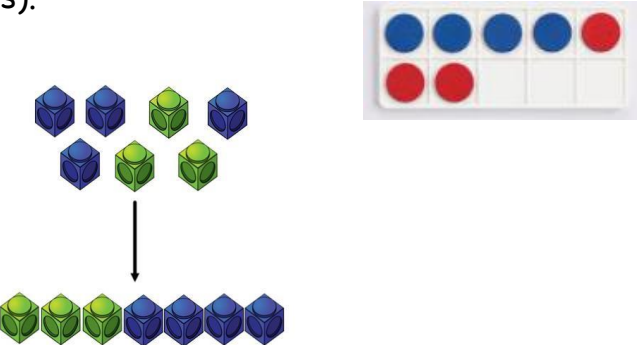
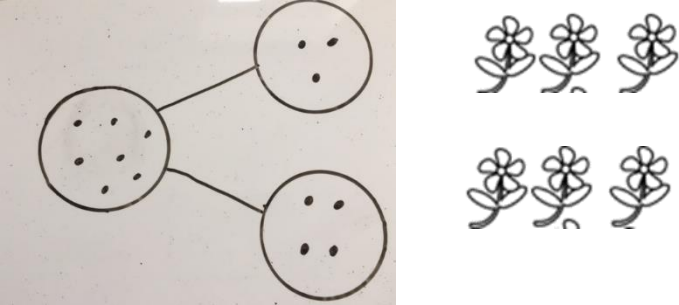
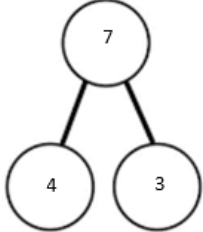

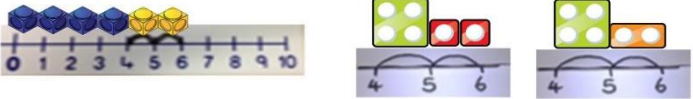
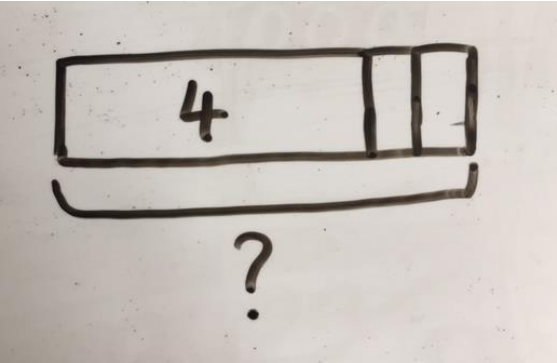



Trafalgar Infants Calculation Policy 2022

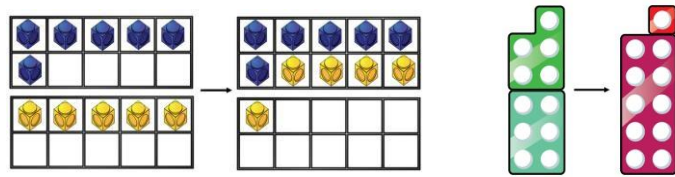
The following pages show the progression in calculation (addition, subtraction, multiplication and division) and how this works in line with the National Curriculum. The consistent use of the CPA (concrete, pictorial, abstract) approach helps children develop mastery across all the operations in an efficient and reliable way. This policy shows how these methods develop children's confidence in their understanding of both written and mental methods.

Calculation policy: Addition

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

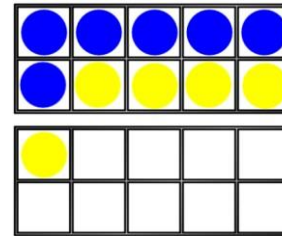
Concrete	Pictorial	Abstract
<p>Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars).</p>  <p>The image shows two groups of cubes: four blue cubes and three green cubes. An arrow points to a single row of seven cubes, four blue and three green. To the right is a ten-frame with four blue dots in the top row and three red dots in the bottom row.</p>	<p>Children to represent the cubes using dots or crosses. They could put each part on a part whole model.</p>  <p>The image shows a hand-drawn part-whole model with a large circle containing seven dots, connected to two smaller circles containing four and three dots. To the right are two rows of three simple flower drawings.</p>	<p>$4 + 3 = 7$ Four is a part, 3 is a part and the whole is seven.</p>  <p>A diagram showing a large circle with the number 7 inside, connected by lines to two smaller circles below it, containing the numbers 4 and 3.</p>
<p>Counting on by adding one more to a group of objects.</p>  <p>A photograph of several colorful toy cars (red, green, blue, orange) on a surface. A hand is shown placing a red car next to a group of four other cars.</p> <p>Using number lines using cubes or Numicon.</p>  <p>Three number lines are shown. The first is a ruler from 0 to 10 with blue cubes placed on numbers 1-4 and yellow cubes on 5-6. The second and third are Numicon blocks with green and red blocks on a number line from 4 to 6.</p>	<p>A bar model which encourages the children to count on, rather than count all.</p>  <p>A hand-drawn bar model with a large rectangle divided into four equal sections. The first section is labeled with the number 4. Below the bar is a bracket spanning the entire length, with a question mark underneath it.</p>	<p>The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? $4 + 2$</p>  <p>A number line from 4 to 6 with two curved arrows above it. The first arrow starts at 4 and ends at 5. The second arrow starts at 5 and ends at 6.</p>

Regrouping to make 10; using ten frames and counters/cubes or using Numicon.



$$6 + 5$$

Children to draw the ten frame and counters/cubes.



Children to develop an understanding of equality e.g.

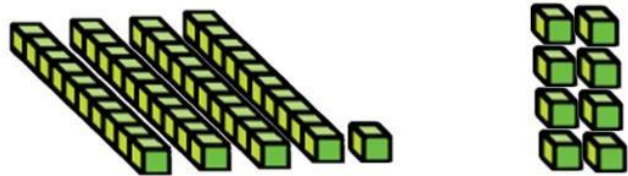
$$6 + \square = 11$$

$$6 + 5 = 5 + \square$$

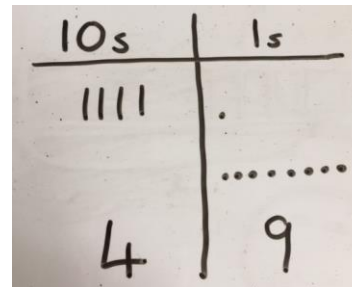
$$6 + 5 = \square + 4$$

TO + O using base 10. Continue to develop understanding of partitioning and place value.

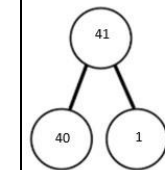
$$41 + 8$$



Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.



$$41 + 8$$

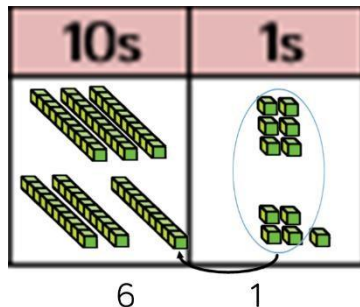


$$1 + 8 = 9$$

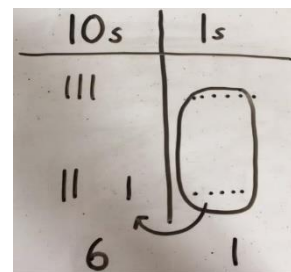
$$40 + 9 = 49$$

	4	1
+		8
<hr/>		
	4	9

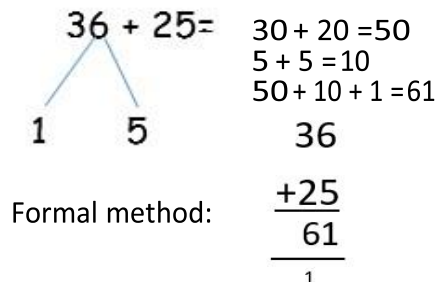
TO + TO using base 10. Continue to develop understanding of partitioning and place value.
 $36 + 25$



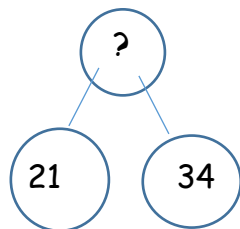
Children to represent the base 10 in a place value chart.



Looking for ways to make 10.



Conceptual variation; different ways to ask children to solve $21 + 34$



?	
21	34

Word problems:
 In year R, there are 21 children and in year 1, there are 34 children.
 How many children in total?

$21 + 34 = 55$. Prove it

21

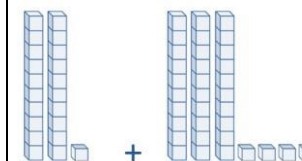
+34

—

$21 + 34 =$

 = $21 + 34$

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

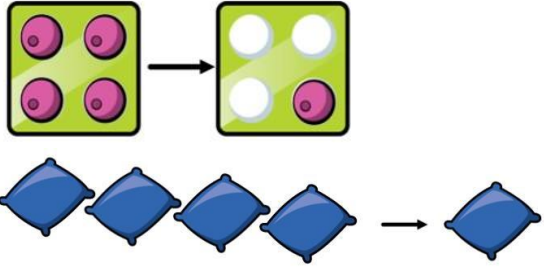
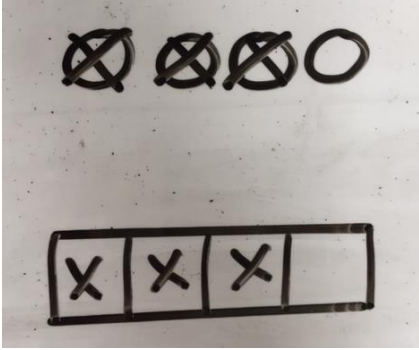

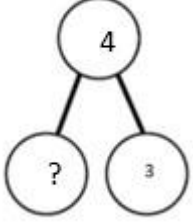
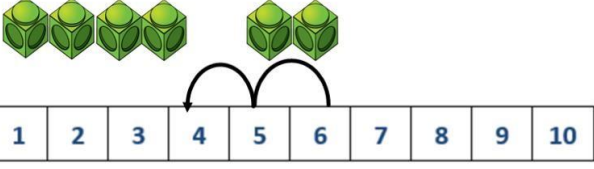
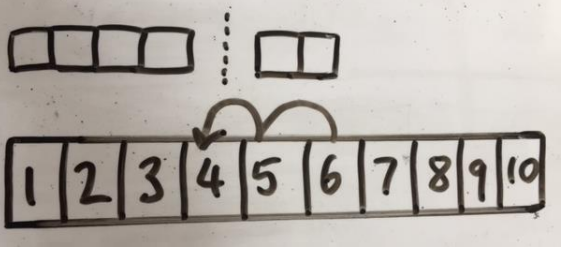
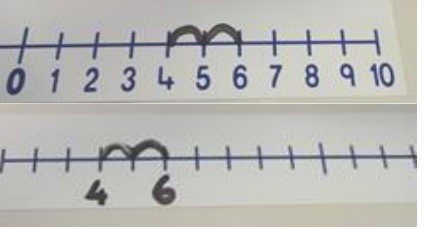


Missing digit problems:

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

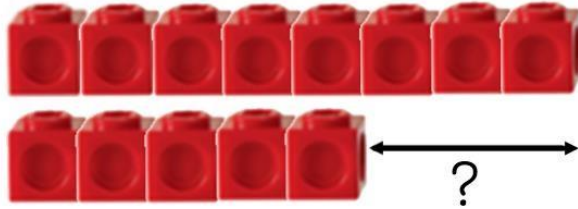
Calculation policy: Subtraction

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

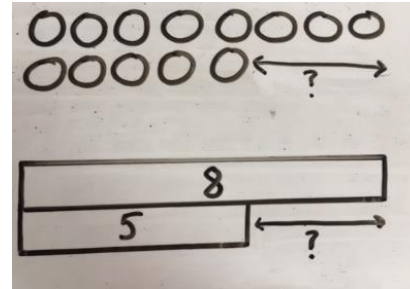
Concrete	Pictorial	Abstract				
<p>Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).</p> <p>$4 - 3 = 1$</p> 	<p>Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.</p> 	<p>$4 - 3 =$</p> <p> = $4 - 3$</p> <table border="1" data-bbox="1706 657 2020 737"> <tr> <td colspan="2">4</td> </tr> <tr> <td>3</td> <td>?</td> </tr> </table> 	4		3	?
4						
3	?					
<p>Counting back (using number lines or number tracks) children start with 6 and count back 2.</p> <p>$6 - 2 = 4$</p> 	<p>Children to represent what they see pictorially e.g.</p> 	<p>Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line</p> 				

Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used).

Calculate the difference between 8 and 5.



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

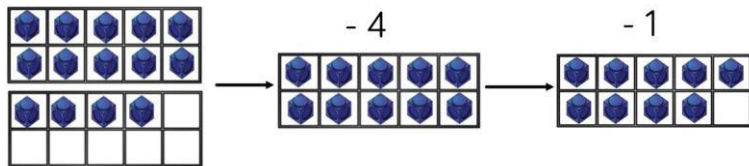


Find the difference between 8 and 5.

8 - 5, the difference is

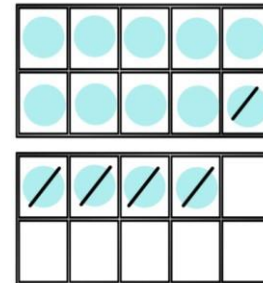
Children to explore why
 $8 - 6 = 8 - 5 = 7 - 4$
 all have the same difference.

Making 10 using ten frames.



14 - 5

Children to present the ten frame pictorially and discuss what they did to make 10.



Children to show how they can make 10 by partitioning the subtrahend.

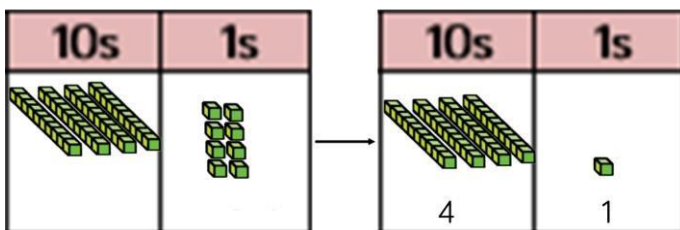
$$14 - 5 = 9$$

$$\begin{array}{c} 4 \quad 1 \end{array}$$

$$14 - 4 = 10$$

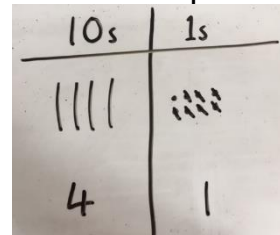
$$10 - 1 = 9$$

Column method using base 10.



48-
7

Children to represent the base 10 pictorially.



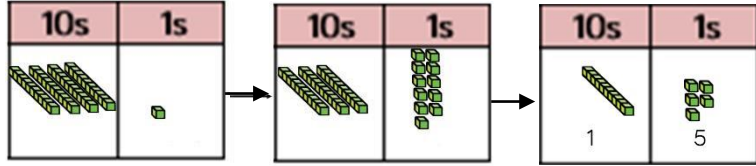
Column method or children could count back 7.

	4	8
-		7
	4	1

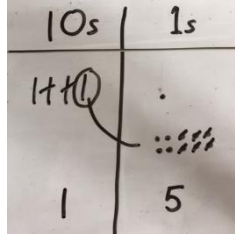
Calculation policy: Multiplication

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

Column method using base 10 and having to exchange. $41 - 26$



Represent the base 10 pictorially, remembering to show the exchange.

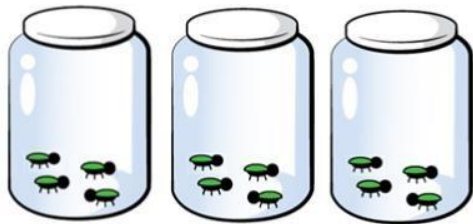


Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because $41 = 30 + 11$.

	3	1
-	4	1
	2	6
	1	5

Concrete

Repeated grouping/repeated addition
 3×4
 $4 + 4 + 4$

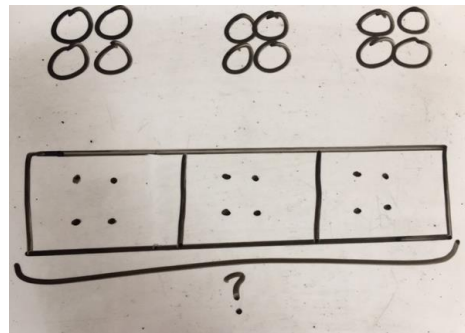


There are 3 equal groups, with 4 in each group.



Pictorial

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

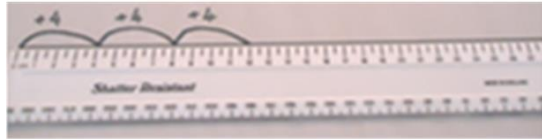


Abstract

$$3 \times 4 = 12$$

$$4 + 4 + 4 = 12$$

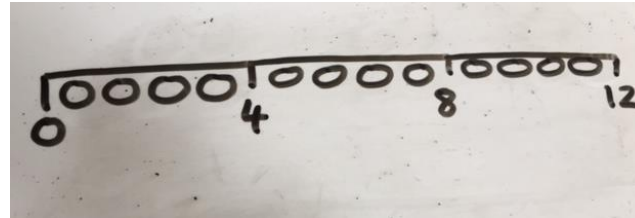
Number lines to show repeated



groups- 3×4

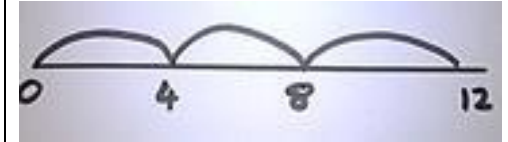
Cuisenaire rods can be used too.

Represent this pictorially alongside a number line e.g.:



Abstract number line showing three jumps of four.

$$3 \times 4 = 12$$

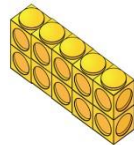


Use arrays to illustrate commutativity counters and other objects can also be used.

$$2 \times 5 = 5 \times 2$$

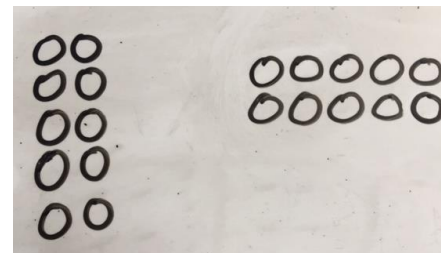


2 lots of 5



5 lots of 2

Children to represent the arrays pictorially.



Children to be able to use an array to write a range of calculations e.g.

$$10 = 2 \times 5$$

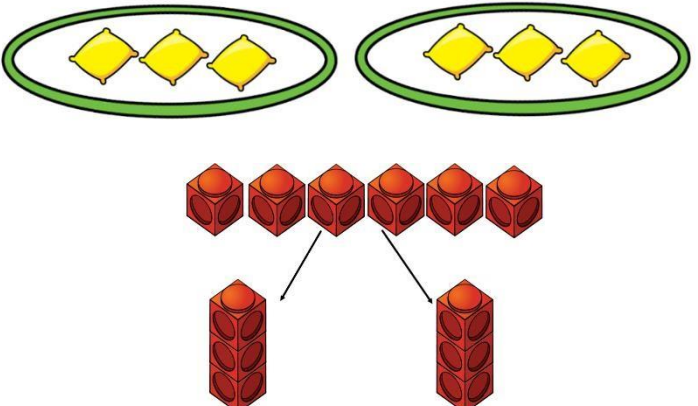
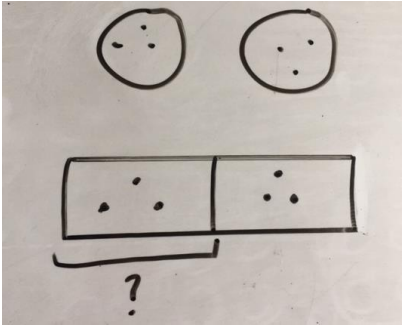
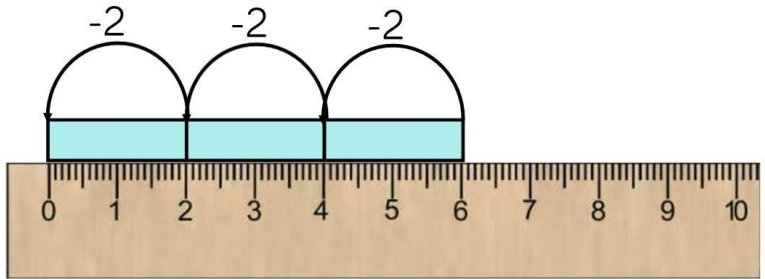
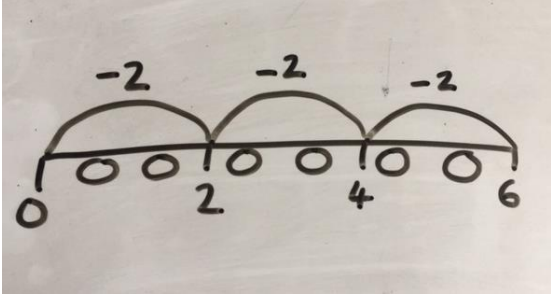
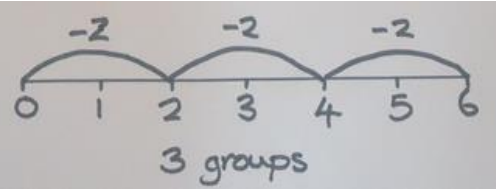
$$5 \times 2 = 10$$

$$2 + 2 + 2 + 2 + 2 = 10$$

$$10 = 5 + 5$$

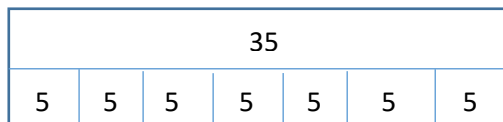
Calculation policy: Division

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

Concrete	Pictorial	Abstract		
<p>Sharing using a range of objects. $6 \div 2$</p>  <p>The diagram shows two groups of three yellow diamonds, each enclosed in a green oval. Below this, six red Cuisenaire rods are arranged in a horizontal row. Two arrows point from the first and fourth rods to two separate vertical stacks of three rods each, representing two groups of three.</p>	<p>Represent the sharing pictorially.</p>  <p>The diagram shows two hand-drawn circles, each containing three dots. Below them is a hand-drawn bar model divided into two equal sections, each containing three dots. A bracket under the first section is labeled with a question mark, indicating the unknown number of groups.</p>	<p>$6 \div 2 = 3$</p> <table border="1" data-bbox="1608 434 2063 502"><tr><td>3</td><td>3</td></tr></table> <p>Children should also be encouraged to use their 2 times tables facts.</p>	3	3
3	3			
<p>Repeated subtraction using Cuisenaire rods above a ruler/ number line. $6 \div 2$</p>  <p>The diagram shows a ruler with markings from 0 to 10. A light blue Cuisenaire rod is placed above the ruler, spanning from 0 to 6. Three arches are drawn above the rod, each labeled '-2', representing three groups of 2 being subtracted from 6.</p> <p>3 groups of 2</p>	<p>Children to represent repeated subtraction pictorially.</p>  <p>The diagram shows a hand-drawn number line from 0 to 6. Small circles are drawn at each integer mark. Three arches are drawn above the line, each labeled '-2', starting at 0 and ending at 2, 4, and 6 respectively, representing three groups of 2.</p>	<p>Abstract number line to represent the equal groups that have been subtracted.</p>  <p>The diagram shows a hand-drawn number line from 0 to 6. Three arches are drawn above the line, each labeled '-2', starting at 0 and ending at 2, 4, and 6 respectively. Below the line, the text '3 groups' is written.</p>		

Conceptual variation; different ways to ask children to show $35 \div 5$

Using the bar model below, how can you divide 35 by 5?



I have £35 and share it equally between 5 people. How much will be in each person get?

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

$$35 \div 5 =$$

$$\square = 35 \div 5$$

What is the calculation?
What is the answer?

