided evenly by 1 or itself. In other words, they only have two factors. Any number that is NOT a prime number, is a **composite number**, which is a number that can be divided evenly by numbers other than 1 or itself. The number 1 is the only exception; it is considered neither a prime number, nor a composite one.

Prime factors are factors of a number (see previous page) that are prime numbers.



2 and 3 are prime factors.

Prime numbers are often considered the 'basic building blocks' of all other numbers, since all composite numbers can be made up of prime numbers multiplied together.

$$12 = 2 \times 2 \times 3$$

This can form the basis of a great investigation for children.

Multiply and divide numbers mentally, and recognise and use square and cube numbers (and their notations).

A number of efficient mental calculation strategies should be made available to the children; they should not be expected to rely solely on written strategies.

Using their times table knowledge, they may want to partition the numbers in their head first and then multiply each part mentally. They may find it helpful to make jottings as they go.

$$35 \times 6 = 30 \times 6 + 5 \times 6$$
$$= 180 + 30$$
$$= 210$$

Other strategies may include:

To multiply by 4: *Double* and then *double* again.

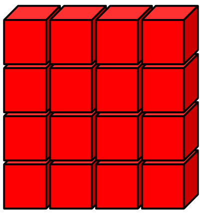
To multiply by 5: *Multiply by 10* and then *halve*.

To multiply by 20: *Multiply by 10* and then *double*.

Key Stage 2 Multiplication and Division

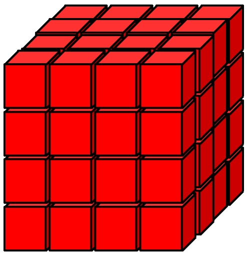
Year 5

They should also recognise square and cube numbers, and use the appropriate notation.



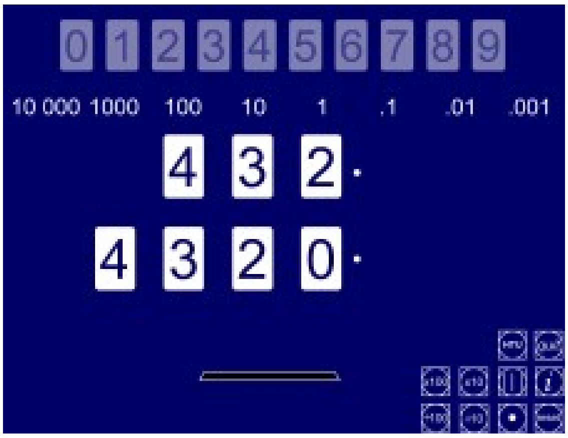
4^2
$= 4 \times 4$
$= 16$

4^3
$= 4 \times 4 \times 4$
$= 64$



Multiply and divide whole numbers, and those involving decimals, by 10, 100 or 1000.

It is essential that children are able to identify and apply rules for multiplying and dividing by 10, 100 and 1000.



$432 \times 10 = 4320$

Place value charts, like this one, are used to demonstrate how far the digits move, and in what direction, when multiplying or dividing by 10, 100 or 1000. Children are encouraged to use these charts until they are confident enough to do it without.

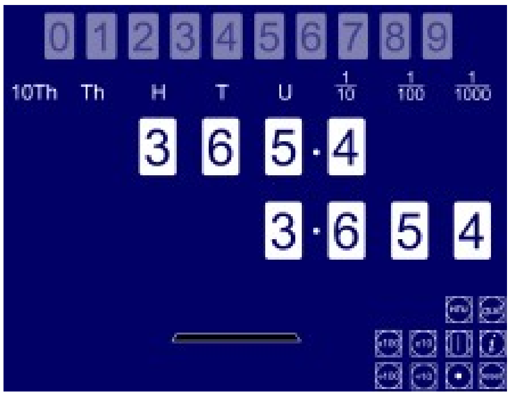
It can be tempting to teach the children to simply 'add a 0 on the end' when multiplying by 10, or add two 0s when multiplying by 100, and so on. However, this approach falls apart when multiplying a decimal number.

$3.8 \times 10 = 38$ ✓

And not; $3.8 \times 10 = 3.80$ ✗

$365.4 \div 100 = 3.654$

Instead, digits should be moved across a place value chart, using 0 as a **place holder** where necessary.



Key Stage 2 Multiplication and Division

Year 5

Multiply and divide numbers mentally drawing upon known facts.
Children should be able to derive multiplication and division facts for both whole numbers, and those with decimals.

0.7 x 0.6 = 0.42

70 x 6 = 420

0.42 ÷ 7 = 0.06

7 x 6 = 42

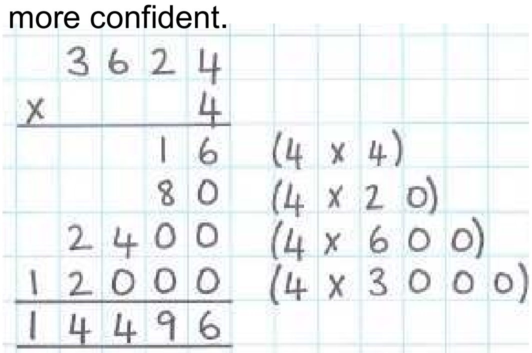
0.7 x 6 = 4.2

70 x 0.6 = 42

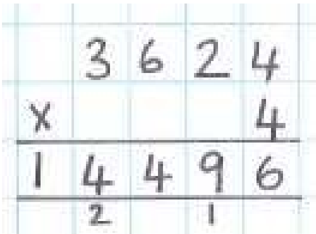
4.2 ÷ 0.6 = 7

Multiply numbers up to four digits by a one or a two-digit number using a formal written method, including long multiplication for two-digit numbers.
When children first start multiplying four-digit numbers, they may prefer to revert to the expanded column method until they feel more confident.

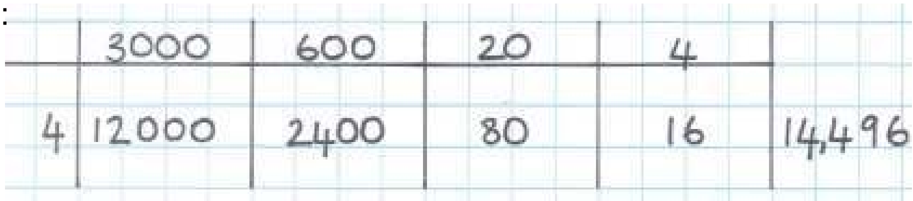
3628 x 4 = ?



They should move on to using **short multiplication** when they are ready.



If children are struggling at any point with these methods, they should return to using the grid method:

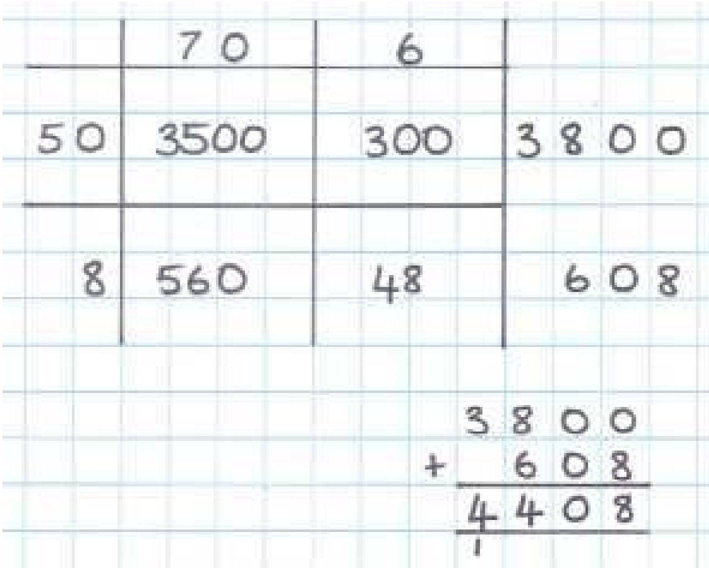


Key Stage 2 Multiplication and Division

Year 5

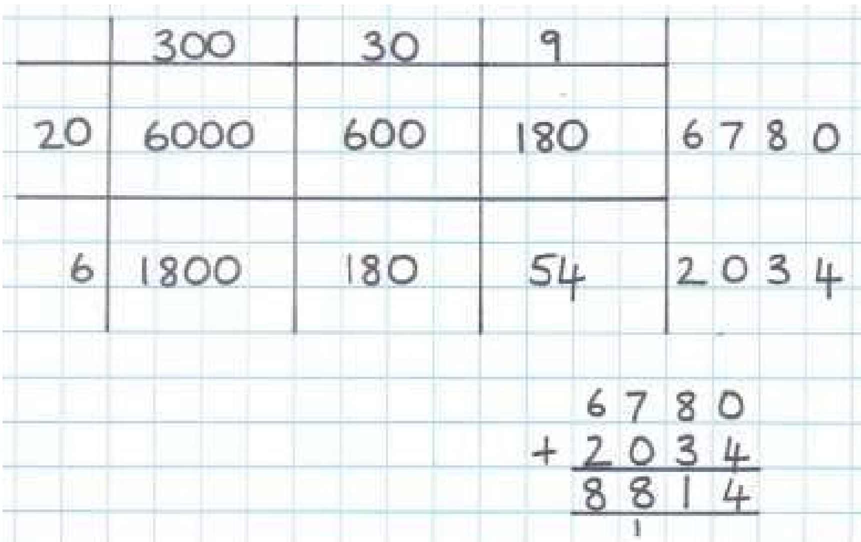
It may also be appropriate to use the **grid method** when children first launch into the process of multiplying a number by a two-digit number.

76 x 58 = ?



76 x 58 = 4408

339 x 26 = ?

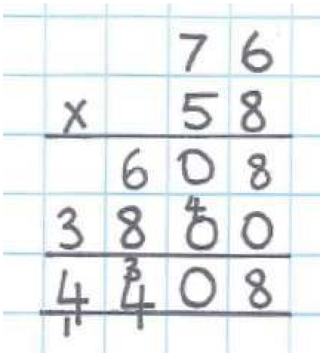


339 x 26 = 8814

Key Stage 2 Multiplication and Division

Year 5

Long multiplication should be introduced as the next step.

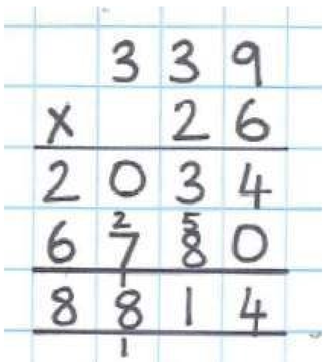


The first step is to solve 76 x 8 using the **short multiplication** method (see Year 4).

The 5 in 58 is 50, or 5 lots of 10. So, instead of multiplying by 50, we can multiply by 10 first and then 5.

To multiply by 10, we move our digits one place to the left; this can be done by putting a 0 in the ones column. **Short multiplication** can then be used to multiply the 76 by 5.

Here is an example of a three-digit number being multiplied by a two-digit one:



Key Stage 2 Multiplication and Division

Year 5

Divide numbers up to four digits by a one-digit number using the formal written method of short division, and interpret remainders appropriately for the context.

With regards to division, children should continue to develop the **short division** method that they began in Year 4.

$$943 \div 7 = ?$$

$$\begin{array}{r} 1 \\ 7\overline{)9\,{}^{2}4\,3} \end{array}$$

Once the calculation has been set out in the appropriate way, the first thing to establish is how many 7s there are in 9. The answer of 1 should be placed on the line above. However, when 9 is divided by 7, there is still 2 left over; we carry this remainder into the next part, as shown.

$$\begin{array}{r} 13 \\ 7\overline{)9\,{}^{2}4\,{}^{3}3} \end{array}$$

The children should now think about how many 7s there are in 24.

The are 3 lots of 7 in 24, with 3 remaining.

$$\begin{array}{r} 134\text{ r6} \\ 7\overline{)9\,{}^{2}4\,{}^{3}3} \end{array}$$

7 goes into 33 four times, with 6 remaining.

$$943 \div 7 = 134\text{ r6}$$

A practical example of **short division** using place value counters is explained in the Year 4 calculation policy.

Key Stage 2 Multiplication and Division

Year 5

Children will also have to express the remainder in a variety of ways, according to the context of the question. In the example just given, it is possible to present it as a fraction.

134 r6

7 | 9 ²4 ³3

943 ÷ 7 = 134 and 6/7s

Some remainders can be represented as a decimal instead:

113 r2

8 | 9 ¹0 ²6

906 ÷ 8 = 113 and 2/8s

= 113.25

Vocabulary:

See Year 4; cube numbers, prime numbers, square numbers, common factors, prime factors, composite numbers, common factors, short division, inverse, power of.

Key Stage 2 Multiplication and Division

Year 6

Children are expected to:

Perform mental calculations, including those with mixed operations and large numbers.

Children should be able to draw upon a number of different mental strategies to help them solve some calculations in their head.

To multiply by 4: *Double* and then *double* again.

To multiply by 5: *Multiply by 10* and then *halve*.

To multiply by 20: *Multiply by 10* and then *double*.

To multiply by 9: *Multiply by 10* and then *adjust*.

To multiply by 6: *Multiply by 3* and then *double*.

As well as knowing the square numbers up to 12 x 12, children are also expected to derive the corresponding squares of multiples of 10:

e.g. 8 x 8 = 64 so... 80 x 80 = 6400

The strategy of rounding should also be used to help make sensible approximations when multiplying or dividing decimal numbers:

3.6 x 18.2

becomes+. 4 x 18 = 72

Identify common factors, common multiples and prime numbers.

As per the Year 4 and 5 calculation policy.

Multiply and divide numbers by 10, 100 and 1000 where the answers are up to 3 decimal places.

See Year 5 calculation policy.

Key Stage 2 Multiplication and Division

Year 6

Use their knowledge of the order of operations to carry out calculations involving the four operations.

The term ‘operation’ refers to the function being carried out in a calculation, such as adding, subtracting, squaring, multiplying and so on. When children are presented with a calculation that includes more than one operation, they need to know which is the correct order to complete it, as doing so in the wrong order will result in an incorrect answer.

For instance, the following calculation will generate two different answers, depending on how it is completed:

6 x 9 + 4 = ?

Either+ 54 + 4 = 58

or+ 6 x 13 = 78

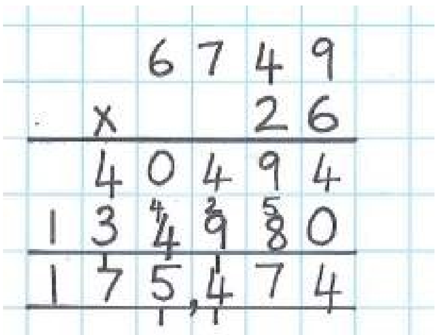
Therefore there needs to be a set of rules for children to follow. They are encouraged to use the acronym **BODMAS** to help them remember.

B brackets
O orders - squared, cubed, square root
DM division and multiplication
AS addition and subtraction

In this regard, the correct order to have completed the example calculation above is:

6 x 9 + 4 = ?
54 + 4 = 58

Multiply multi-digit numbers up to four digits by a two digit whole number using the formal written method of long multiplication.

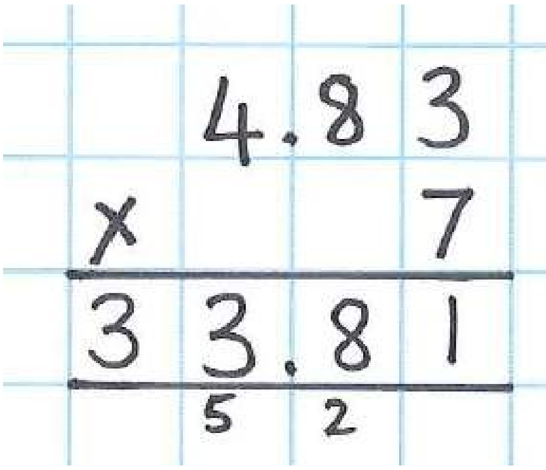


For a more detailed explanation of how to use **long multiplication**, please see the Year 5 calculation policy.

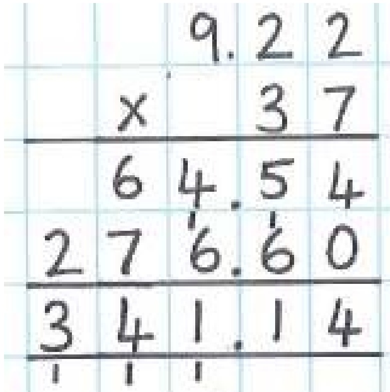
Key Stage 2 Multiplication and Division

Year 6

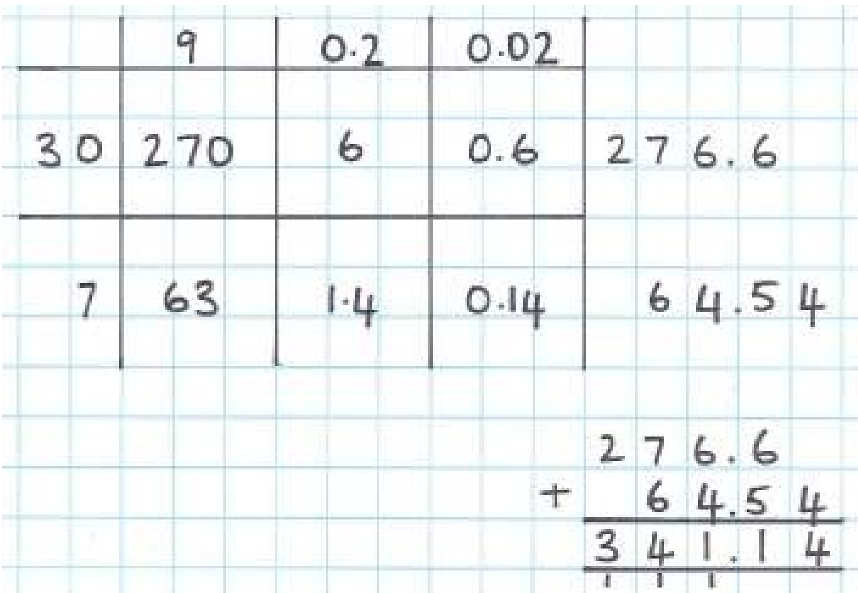
Multiply one-digit numbers with up to two decimal places by whole numbers.



When multiplying a decimal number, it is important to place the decimal point on the answer line before doing anything else. **Short multiplication** should then be used to complete the rest.



Long multiplication can used to multiply a decimal number by a two-digit whole number. Again, the decimal point should be placed on the answer line first.



The **grid method** can be used to build confidence first if necessary.

Key Stage 2 Multiplication and Division

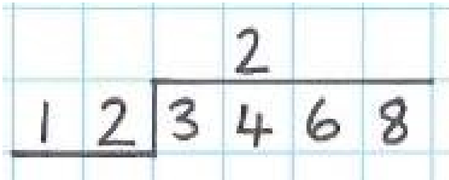
Year 6

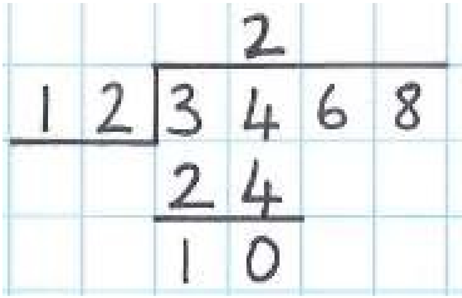
Divide numbers with up to four digits by a two-digit whole number using the formal written method of long division.

When dividing by a two-digit number, children should use a method called **long division**. The steps required to do this are outlined below:

1) How many 12s are there in 3? Since 3 is smaller than 12, there are no 12s in 3.

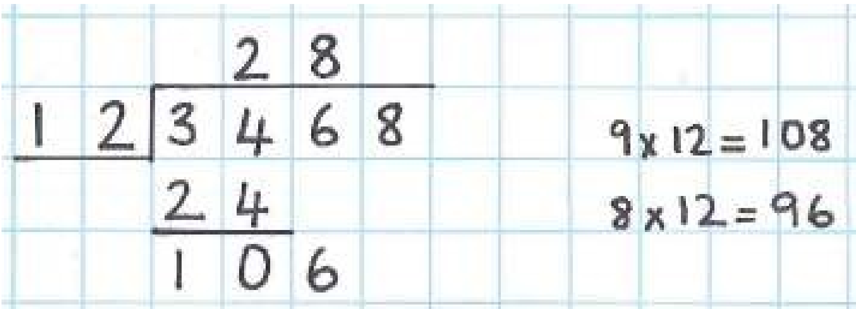
2) So how many 12s are there in 34? We can work out that there are 2 lots of 12 in 34. We write this number above the 4.





3) We then need to write down the exact amount that 2 x 12 comes to underneath the 34, so that we can see how many are left. 34 - 24 = 10

4) Bringing down the next digit, we now need to find out how many 12s there are in 106. Separate jottings on the side may be helpful. The answer of 8 is written above the 6.



Key Stage 2 Multiplication and Division

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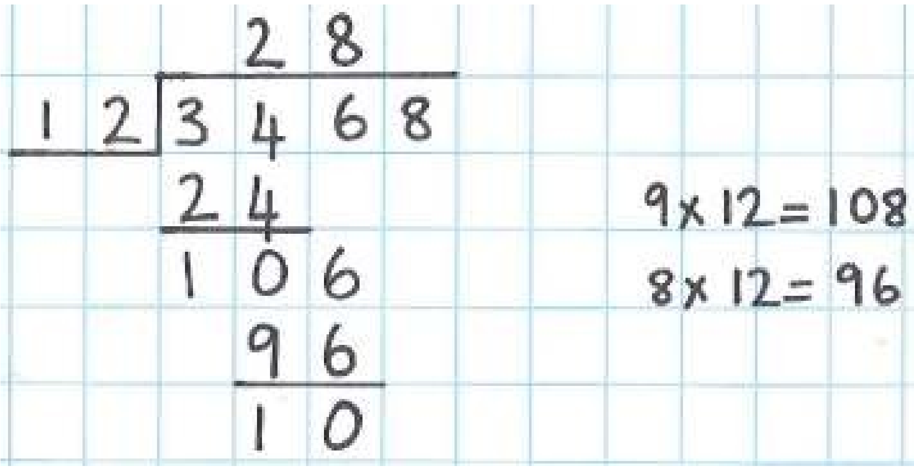
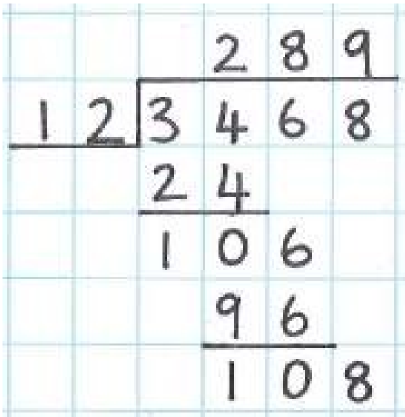
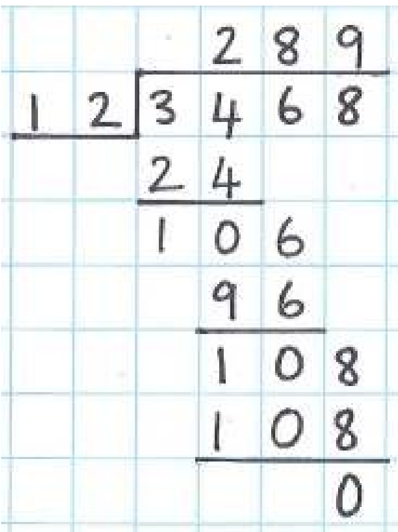
5) Having established that there are 8 lots of 12 in 106, we need to work out how many we have left over. 8 x 12 = 96, leaving a remainder of 10.



6) Again, we bring down the next digit in the question (8). Now we have to calculate how many 12s there are in 108. The answer of 9 is written above the 8.





7) 12 x 9 = 108 which leaves us with no remainders.

So, 3468 ÷ 12 = 289

Key Stage 2 Multiplication and Division

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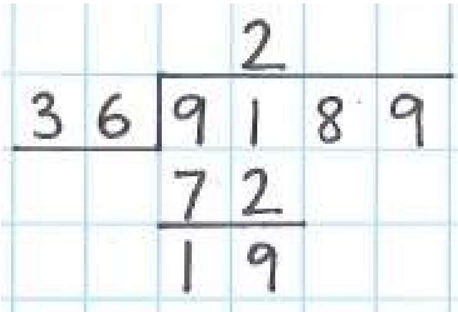
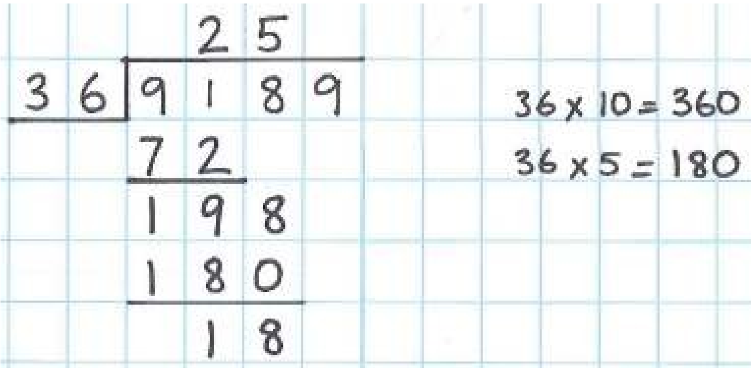
Here is another example where we are left with a remainder:

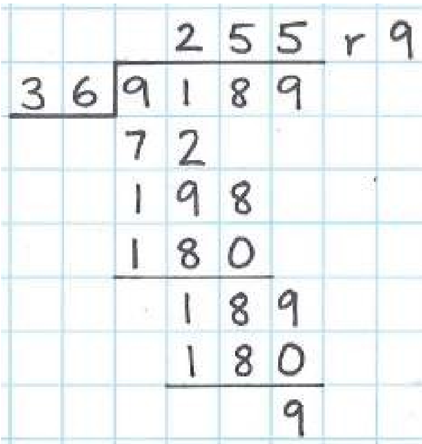


9189 ÷ 36 = ?

1) There are 2 lots of 36 in 91, with 19 left over.

2) There are 5 lots of 36 in 198, with 18 left over.





3) There are 5 lots of 36 in 189 with 9 remaining.

So, 9189 ÷ 36 = 255 r9

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Interpret remainders as whole number remainders, fractions or by rounding, as appropriate for the context.

Children should have an understanding of how to turn a remainder into a fraction or decimal.

In this example... $19 \div 6 = 3\ r1$

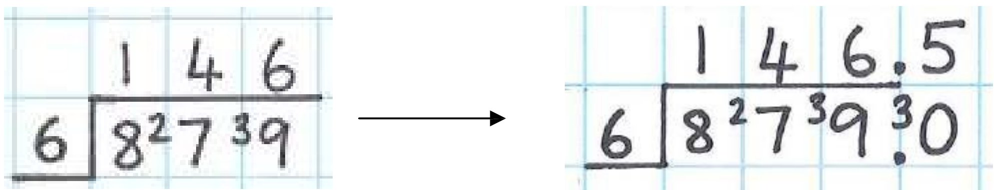
...the remainder can be turned into a fraction by continuing to divide it by 6.

$$19 \div 6 = 3\ 1/6$$

For some examples, the fraction can be simplified.:

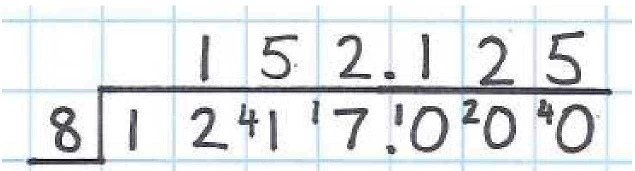
$$26 \div 4 = 6\ r2$$
$$26 \div 4 = 6\ 2/4$$
$$26 \div 4 = 6\ 1/2$$

Children can also express a remainder as a decimal. When using either **short** or **long multiplication**, by adding a decimal point and a zero to the number being divided, we are able to carry on the calculation.



They must also remember to add a decimal point to the answer line, in the same position as the one in the question.

It might be that the children will be presented with an example where they need to add more than one zero on to the number being divided.



Examples where the numbers after the decimal point carry on indefinitely should <u>not</u> be given to the children at this stage.

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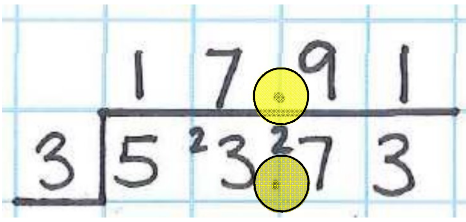
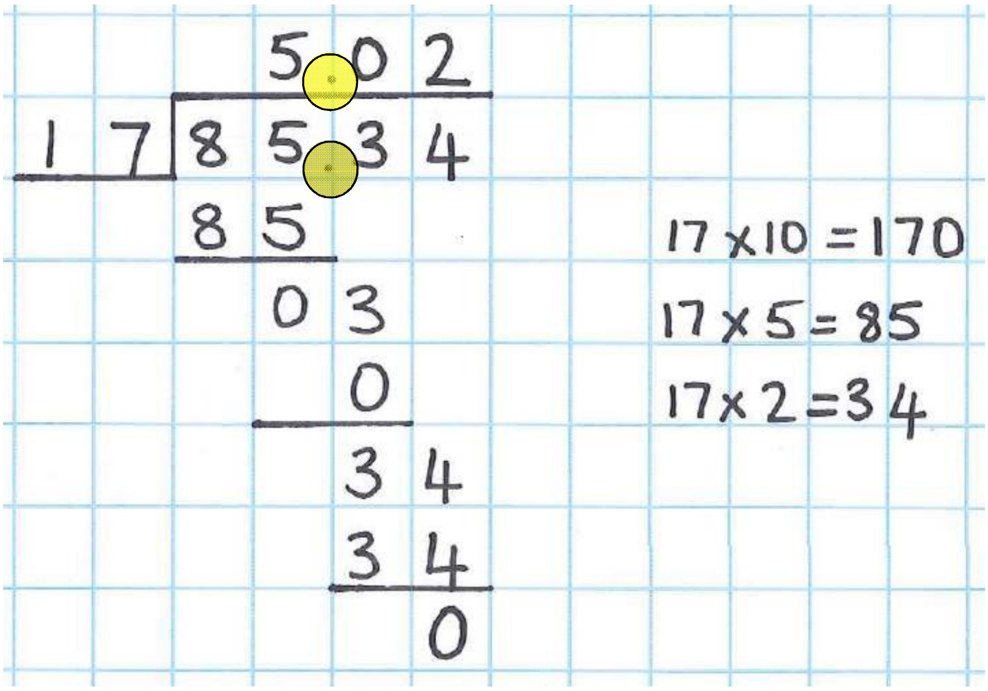
Short and **long division** can be used to divide decimal numbers as well; children simply need to remember to put the decimal point in exactly the same position on the answer line as it is in the question.

53.73 ÷ 3 = 17.91



85.34 ÷ 17 = 5.02



Vocabulary:
See previous years; common factor.