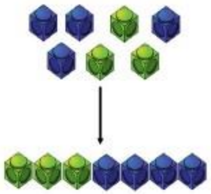
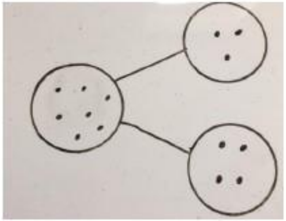
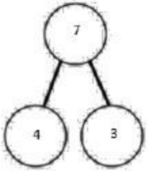
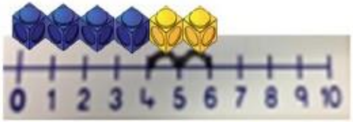
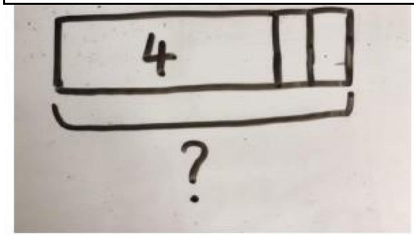
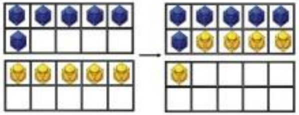
Our policy us based on the **White Rose Maths** policy.

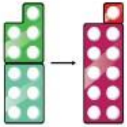
Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, ‘is equal to’ ‘is the same as’

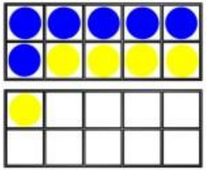
Concrete	Pictorial	Abstract
Combining two parts to make a whole. 		4+3=7 
 Counting on using number lines and cubes.	A bar model which encourages the children to count on rather than count all.  	The abstract number line. 

Regrouping to make 10 using ten frames, Numicon or **straws**.





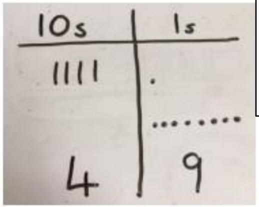
Children draw the ten frame.



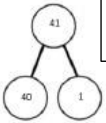
Children to develop an understanding of equality.

eg.
6 + __ = 11
6 + 5 = 5 + __
6 + 5 = __ + 4

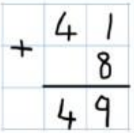
TO + O using base ten or **straws**.



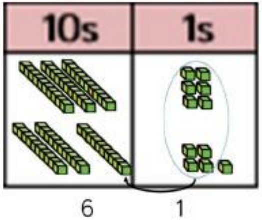
Children to represent the base ten. eg. Lines for tens and dots for ones.

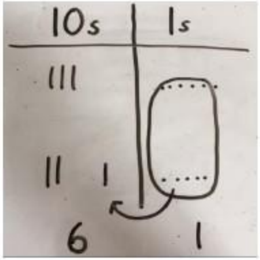


Formal method



TO + TO using base ten or **straws**.



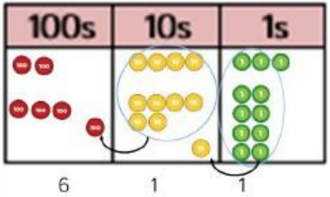


Formal method

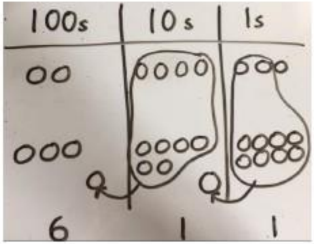
Use straws to demonstrate **regrouping**

$$\begin{array}{r} 36 \\ +25 \\ \hline 61 \\ \hline {\scriptstyle 1} \end{array}$$

Use of place value counters to add HTO + TO and HTO + HTO
When there are 10 ones in the 1s column, we exchange for 1 ten, when there are 10 tens in the 10s column, we exchange for 1 hundred.

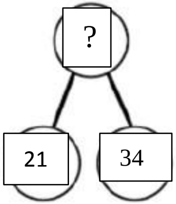


Children to represent the counters in a place value chart, circling when they make an exchange.



$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1\ \ 1 \end{array}$$

Conceptual variation: different ways to ask children to solve 21 + 34



?	
21	34

Word problems:
In year 3, there are 21 children and in year 4, there are 34 children.
How many children in total?

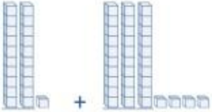
21 + 34 = 55. Prove it

$$\begin{array}{r} 21 \\ +34 \\ \hline \\ \hline \end{array}$$

21 + 34 = 55

☐ = 21 + 34

Calculate the sum of twenty-one and thirty-four.



Missing digit problems

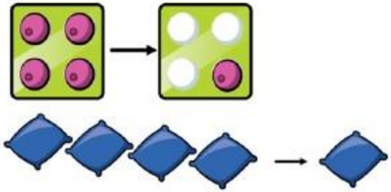
10s	1s
10 10	1
10 10 10	?
?	5

Subtraction

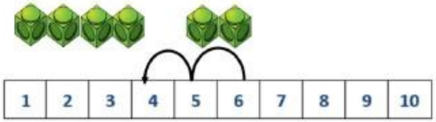
Key language: take away, less than, the difference, subtract, minus, fewer, decrease.

Concrete

Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used)



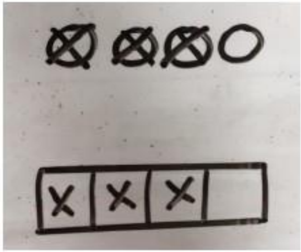
Counting back (using number lines or number tracks) children start with 6 and count back 2

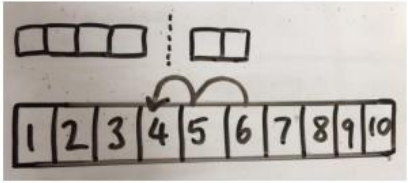


6 – 2 = 4

Pictorial

Children draw the concrete resources they are using and cross out the correct amount.



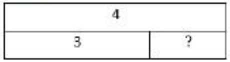


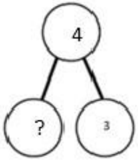
Children to represent what they see pictorially

Abstract

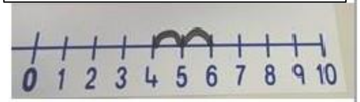
4 - 3= __

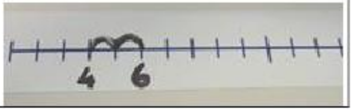
__ = 4 - 3



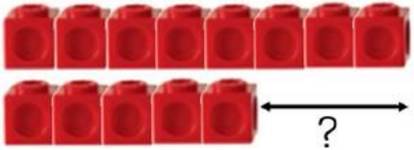


Children represent the calculation on a number line or number track and show their jumps.

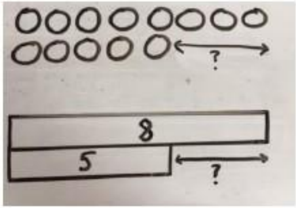




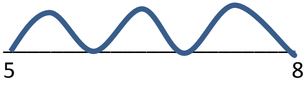
Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used)
Calculate the difference between 8 and 5



Children draw the cubes / other concrete objects which they have used or use the bar model to illustrate what they need to calculate.

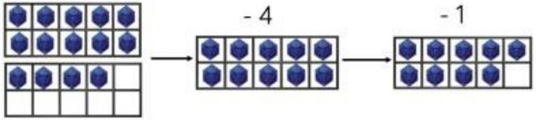


‘Count on’ on a number line to find the difference between 8 and 5.

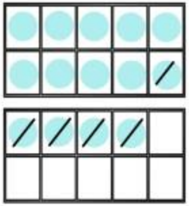


‘How many jumps?’

14 - 5

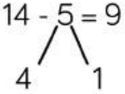


Bridging ten using ten frames.

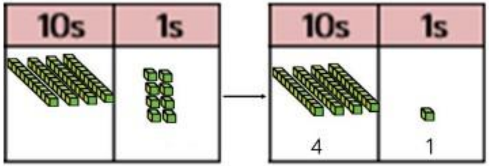


Present the tens frame pictorially.

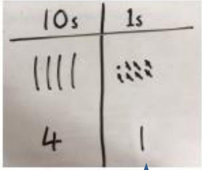
Bridge 10 by partitioning the subtrahend.



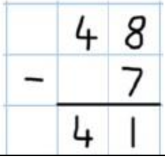
14 – 4 = 10
10 – 1 = 9



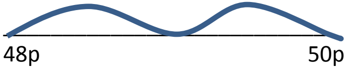
Column method using base 10 **or straws.**



Children to represent the base 10 pictorially.



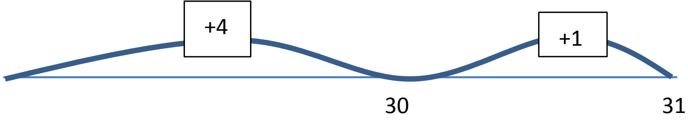
Remember: if the numbers are close together, it’s easier to count on to find the difference! eg. When finding change from 50p



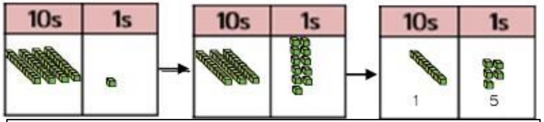
Difference = 2p
Change = 2p

Counting on to find the difference is a great way to check our answers! Especially when the numbers are close together.

Eg. 31 – 26

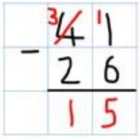


The difference is 5

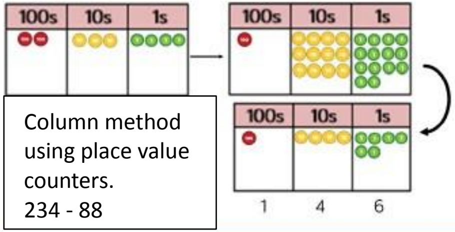


Column method using base ten **or straws** and having to **regroup.** 41 - 26

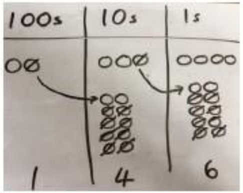
Represent the base 10 pictorially, remembering to show the **regrouping.**



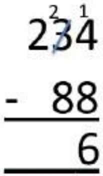
Formal column method.



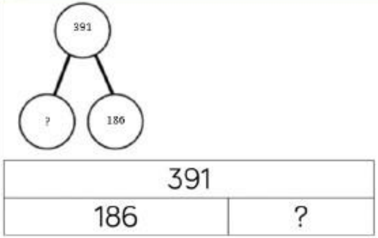
Column method using place value counters.
234 - 88



Represent the place value counters pictorially: remembering to show what has been **regrouped**



Conceptual variation: different ways to ask children to solve 391 - 186



Raj spent £391, Timmy spent £186.
How much more did Raj spend?

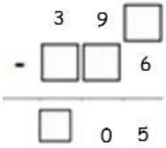
Calculate the difference between 391 and 186

____ = 391 - 186

391
-186
____

What is 186 less than 391?

Missing digit calculations

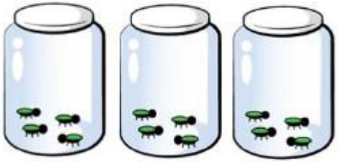


Multiplication

Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

Concrete

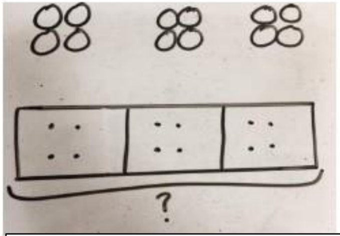
Repeated grouping/ repeated addition
3 x 4
4 + 4 + 4



Number lines to show repeated groups: 3 x 4

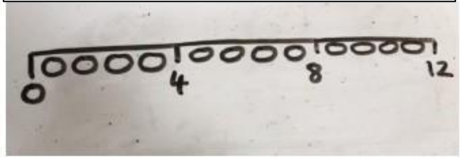
Cuisenaire rods can be used too.

Pictorial



Children represent the practical resources in a picture and use a bar model.

Represent this pictorially alongside a number line.

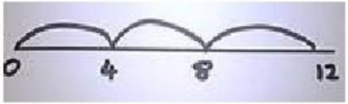


Abstract

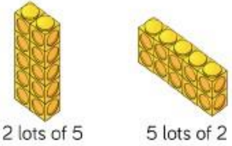
3 x 4 = 12

4 + 4 + 4 = 12

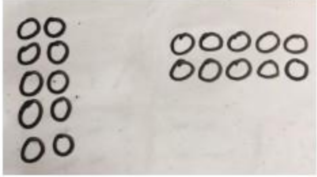
Abstract number line showing three jumps of four.
3 x 4 = 12



Use arrays to illustrate commutativity.
Counters and other objects can also be used
2 x 5 = 5 x 2

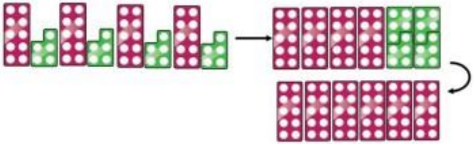


Children to represent the arrays pictorially.

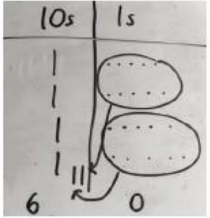


Children to be able to use an array to write a range of calculations.
10 = 2 x 5
5 x 2 = 10
2 + 2 + 2 + 2 + 2 = 10
10 = 5 + 5

Partition to multiply using Numicon, base 10 or Cuisenaire rods 4 x 15



Children to represent the concrete manipulatives pictorially.

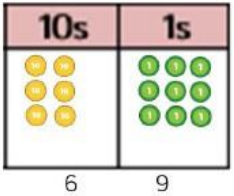


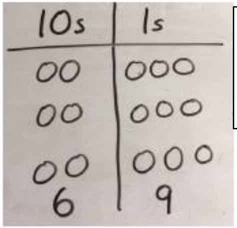
Grid multiplication is an example of partitioning to multiply.

4 x 15

x	10	5
4	40	20

Formal column method with place value counters (base ten can also be used) 3 x 23



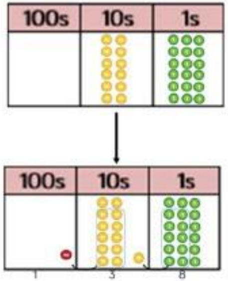


Children to represent the counters pictorially.

Children to record what it is they are doing to show understanding.

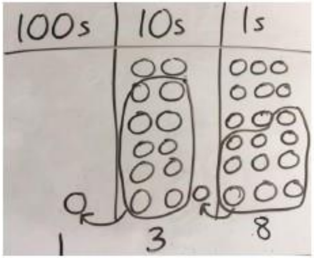
$$\begin{array}{r} 23 \\ \times\ \ 3 \\ \hline 69 \\ \hline \end{array}$$

23 is made of 20 and 3
3 x 3 = 9
20 x 3 = 60
60 + 9 = 69



Formal column method with place value counters.
6 x 23

Children represent the counters pictorially.

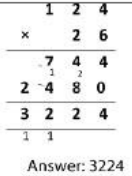


6 x 23 =

$$\begin{array}{r} 23\\ \times\ \ 6\\ \hline 138\\ \hline 1\ 1 \end{array}$$

Formal written method

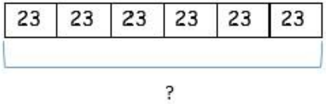
When children start to multiple 3 digits by 3 digits and 4 digits by 2 digits, they should be confident with the abstract.
To get 744 they have solved 6 x 124
To get 2480 they have solved 20 x 124



$$\begin{array}{rrrrr} & & 1 & 2 & 4\\ \times & & & 2 & 6\\ \hline & & \underset{1}{7} & \underset{2}{4} & 4\\ & 2 & 4 & 8 & 0\\ \hline & 3 & 2 & 2 & 4\\ \hline & 1 & 1 & & \end{array}$$

Answer: 3224

Conceptual variation: different ways to ask children to solve 6 x 23



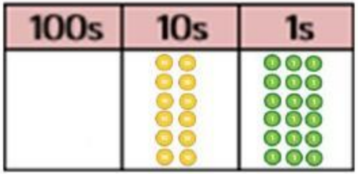
Mai had to swim 23 lengths, 6 times a week.
How many lengths did she swim in one week?

With the counters, prove that 6 x 23 = 138

Find the product of 6 and 23
6 x 23 =
$\boxed{}$ = 6 x 23

$$\begin{array}{r} 6\\ \times\ 23\\ \hline \end{array} \qquad \begin{array}{r} 23\\ \times\ \ 6\\ \hline \end{array}$$

What is the calculation?
What is the product?

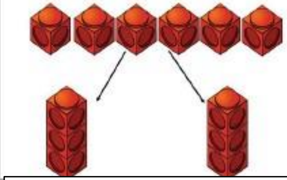


Division

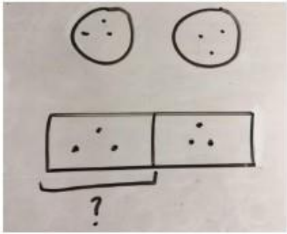
Key language: share, group, divide, divided by, half.

Concrete

Sharing using a range of objects 6 ÷ 2



Pictorial

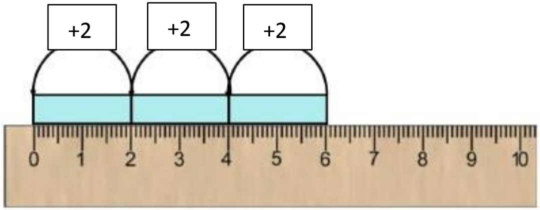


Abstract

3	3

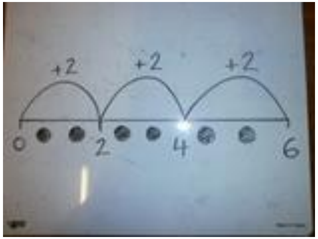
Follow ‘sharing’ of objects with ‘grouping’ of objects eg. For 6 ÷ 2, we put 6 objects into groups of 2. How many groups do we have? Three groups.

Use the language: ‘How many 2s make 6?’

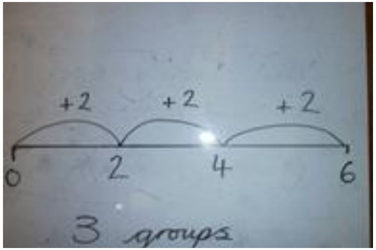


3 groups of 2

Repeated addition using Cuisenaire rods above a ruler/ in a Cuisenaire track.



Children represent repeated addition pictorially.

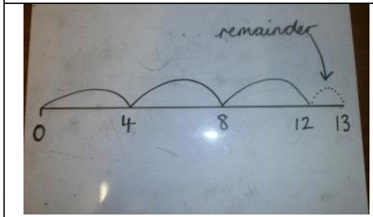


3 groups

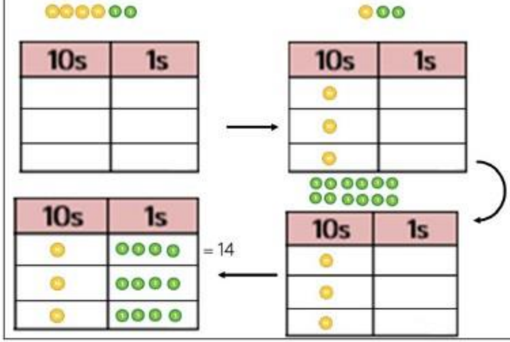
2 digit ÷ 1 digit with remainders using counters.
Cuisenaire rods, above a ruler, can also be used.
13 ÷ 4
There are 3 groups of 4 with 1 left over.

Children represent counters pictorially.

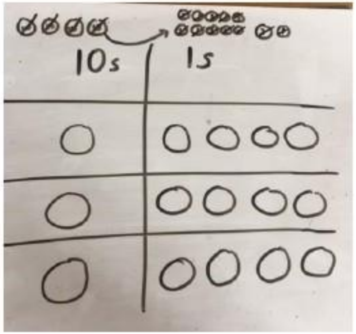
13 ÷ 4 = 3 remainder 1
Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line



Sharing using place value counters 42 ÷ 3 =14



Represent the place value counters pictorially.



Children to be able to make sense of the place value counters and write calculations to show the process.

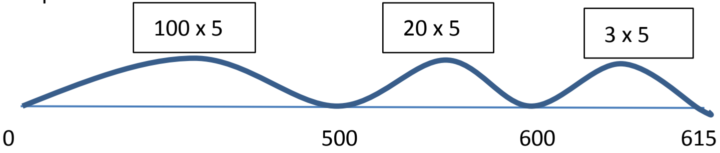
42 ÷ 3
42 = 30 + 12
30 ÷3 = 10
12 ÷3 = 4
10 + 4 = 14

It is inefficient to use 'sharing' to solve problems like 144 ÷ 12. 'Sharing' between 12 would take a long time!

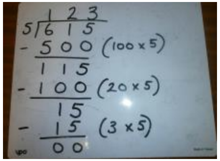
Instead, we can use 'grouping to find our share' eg. When sharing 144 sweets between 12: for each group of 12 sweets, I get one sweet.

Before you move on to short division, Look at division using key multiplication facts and a number line
Key facts:
10 x 5 = 50
20 x 5 = 100
100 x 5 = 500

615 ÷ 5 = 123

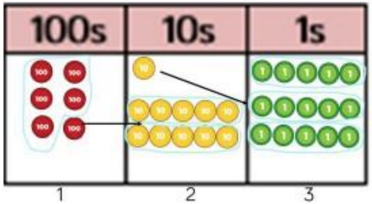


Use key multiplication facts and repeated subtraction

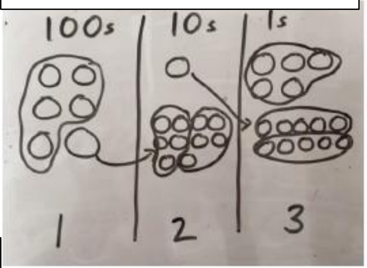


$$\begin{array}{rl} & 123 \\ 5 & \overline{)615} \\ - & 500 \ (100 \times 5) \\ & \overline{115} \\ - & 100 \ (20 \times 5) \\ & \overline{15} \\ - & 15 \ (3 \times 5) \\ & \overline{00} \end{array}$$

Short division using place value counters or base ten.



1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?



Represent the place value counters pictorially.

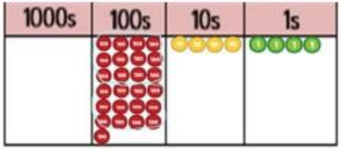
Children to solve the calculation using the short division scaffold.

$$\begin{array}{r} 123 \\ 5\overline{)6\,{}^{1}1\,{}^{1}5} \end{array}$$

Draw the children’s attention to what this model really represents.

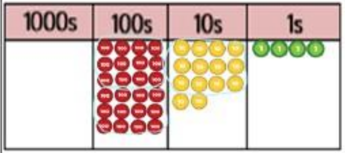
Long division using place value counters
2544 ÷ 12

We can't group 2 thousands into groups of 12 so will exchange them.



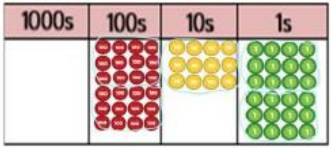
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$\begin{array}{r} 02 \\ 12\overline{)2544} \\ 24 \\ \hline 1 \end{array}$$



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

$$\begin{array}{r} 021 \\ 12\overline{)2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 2 \end{array}$$

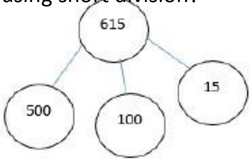


After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

$$\begin{array}{r} 0212 \\ 12\overline{)2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{array}$$

Conceptual variation: different ways to ask children to solve 615 ÷ 5

Using the part whole model below, How can you divide 615 by 5 without using short division?



I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

$$5\overline{)615}$$

615 ÷ 5 =

☐ = 615 ÷ 5

What is the calculation?
What is the answer?