

9

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# Multiplication and Division

=

7

x

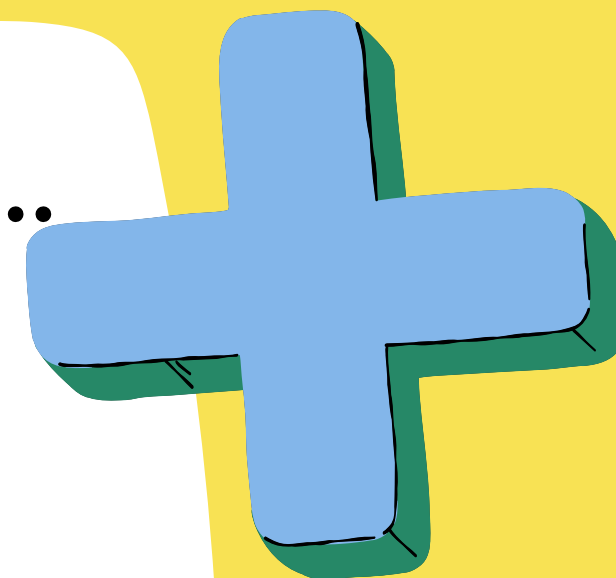


**We didn't do it that way when I was at school.....**

**I'm useless at maths.....**

**You'll never have to do that again once you leave school....**

**I can't calculate to save my life....**



# Try These!

What thoughts  
come to mind  
when you see.....



Feelings?

Strategy?

$\begin{array}{r} 248 \\ \times 22 \\ \hline \end{array}$	$\begin{array}{r} 734 \\ \times 74 \\ \hline \end{array}$
$\begin{array}{r} 349 \\ \times 91 \\ \hline \end{array}$	$\begin{array}{r} 652 \\ \times 51 \\ \hline \end{array}$

$$7 \times 10$$

$$2 \times 3$$

$$173 \div 6$$

$$7 \overline{) 2982}$$

# Our children

We want them to feel **fully equipt** to understand and solve calculations.

We want them to have a **range of strategies** to solve calculations.

We want them to **understand** the processes involved in answering calculations.

We want them to **recognise** when answers to calculations are reasonable.

We want them to feel **confident**.

To do all of these children need a solid understanding of number and counting.

# Let's start in EYFS

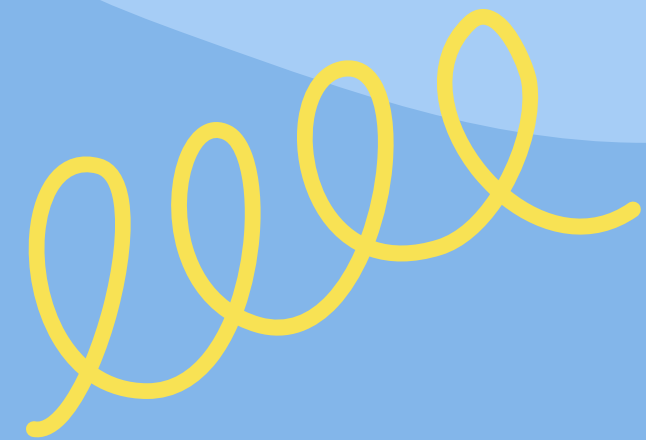
Play

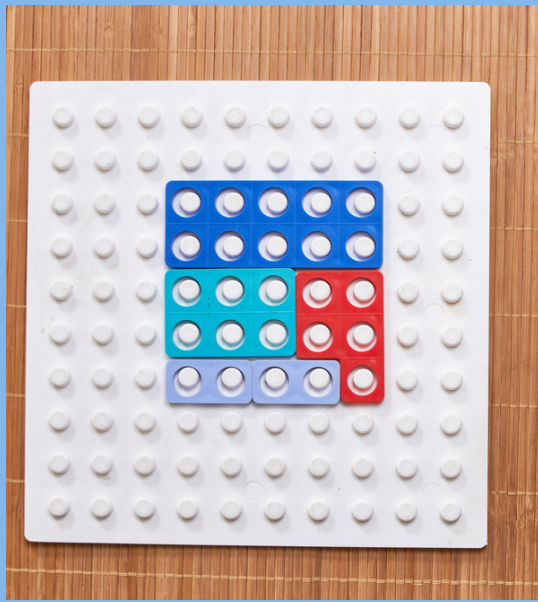
Explore

Hypothesise

Investigate

Connect

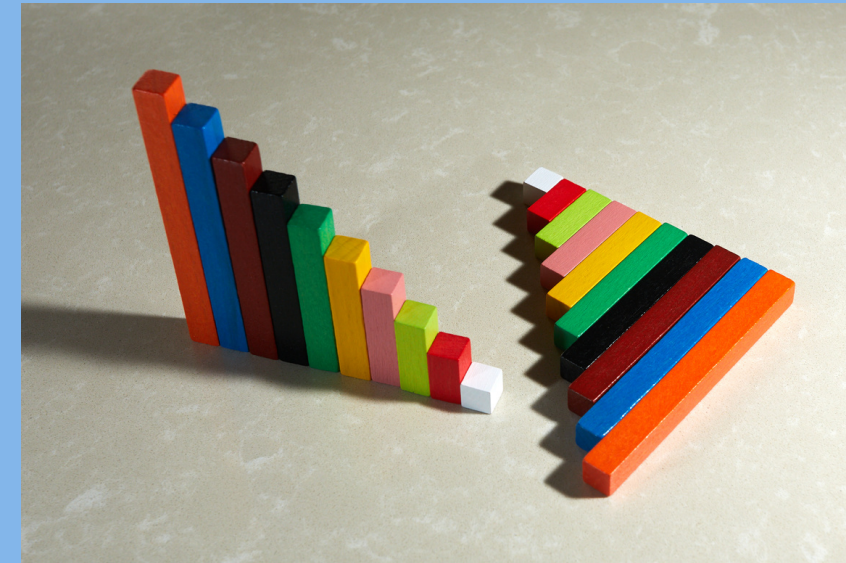




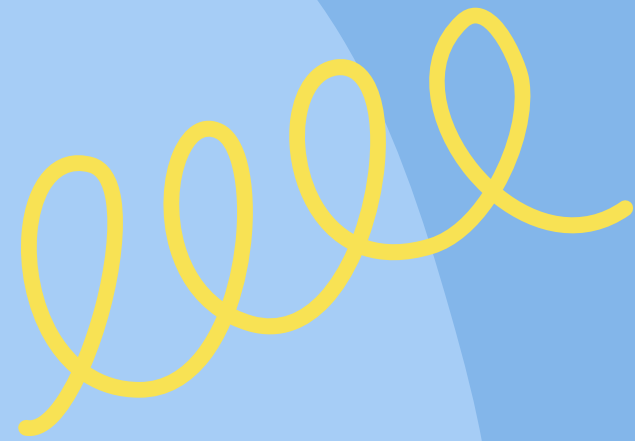
### 100 Square

91	92	93	94	95	96	97	98	99	100
81	82	83	84	85	86	87	88	89	90
71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
1	2	3	4	5	6	7	8	9	10

twinkl



# Exploring patterns with numbers



What do you notice about the groups of objects on your trays?

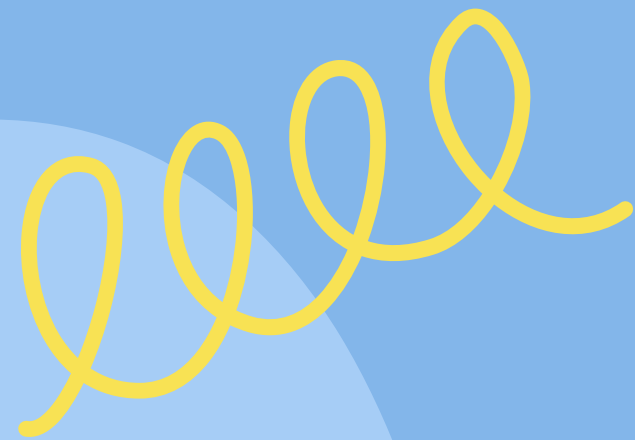
I have the same number of things on my tray as Sam. Our groups are equal.

I do not have the same number of things on my tray as James. Our groups are not equal.

## Equal and unequal



# Identify doubles and halves

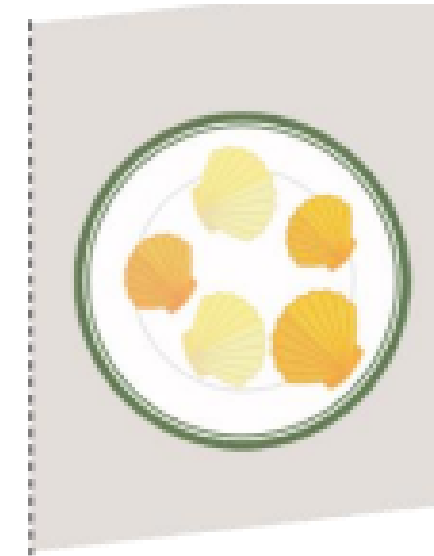
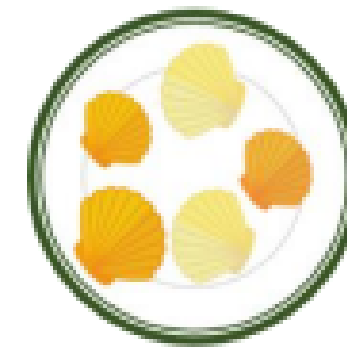


What do you see in the mirror?

I can see my things again.

So how many things are there on the plate in the mirror?

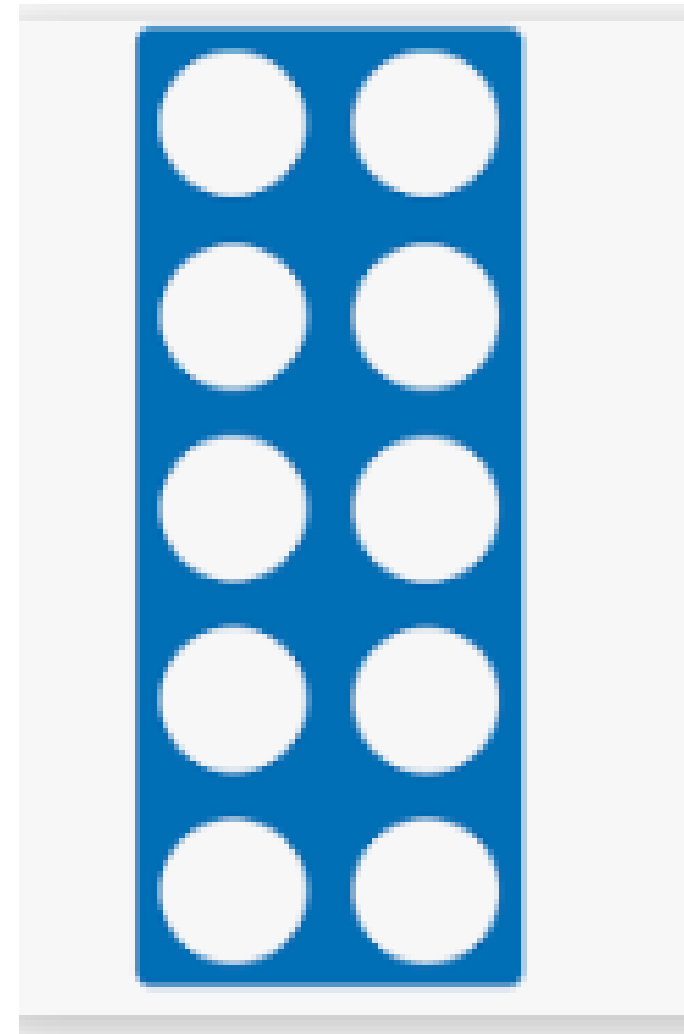
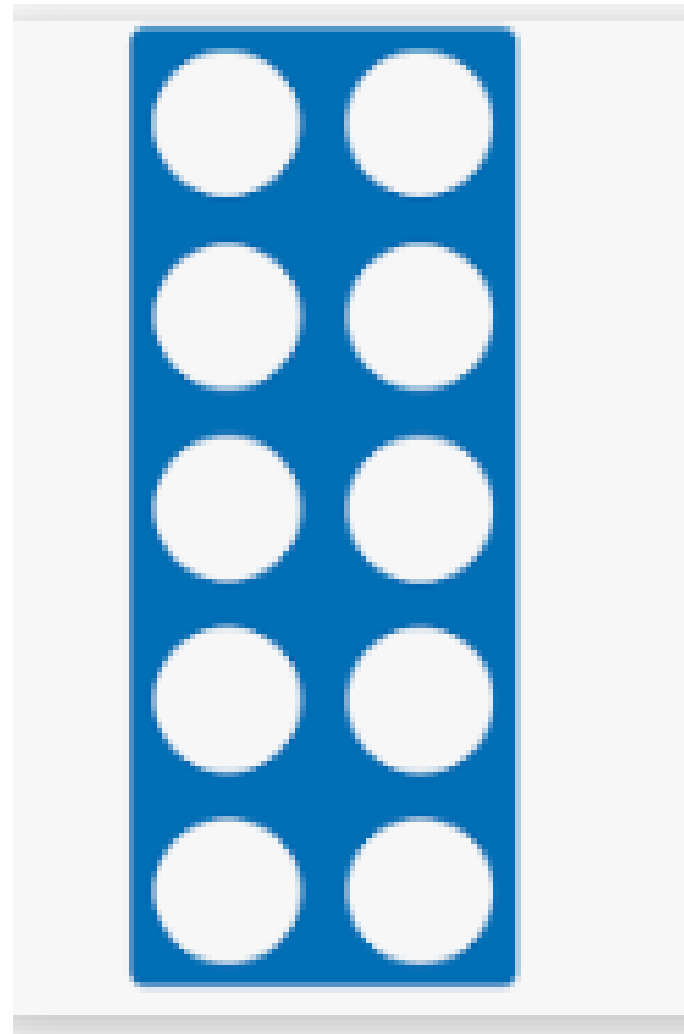
So how many things can you see altogether?



There must be five just like on my plate.

Ten things altogether. I can just double 5.

# Identify doubles and halves



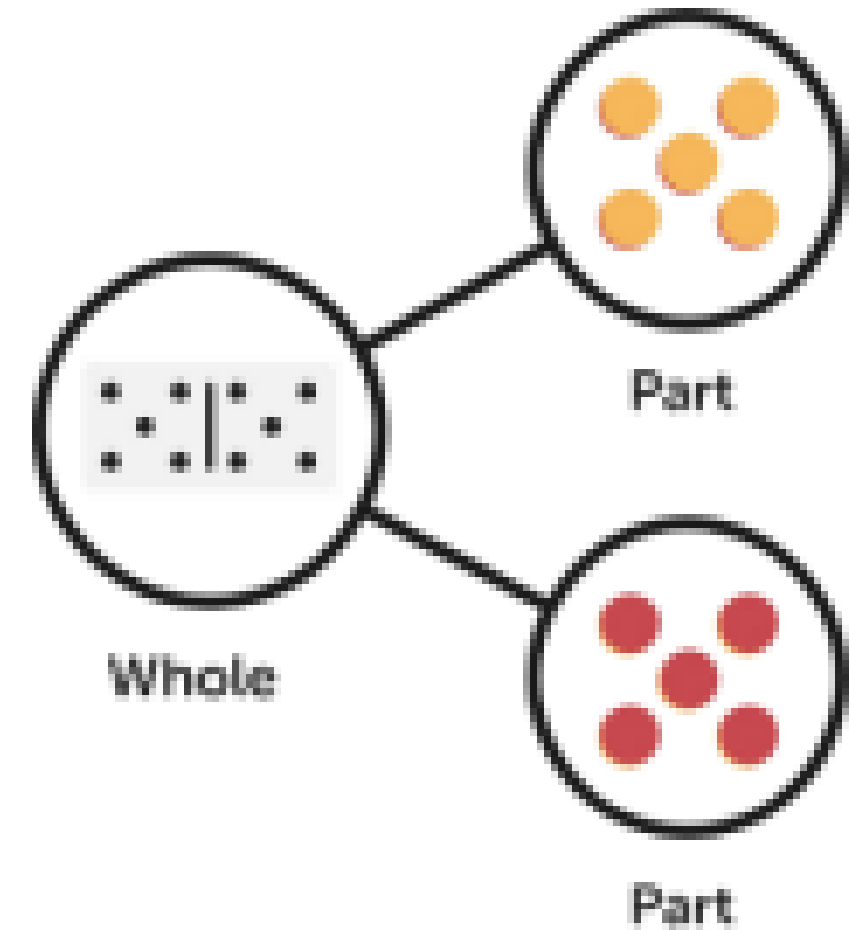
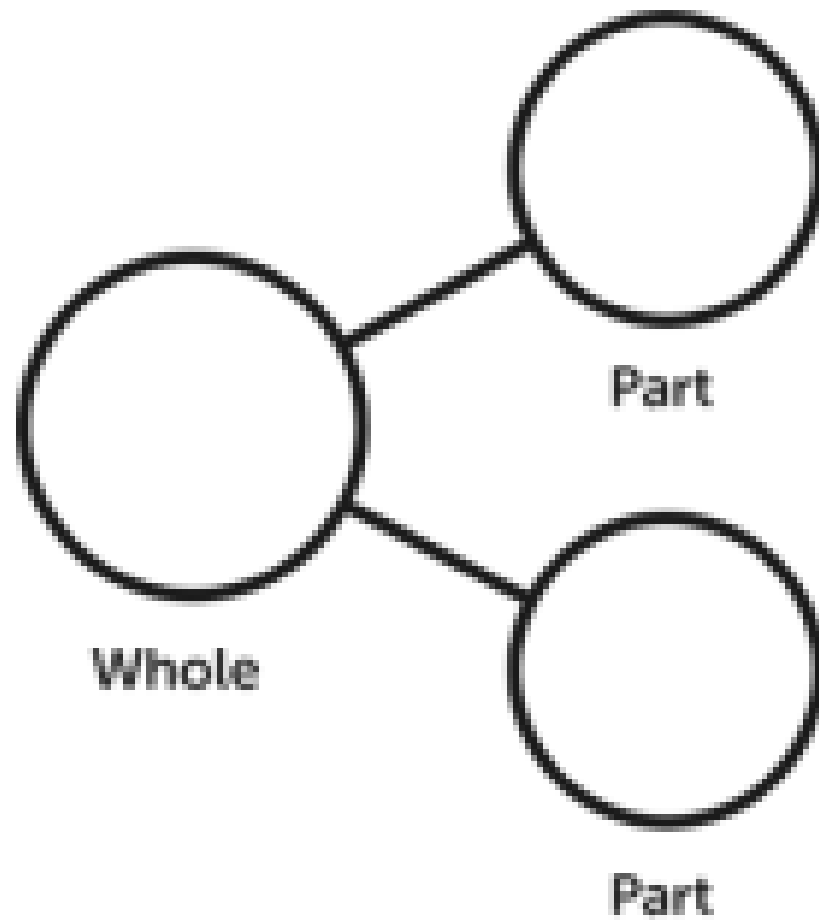
# Identify doubles and halves



Teach the children how to play Dominoes; establish that the number of dots on the opposite sides of each brick must be equal when they touch and therefore will form a double. How many doubles can they find in a domino snake? (A line of dominoes). Then ask them to find the double dominoes (e.g. the double 3 domino) and to predict how many doubles there will be in a complete set of dominoes



# Linking doubles and halves



**Sharing into 2 equal groups**

# Key language

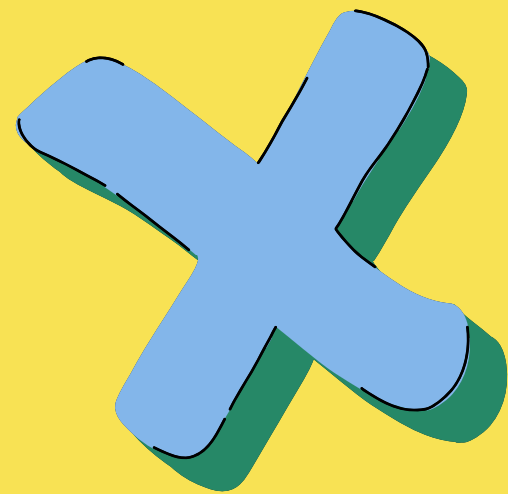
**Double**  
**Half/halve**  
**Equal**  
**Doubling/Halving**  
**Twice as many**  
**Half as many**

**In context and with concrete resources**

# Counting in different sized jumps.....

**Rehearse counting in  
2s and 10s**  
**Forwards and  
backwards**

llll



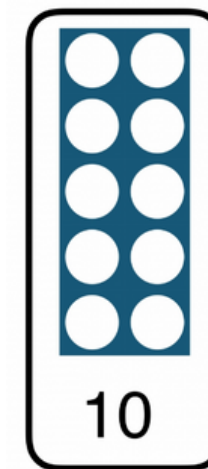
**1**

**Whisper  
games**



**2**

**With  
resources**




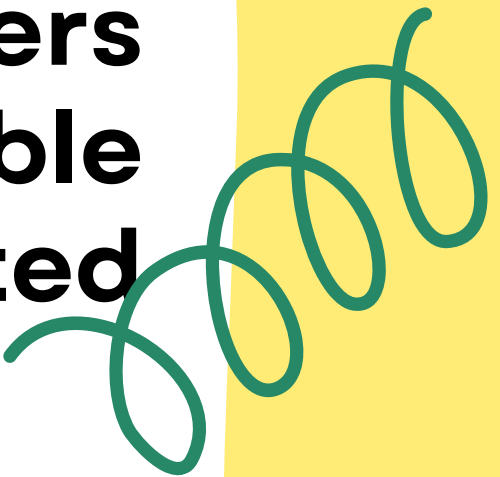
**3**

**Abstract**

91	92	93	94	95	96	97	98	99	100
81	82	83	84	85	86	87	88	89	90
71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
1	2	3	4	5	6	7	8	9	10



## By the end of EYFS

- **Automatically recall some doubles facts**
  - **Compare quantities to 10, recognising when one quantity is the same as the other quantity**
  - **Explore and represent patterns with numbers up to 10, including evens and odds, double facts and how quantities can be distributed evenly**
- 
- 

# By the end of Year 2



- recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ( $\times$ ), division ( $\div$ ) and equals ( $=$ ) signs
- show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
- solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

x	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

By the end of Year 4

**BUT**

**There is no point in the children learning these facts if they do not understand what they mean because.....**

# By the end of Year 6



- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

# Children will still need to.....

Play

Explore

Hypothesise

Investigate

Connect

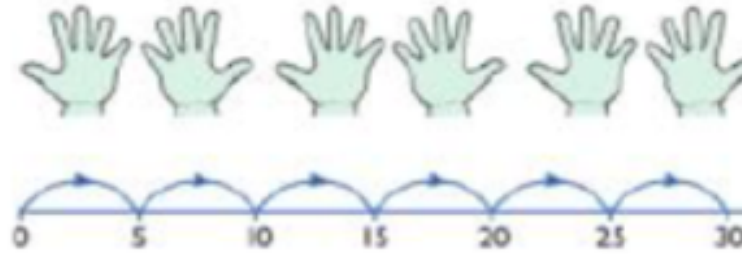


# Multiplication

## Counting in 2s, 5s and 10s



Count in multiples supported by concrete objects in equal groups.



Use a number line or pictures to continue support in counting in multiples.

Count in multiples of a number aloud.

Write sequences with multiples of numbers.

2, 4, 6, 8, 10

5, 10, 15, 20, 25, 30

### 100 Number Square

91	92	93	94	95	96	97	98	99	100
81	82	83	84	85	86	87	88	89	90
71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
1	2	3	4	5	6	7	8	9	10

# Multiplication

## Arrays – commutative multiplication

Create arrays using counters/ cubes to show multiplication sentences.



$$4 \times 6 = 24$$

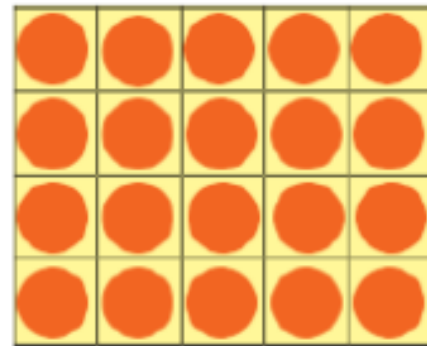
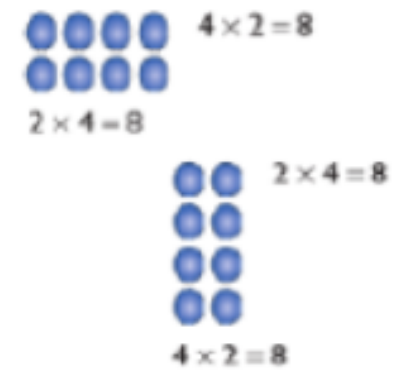
$$6 \times 4 = 24$$



$$3 \times 5 = 15$$

$$5 \times 3 = 15$$

Draw arrays in different rotations to find **commutative** multiplication sentences.



Link arrays to area of rectangles.

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

$$5 + 5 + 5 + 5 = 20$$

$$4 + 4 + 4 + 4 + 4 = 20$$

Use an array to write multiplication sentences and reinforce repeated addition.



$$5 + 5 + 5 = 15$$

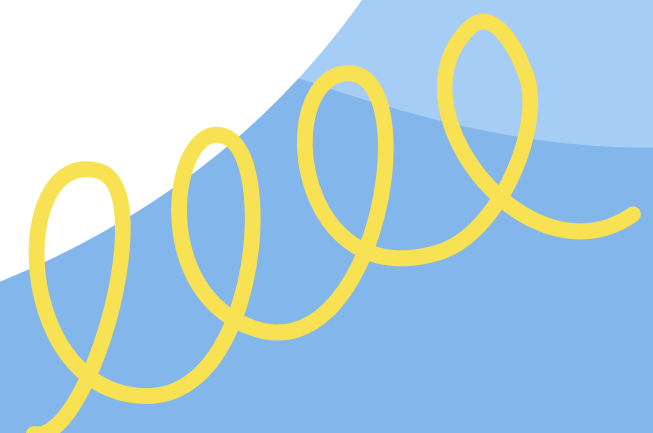
$$3 + 3 + 3 + 3 + 3 = 15$$

$$5 \times 3 = 15$$

$$3 \times 5 = 15$$

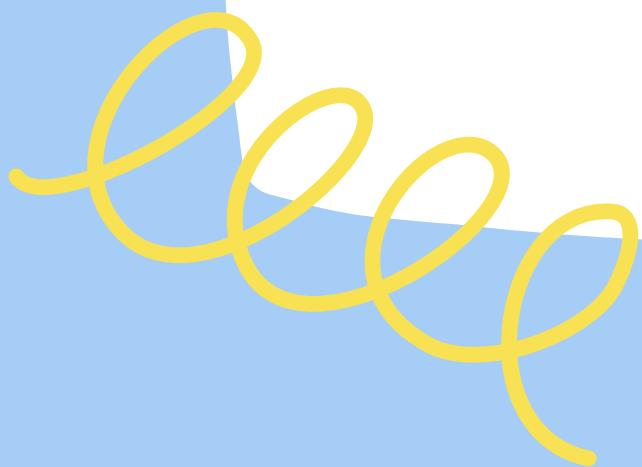
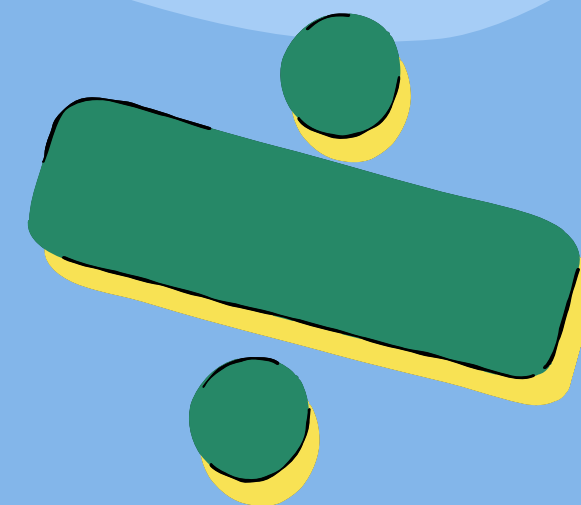
**Use resources/pictures to represent**


$$3 \times 5 = 15$$

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


**Written methods**

**Short multiplication**



$12 \begin{cases} 10 \\ 2 \end{cases} \times 3 =$

$$\begin{array}{r} 12 \\ \times 3 \\ \hline \end{array}$$

$12 \begin{cases} 10 \\ 2 \end{cases} \times 3 =$

$$\begin{array}{r} 12 \\ \times 3 \\ \hline 6 \end{array}$$

Start with the ones. I build 3 groups of 2 ones. There are 6 ones.

$12 \begin{cases} 10 \\ 2 \end{cases} \times 3 =$

$$\begin{array}{r} 12 \\ \times 3 \\ \hline 36 \end{array}$$

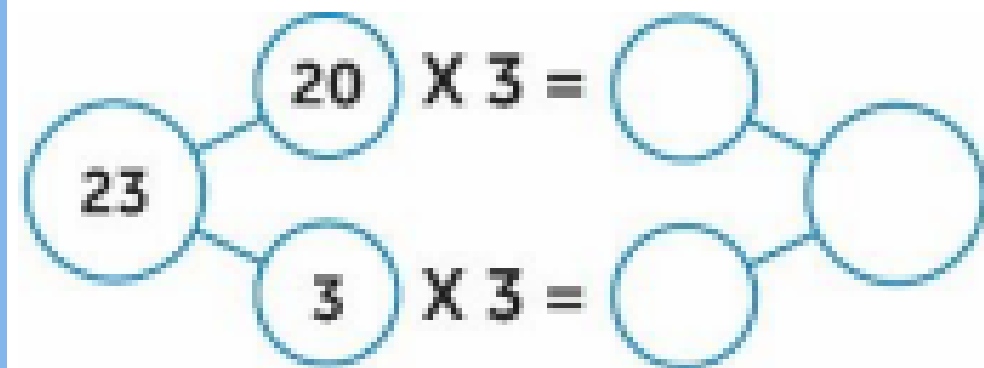
$12 \begin{cases} 10 \\ 2 \end{cases} \times 3 =$

$$\begin{array}{r} 12 \\ \times 3 \\ \hline 36 \end{array}$$

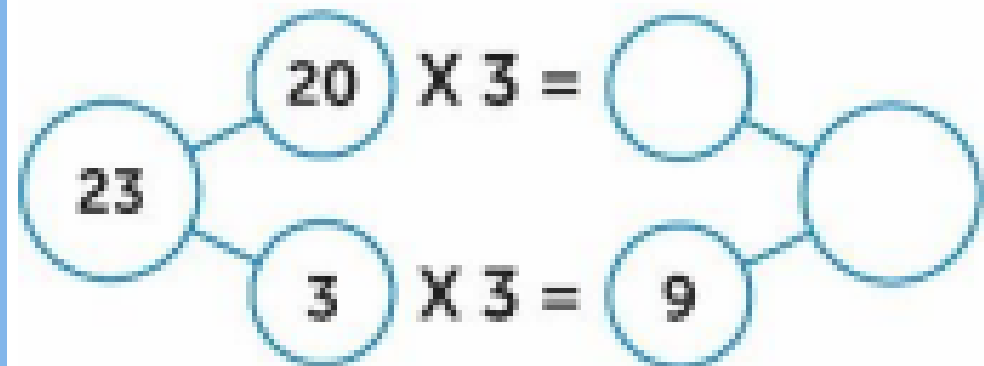
Then I build 3 groups of 1 ten. There are 3 tens. 6 ones added to 3 tens is 36.

- $24 \times 2$
- $40 \times 2$
- $32 \times 3$
- $22 \times 4$

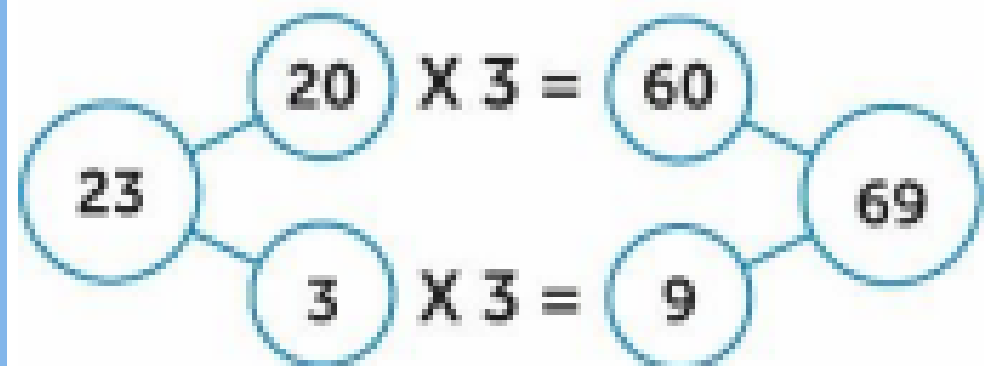
needed.  
Following standard examples.



$$\begin{array}{r} \phantom{x} \phantom{2} \phantom{3} \\ x \phantom{2} \phantom{3} \\ \hline \phantom{2} \phantom{3} \\ \hline \phantom{2} \phantom{3} \end{array}$$



$$\begin{array}{r} \phantom{x} \phantom{2} \phantom{3} \\ x \phantom{2} \phantom{3} \\ \hline \phantom{2} \phantom{3} \phantom{9} \\ \hline \phantom{2} \phantom{3} \phantom{9} \end{array}$$



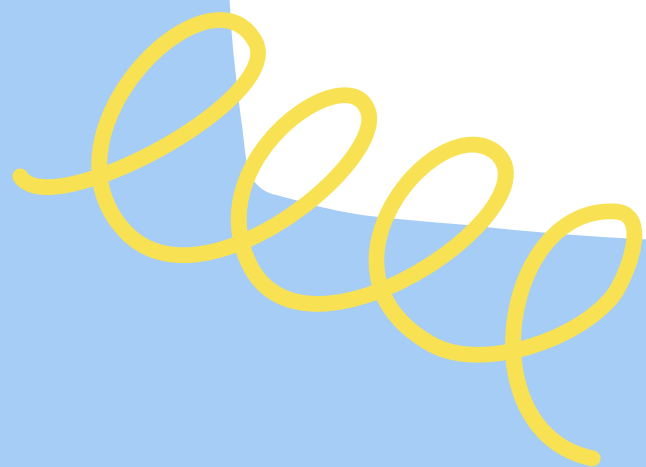
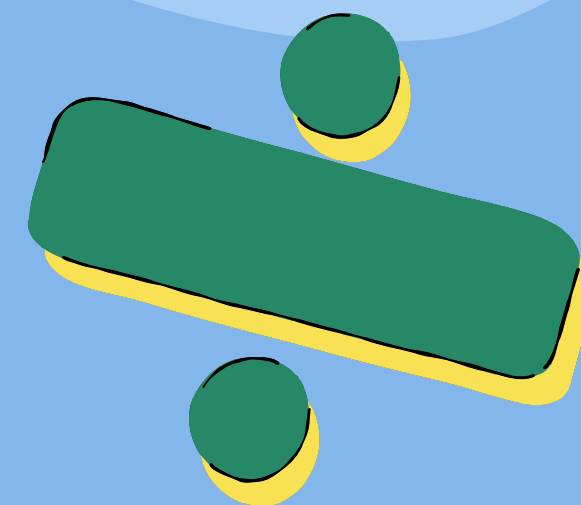
$$\begin{array}{r} \phantom{x} \phantom{2} \phantom{3} \\ x \phantom{2} \phantom{3} \\ \hline \phantom{2} \phantom{3} \phantom{9} \\ \phantom{2} \phantom{3} \phantom{9} \\ \hline \phantom{2} \phantom{3} \phantom{9} \end{array}$$

**Start with the ones. I build 3 groups of 3 ones. There are 9 ones.**

**Then I build 3 groups of 2 tens. There are 6 tens. What is 9 ones added to 6 tens?**

**Written methods**

**Long multiplication**



7 

x	1	3	2
		4	6
		1	2
	1	8	0
	6	0	0

How might this part look as short multiplication?

Where has the 180 come from? Why isn't it just 18?

x	1	3	2
		4	6
		1	2
	1	8	0
	6	0	0
		8	0
1	2	0	0
4	0	0	0
<sup>1</sup> 6	<sup>1</sup> 0	7	2

I know that  $4 \times 2 = 8$   
so I also know that  $40 \times 2 = 80$ .

I know that  $4 \times 3 = 12$   
so I also know that  $40 \times 30 = 1200$ .

I know that  $4 \times 1 = 4$   
so I also know that  $40 \times 100 = 4000$ .

7 

x	1	3	2
		4	6
		1	2
	1	8	0
	6	0	0

How might this part look as short multiplication?

Where has the 180 come from? Why isn't it just 18?

Try:

$$221 \times 34$$

x	1	3	2
		4	6
		1	2
	1	8	0
	6	0	0
		8	0
1	2	0	0
4	0	0	0
<sup>1</sup> 6	<sup>1</sup> 0	7	2

I know that  $4 \times 2 = 8$   
so I also know that  $40 \times 2 = 80$ .

I know that  $4 \times 3 = 12$   
so I also know that  $40 \times 30 = 1200$ .

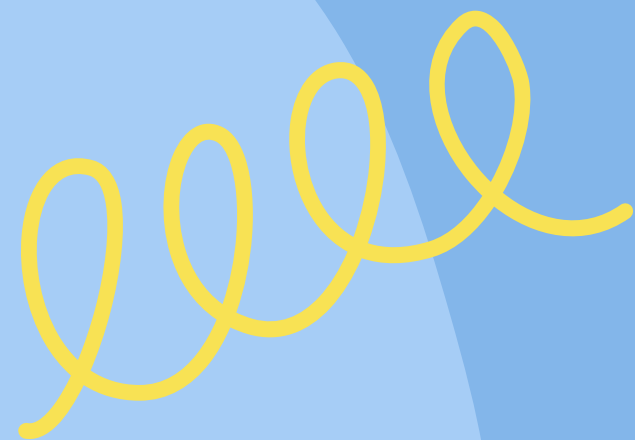
I know that  $4 \times 1 = 4$   
so I also know that  $40 \times 100 = 4000$ .

**Please...**

**If multiplying by  
10/100/1000 please don't  
teach children to add a 0!**

**Why?**

$$\text{£}1.50 \times 10 = \text{£}1.50\mathbf{0}$$



# Division

- ▶ What images comes most readily to our minds when you see
- ▶  $12 \div 2$  ?
- ▶ If I take 12 counters, what would you expect me to do with them to demonstrate  $12 \div 2$

# Division

- ▶ -Did some of you share them into two piles?

**12 shared by 2 is 6**

- ▶ Did any of you share the 12 objects into groups of 6 without doing 'one for you, one for you?'
- ▶ **There are 6 groups of 2 in 12 ( $12 \div 2$ )**
- ▶ These differences highlight 'sharing' and 'grouping' as different methods of dividing.

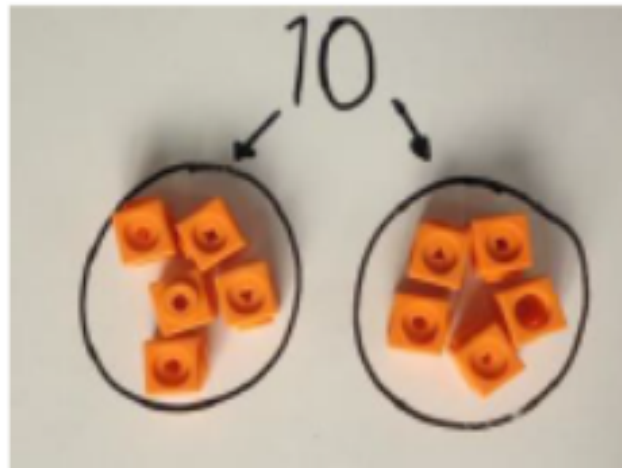
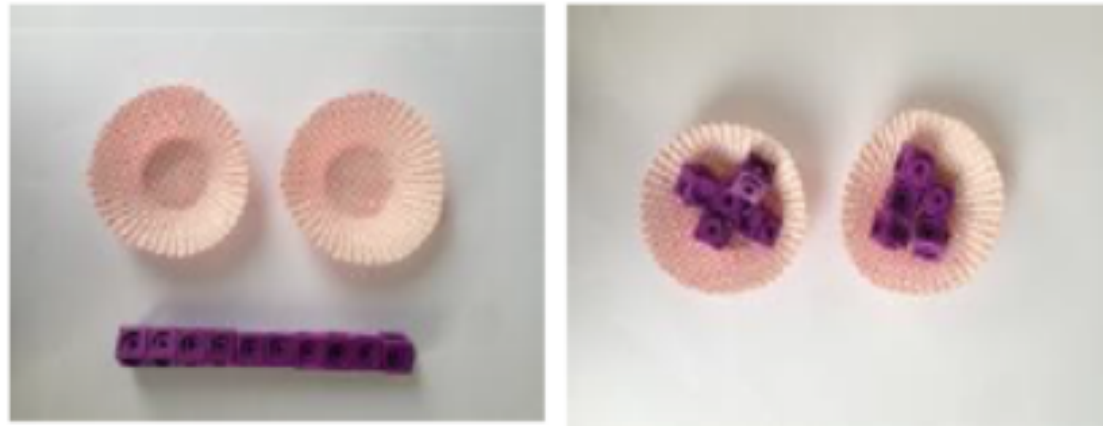
# Division

$$12 \div 2 =$$

- ▶ Sharing
  - ▶ A set of 12 objects shared between 2 groups
  
  - ▶ Grouping
  - ▶ (The inverse of multiplication)
- 12 objects are arranged into groups –how many groups of 2 in 12?

# Division

## Division as sharing



I have 10 cubes, can you share them equally in 2 groups?

Children use pictures or shapes to share quantities..



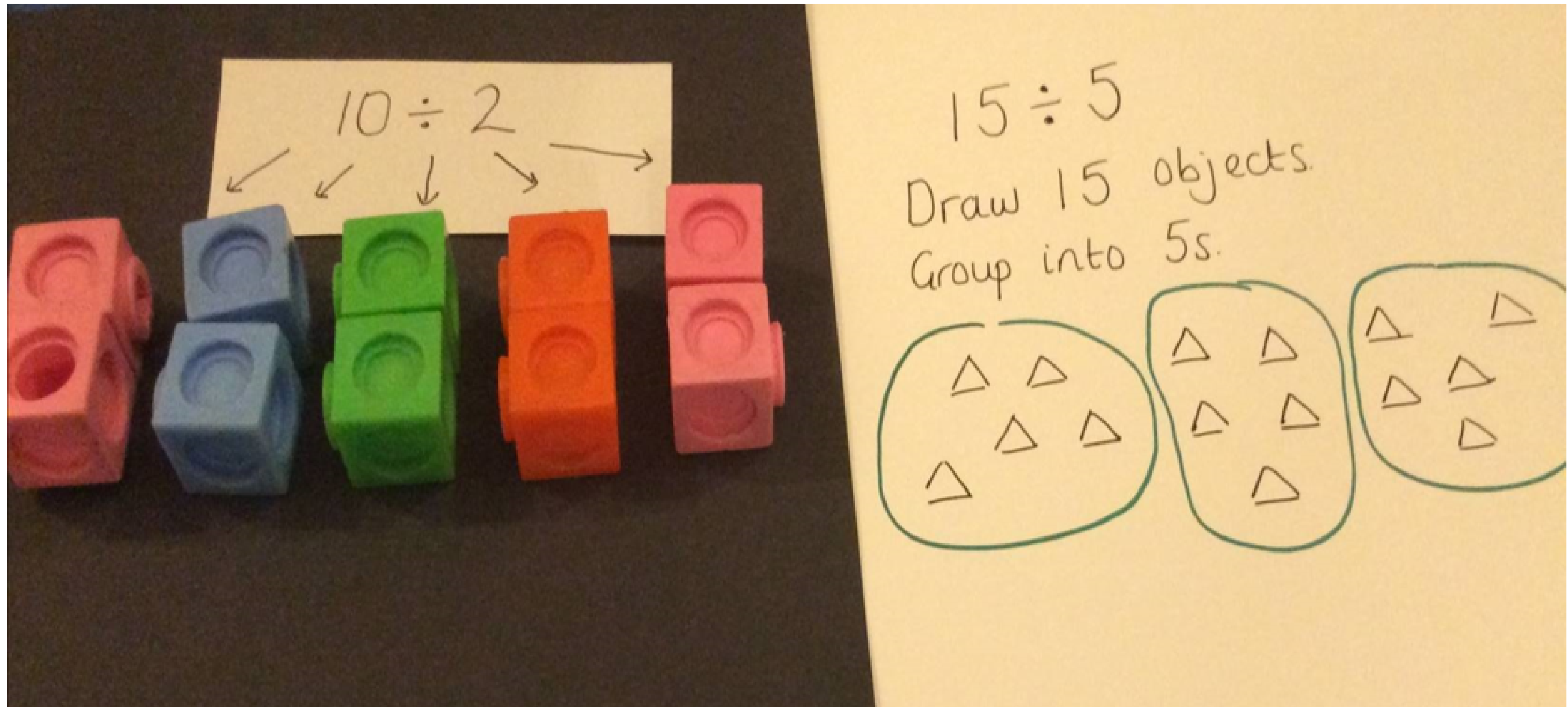
$$8 \div 2 = 4$$

$$6 \div 2 = 3$$

PLEASE read as '6 divided by 2' and not '6 shared by 2'.

# Division

## Division as grouping



# Division

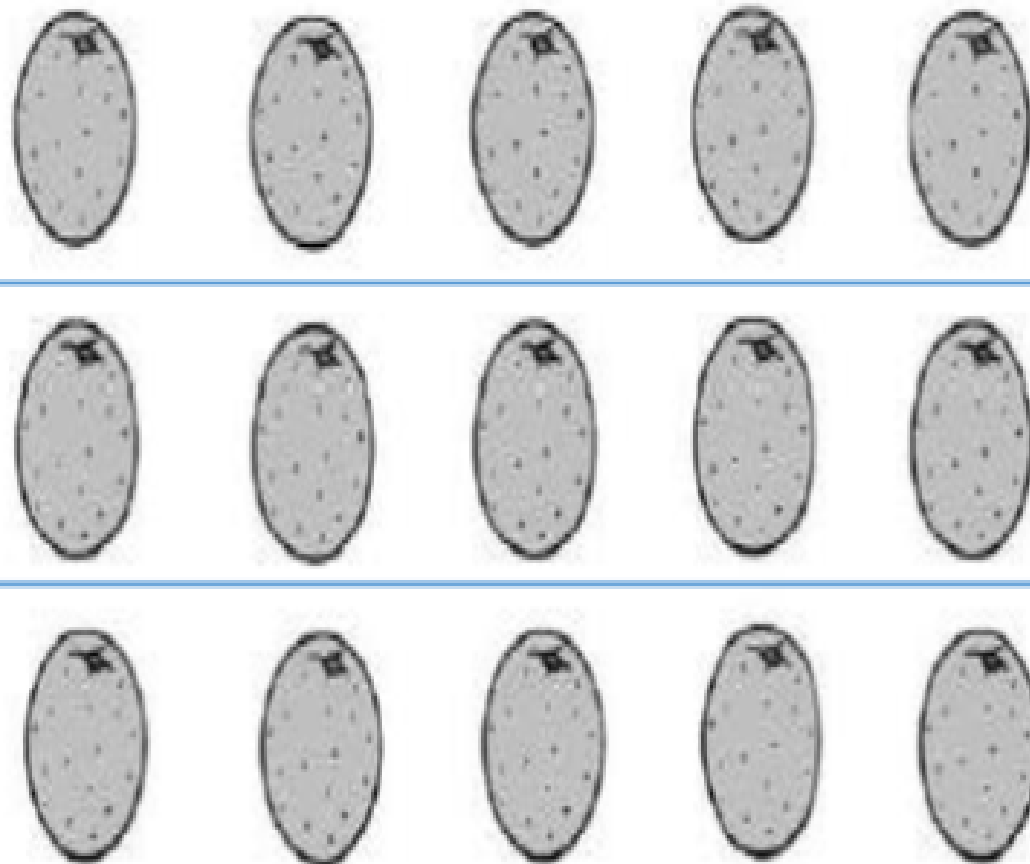
## Division within arrays



Link division to multiplication by creating an array and thinking about the

number sentences that can be created.

Eg  $15 \div 3 = 5$      $5 \times 3 = 15$   
 $15 \div 5 = 3$      $3 \times 5 = 15$



Draw an array and use lines to split the array into groups to make multiplication and division sentences.

Find the inverse of multiplication and division sentences by creating four linking number sentences.

$$7 \times 4 = 28$$

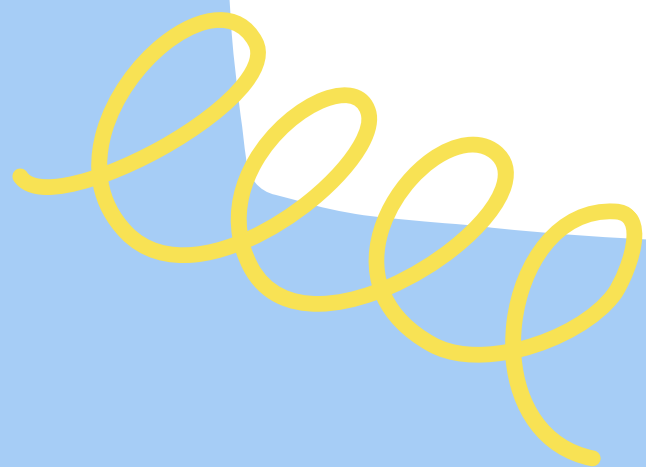
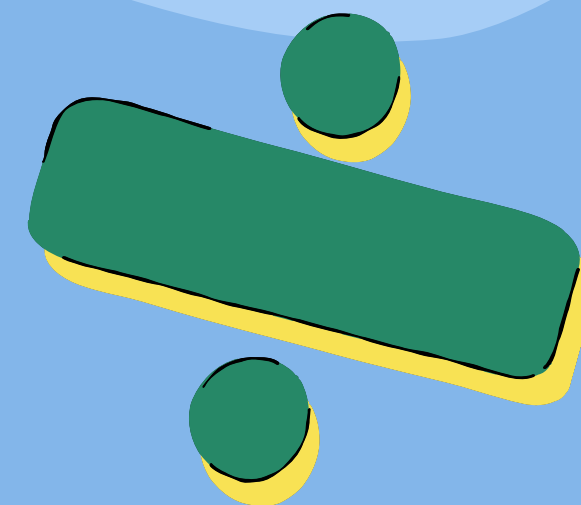
$$4 \times 7 = 28$$




$$28 \div 7 = 4$$

$$28 \div 4 = 7$$

# Written methods

**Short division**



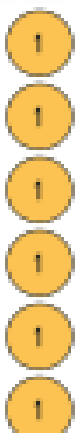


4	5	3	6	
				<div style="border: 1px solid black; height: 20px; width: 100%;"></div> <div style="border: 1px solid black; height: 20px; width: 100%;"></div> <div style="border: 1px solid black; height: 20px; width: 100%;"></div> <div style="border: 1px solid black; height: 20px; width: 100%;"></div>

**This is a division calculation. It is 536 shared equally by 4.**

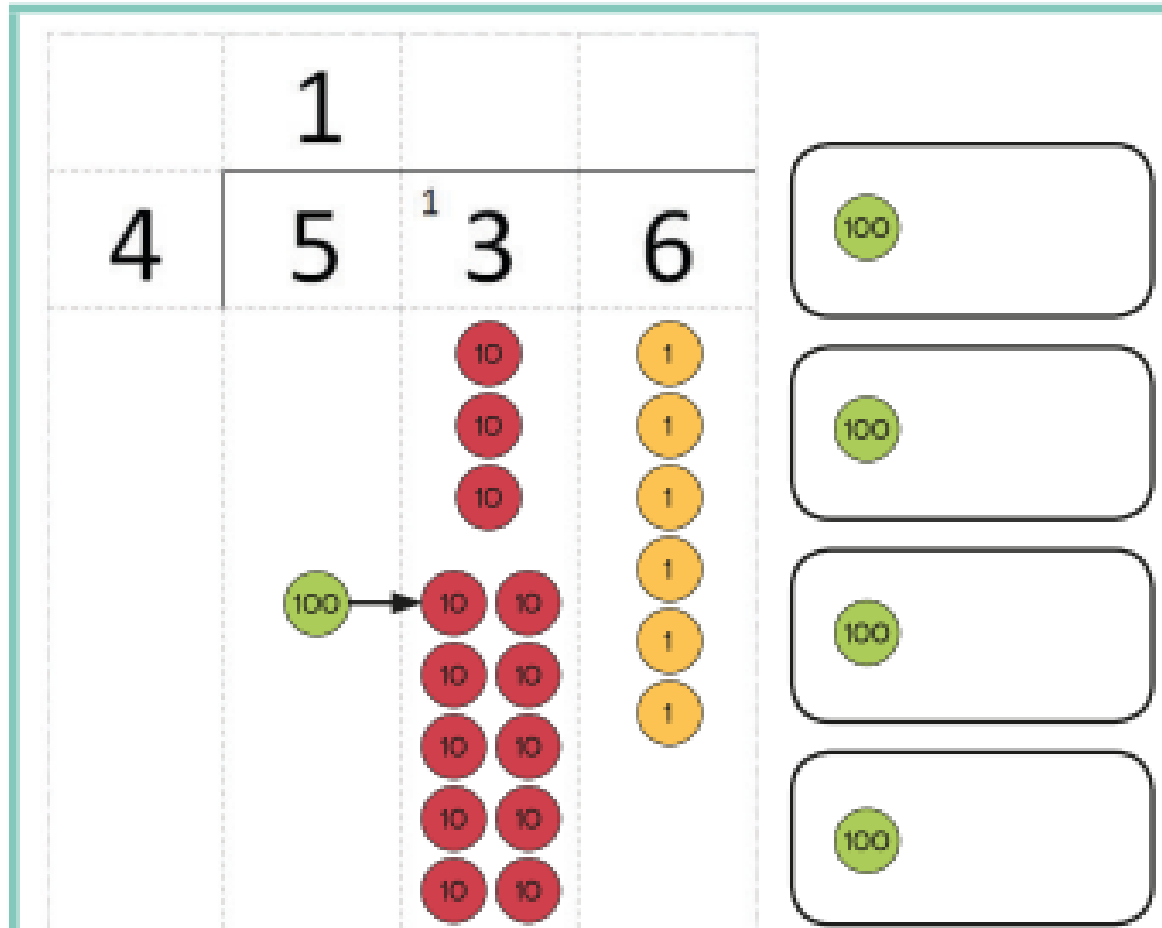
**The counters represent 536 and the 4 empty boxes (groups) can be used to share out the 536 equally.**

**I want to know how many in each group.**

	1			<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;">100</div>
4	5	3	6	<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;">100</div>
				<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;">100</div>
				<div style="border: 1px solid black; border-radius: 10px; padding: 5px; text-align: center;">100</div>

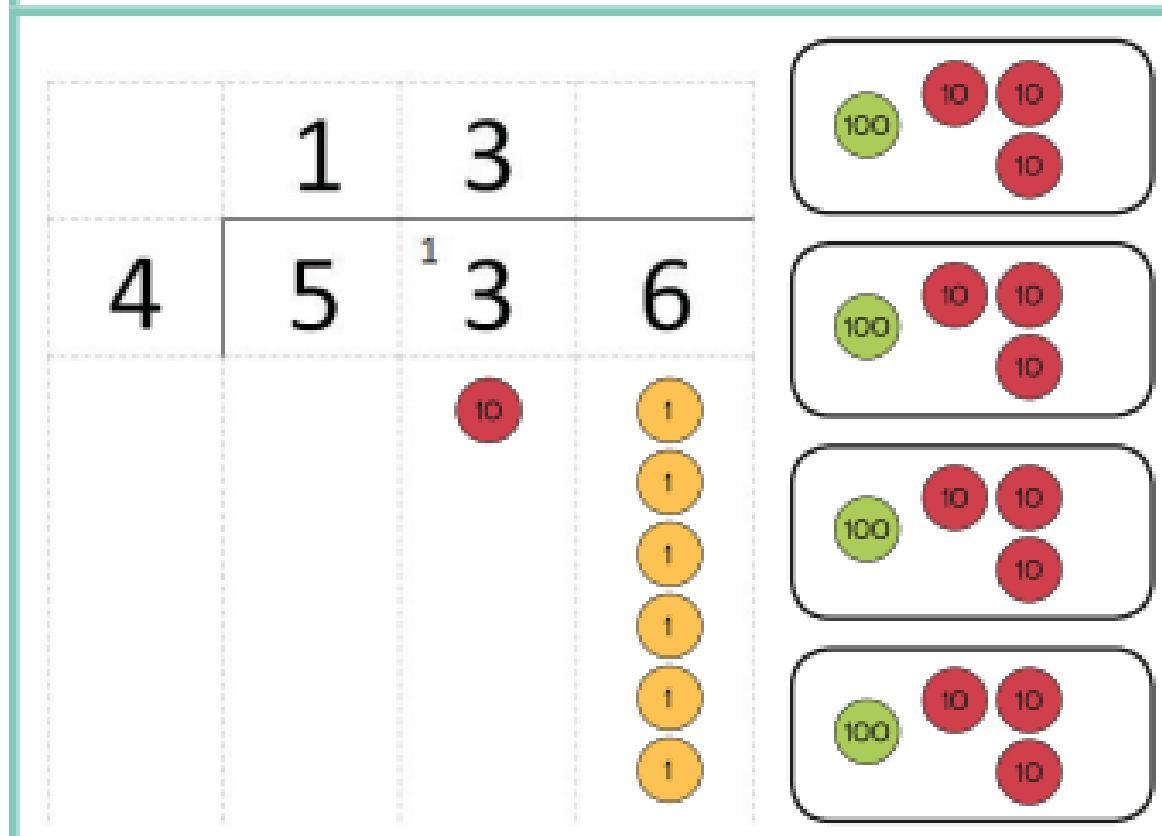
**I have 5 hundreds and I share them between 4 groups.**

**Each group gets 1 hundred.**



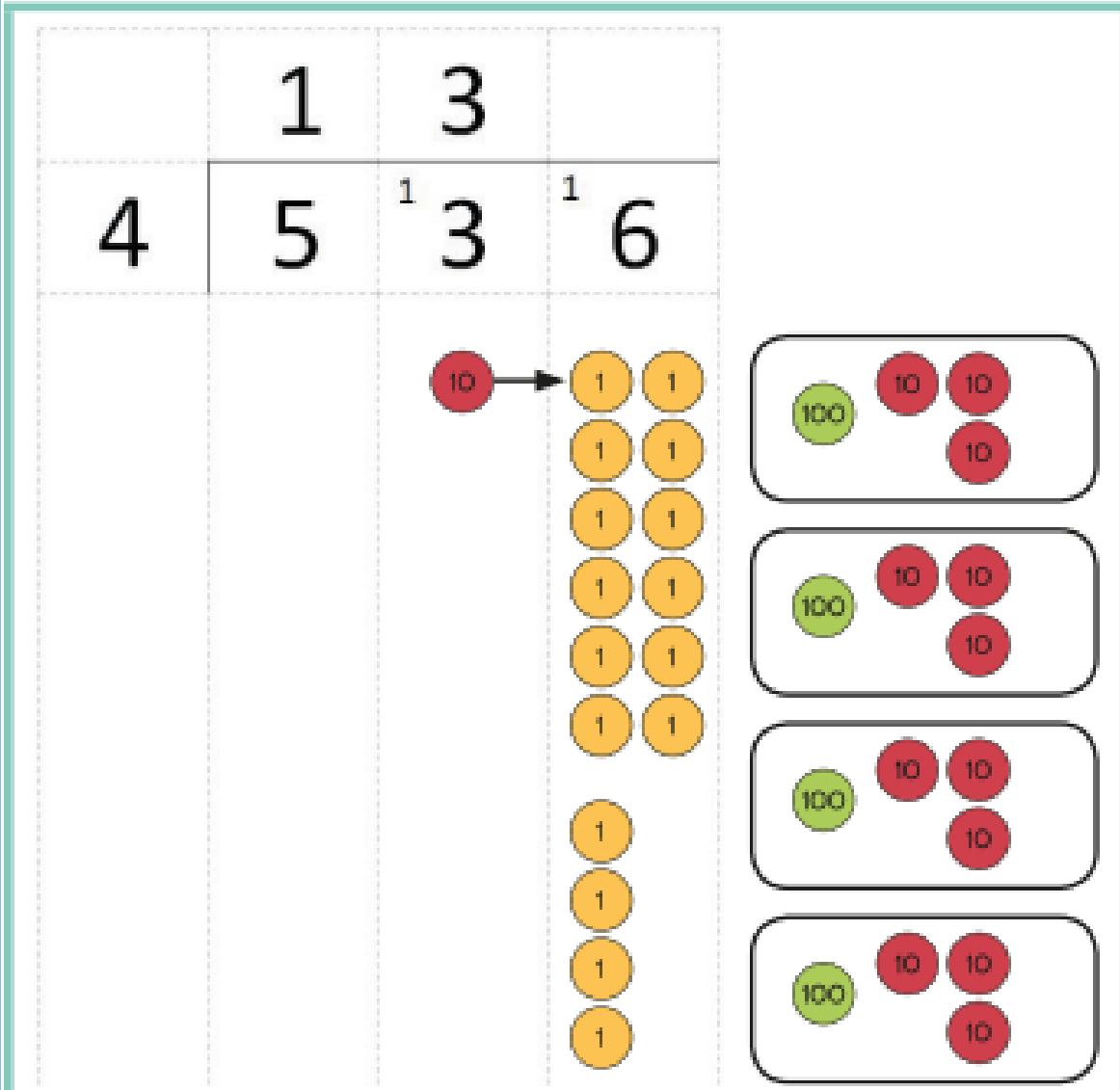
**I have 1 hundred, which I can't share equally between 4.**

**I regroup the 1 hundred into 10 tens, so now I have 13 tens to share equally between the 4 groups.**

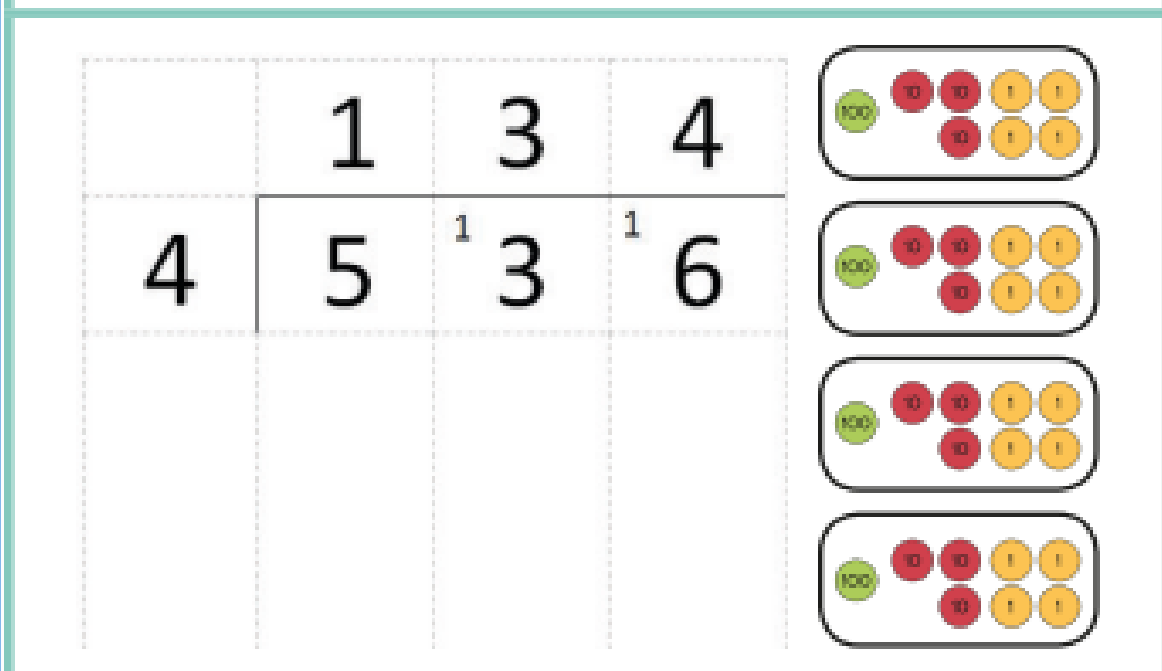


**When I share the 13 tens equally between 4 groups, there are 3 tens in each group.**

**I have 1 ten which I can't share equally by 4.**



**I have to regroup the 1 ten into 10 ones, so now I have 16 ones to share equally between 4 groups.**



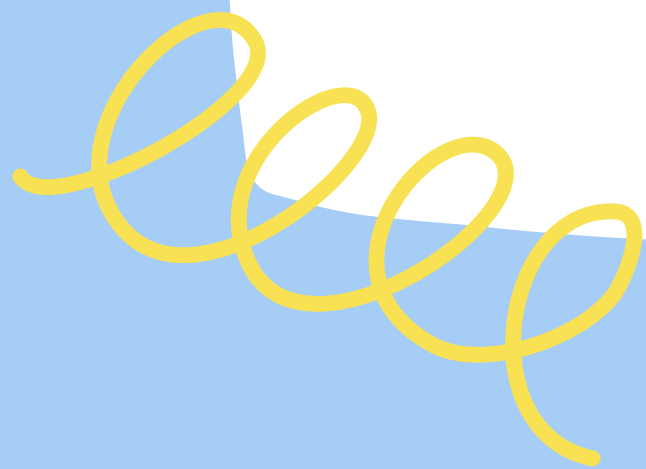
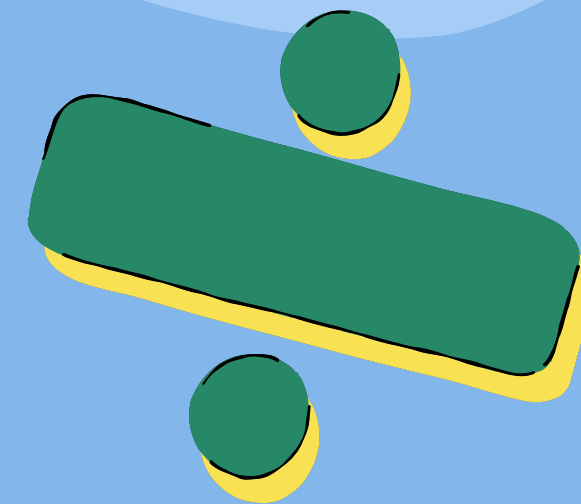
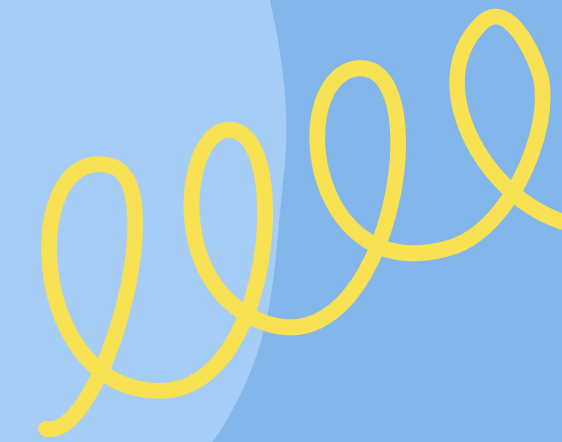
**I share the 16 ones equally between 4 groups and each group gets 4 ones.**

**When I shared 536 between 4 groups, each group got 134.**

$$536 \div 4 = 134$$

# Written methods

Long division



How many groups of 12?

1	2
2	4
3	6
4	8
6	0
7	2
8	4
9	6
10	8

$$12 \overline{) 9516}$$

The calculation is  $9516 \div 12$   
I want to know how many 12s in 9516 .  
I am going to list the multiples of 12 to help me.

$$\begin{array}{r} 7 \\ 12 \overline{) 9516} \\ \underline{-84} \\ 11 \end{array}$$

There are 0 groups of 12 thousands in 9000 so I regroup to 95 hundreds.  
From my jottings, I can see that  $7 \times 12 = 84$ .  
There are 7 groups of hundreds and I can work out that there are 11 hundreds remaining.

$$\begin{array}{r} 7 \\ 12 \overline{) 9516} \\ \underline{-84} \phantom{0} \\ 111 \end{array}$$

Instead of carrying the 11 at the top, I am going to pull down the 1 ten to show the 111 tens which I have now.

$$\begin{array}{r} 79 \\ 12 \overline{) 9516} \\ \underline{-84} \phantom{0} \\ 111 \\ \underline{-108} \end{array}$$

From my jottings, I can see that  $9 \times 12 = 108$ .  
There are 9 groups of tens.

$$\begin{array}{r} 793 \\ 12 \overline{) 9516} \\ \underline{-84} \phantom{0} \\ 111 \\ \underline{-108} \\ 36 \\ \underline{36} \\ 0 \end{array}$$

I can work out that 111 tens subtract 108 tens leaves 3 tens and pull down the 6 to show the 36 ones that I have now.

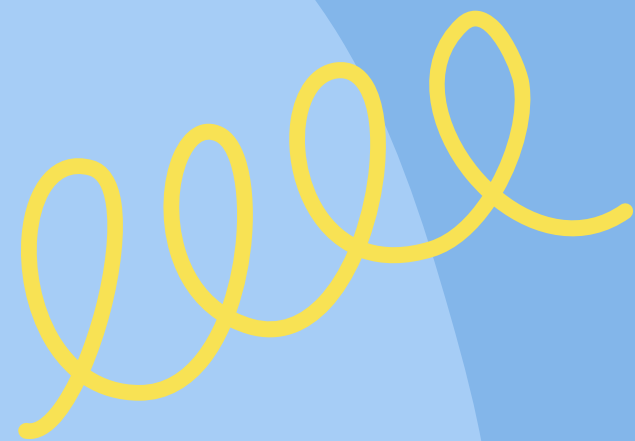
From my jottings, I can see that  $3 \times 12 = 36$ .  
There are 3 groups of ones and none leftover.

**Please...**

**If dividing by 10/100/1000  
please don't teach children to  
take away a 0!**

**Why?**

$$\text{£}1.50/10 = \text{£}1.5$$



9

0

Thank you



=

7

x