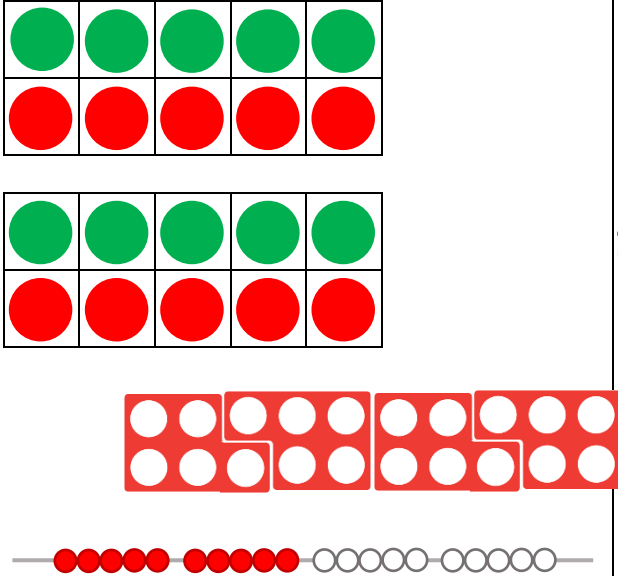
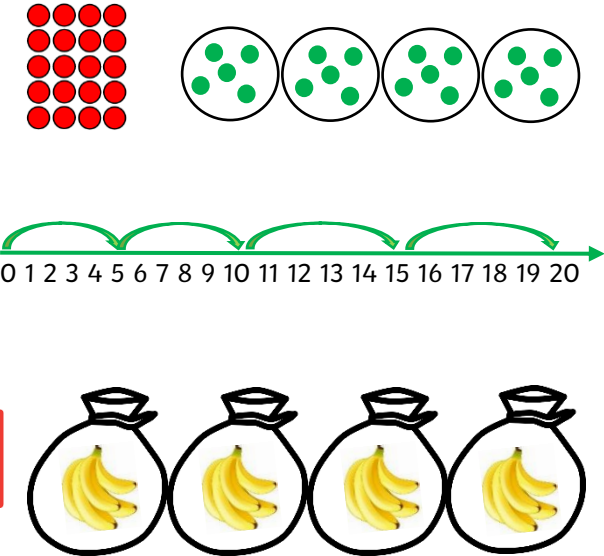
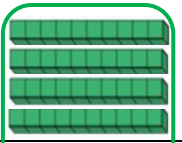

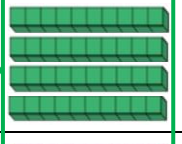

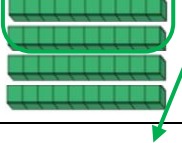

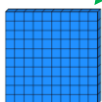


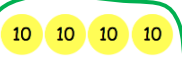

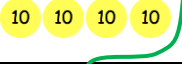

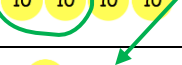

# Bowsland Green – Multiplication and Division Calculation Policy

Multiplication			
	Concrete	Pictorial	Abstract
Solve one-step problems with multiplication			<p>One bag holds five bananas. How many bananas does four bags hold?</p> $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$ $5 \times 4 = 20$ $20 = 4 \times 5$ $20 = 5 \times 4$
	In Years 1, pupils can focus on using concrete and pictorial representations without the written method. Pupils should link this objective with repeated addition.		

### Concrete

Hundreds	Tens	Ones
		
		
		



Hundreds	Tens	Ones
		
		
		

100

10

### Abstract

	H	T	O		
		4	6		
$\times$			3		
		1	8	$(6 \times 3)$	
	1	2	0	$(40 \times 3)$	
	1	3	8		

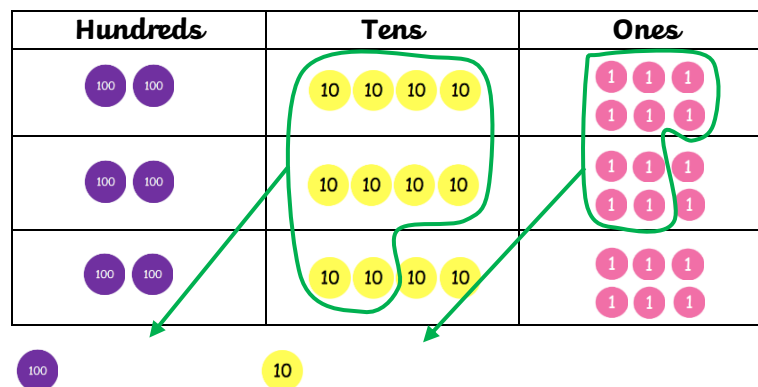
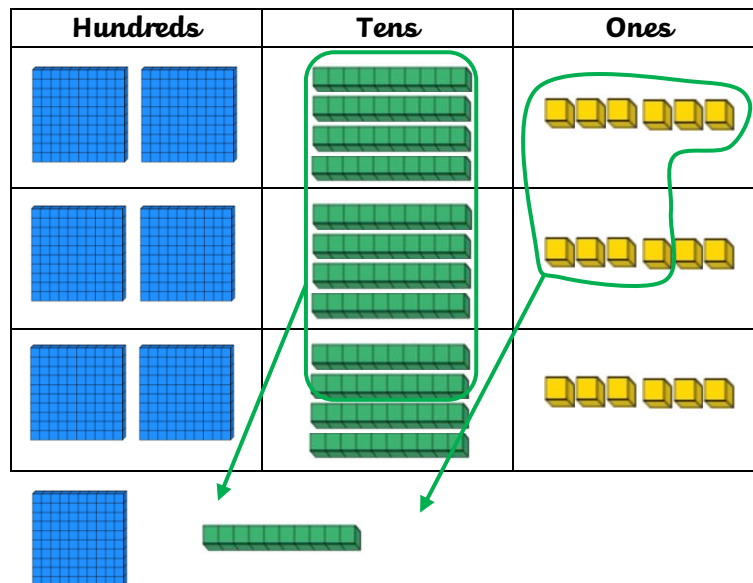
	H	T	O	
		4	6	
$\times$			3	
	1	3	8	

1 1

$$46 \times 3 = 138$$

Concrete resources should be used to support the understanding of the method rather than to support the multiplication as pupils should use their times table knowledge.

The expanded method may be used as a pre-step to the short multiplication method if required.

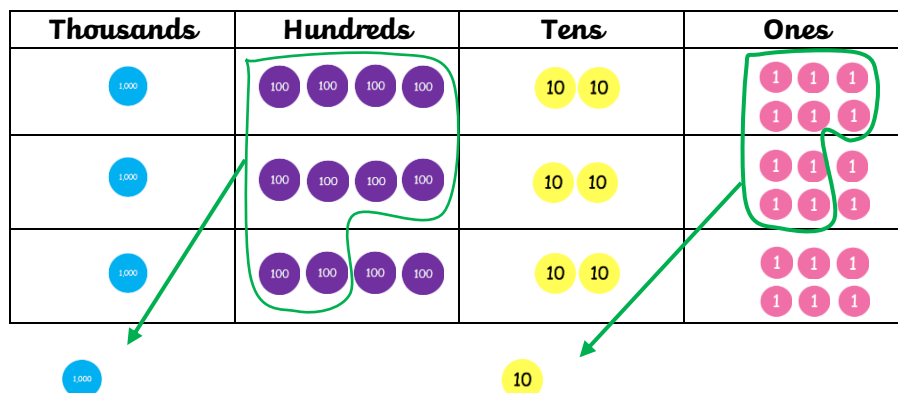


	H	T	O	
	2	4	6	
x			3	
	7	3	8	
	1	1		

$$246 \times 3 = 738$$

In Year 3, limit the number of **exchanges** needed so that pupils can focus on mastering the short multiplication method and move away from the expanded method.

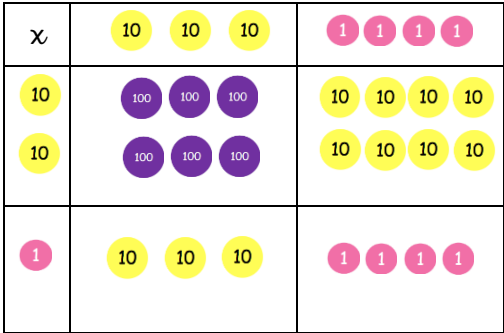
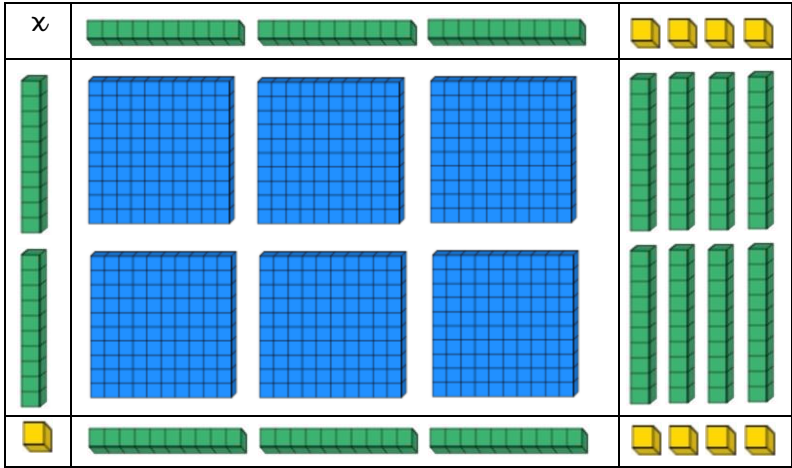
Multiply 4-digit by 1-digit numbers



		H	T	O	
	1	4	2	6	
x				3	
	4	2	7	8	
	1		1		

$$1,426 \times 3 = 4,278$$

Pupils may use a multiplication square to support them if needed as this will allow them to focus on the method.



x	30	4
20	600	80
1	30	4

	H	T	O	
		3	4	
x		2	1	
			4	(1 x 4)
		3	0	(1 x 30)
		8	0	(20 x 4)
	6	0	0	(20 x 30)
	7	1	4	

	H	T	O
		3	4
x		2	1
		3	4
	6	8	0
	7	1	4

1

34 x 21 = 714

Use the area model to help pupils understand the size of the numbers they are using.  
This links to them understanding the area of a rectangle.  
The grid method offers a good transition from area model to the written method.

Multiply 2-digit by 3-digit numbers

x	101010	1111
100	100010001000	100100100100
100	100010001000	100100100100
100	100010001000	100100100100
10	100100100	10101010
10	100100100	10101010
1	101010	1111

x	30	4
300	9000	1200
20	600	80
1	30	4

TTh	Th	H	T	O
		3	2	1
x			3	4
	1	2	8	4
	9	6	3	0
1	0	9	1	4

1

321 x 34 = 10,914

Multiply 2-digit by 4-digit numbers

TTh	Th	H	T	O
	2	3	6	9
x			3	8
1	8	9	5	2
	2	5	7	
7	1	0	7	0
1	2	2		
9	0	0	2	2

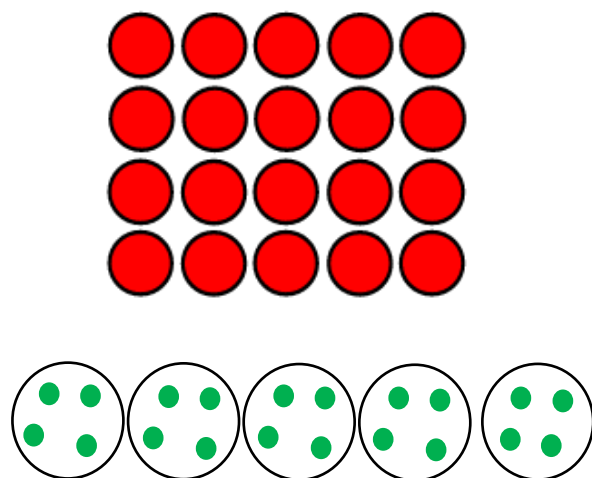
1 1

2369 x 38 = 90,022

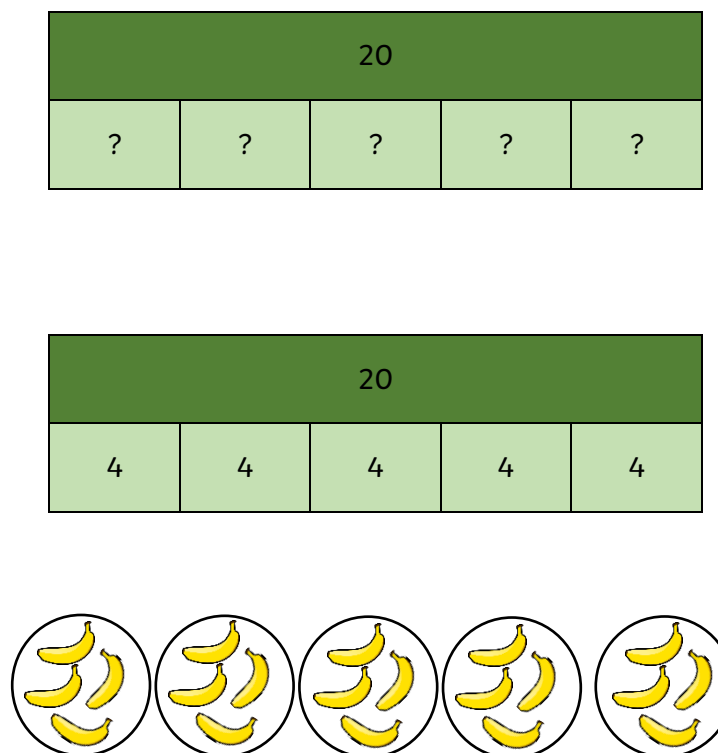
Solve one-step problems with division (sharing)

## Division

### Concrete



### Pictorial



### Abstract

There are 20 bananas altogether. They are shared equally between 5 bags. How many bananas are in each bag?

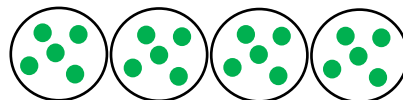
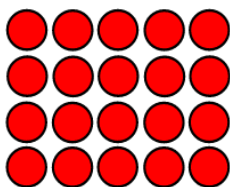
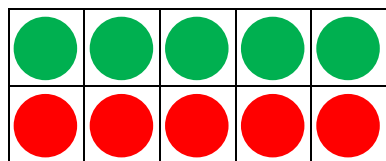
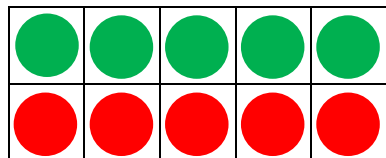
$$20 \div 5 = 4$$

Pupils to use counters and sorting hoops (concrete or drawn) to start exploring **arrays** and sharing equally before progressing to drawing these in their books or on whiteboards.

In Year 1, pupils are not expected to record division formally and should focus on concrete and pictorial representations of sharing equally.

In Year 2, pupils are introduced to the division symbol.





There are 20  
bananas altogether.  
They are put in bags  
of 5.  
How many bags are  
there?

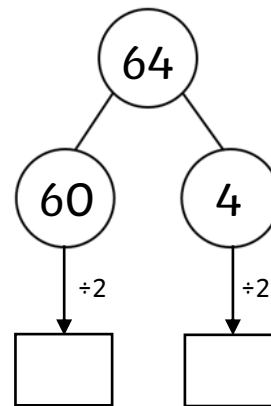
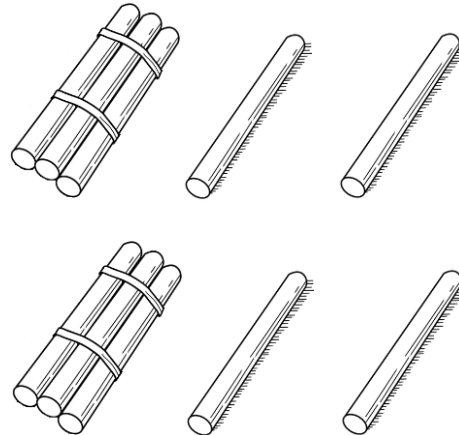
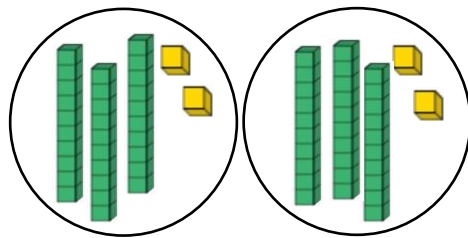
$$20 \div 5 = 4$$

Pupils to solve problems by grouping and then counting the number of groups. When grouping, encourage pupils to count in multiples and link this to subtraction on a numberline (note the arrows in the diagram are in the opposite direction to multiplying).

Using concrete resources such as numicon will help them understand the relationship between multiplication and division.

Divide 2-digit by 1-digit (sharing without exchanging)

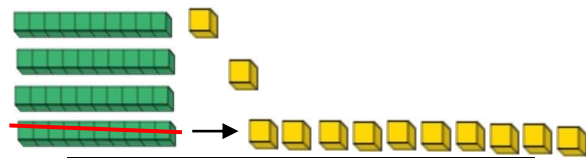
Tens	Ones
10 10 10	1 1
10 10 10	1 1









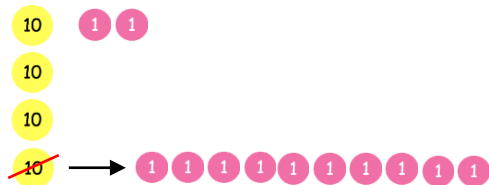
$$64 \div 2 = 32$$

When dividing larger numbers, pupils can use manipulatives to use **partitioning** to support them. Part-models provide pupils with a clear written method that matches the concrete representation.

Divide 2-digit by 1-digit (sharing with exchanging)

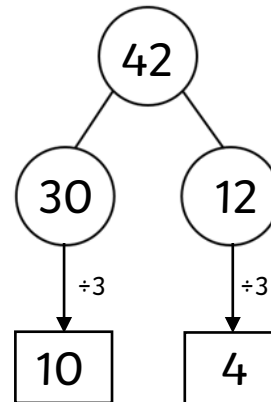


Tens	Ones
	
	
	



Tens	Ones
	
	
	

42		
?	?	?

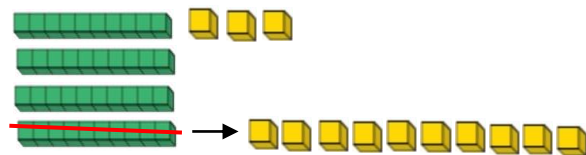








$$10 + 4 = 14$$

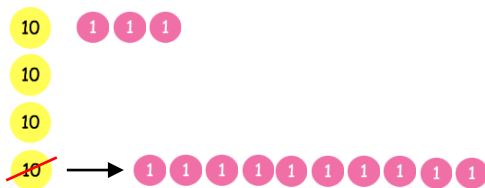
$$42 \div 3 = 14$$

Place value counters and Base 10 are used to help pupils **exchange** one ten for ten ones.  
Exchanging outside the place value grid will allow them to use the grid to share the resources equally after the **exchange**.

Divide 2-digit by 1-digit (sharing with remainders)

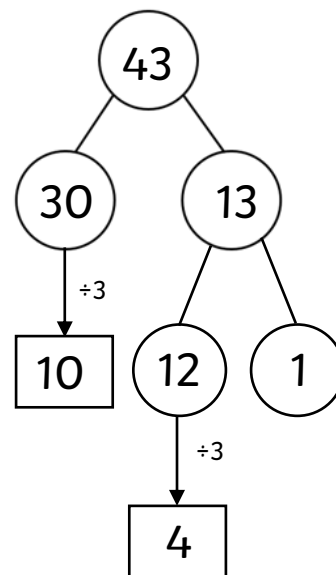


	Ones
	
	
	



Tens	Ones
	
	
	

43			
14	14	14	1

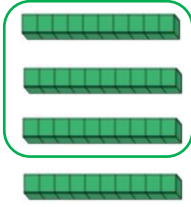



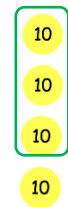
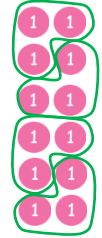
$$10 + 4 = 14$$

$$43 \div 3 = 14r1$$

Place value counters and Base 10 are used to help pupils **exchange** one ten for ten ones.  
Exchanging outside the place value grid will allow them to use the grid to share the resources equally after the **exchange**.  
Any resources left outside the grid represent the **remainder**.

Divide 2 digits by 1-digit (grouping)

Tens	Ones
	

Tens	Ones
	

		1	4	
	3	4	<sup>1</sup> 2	

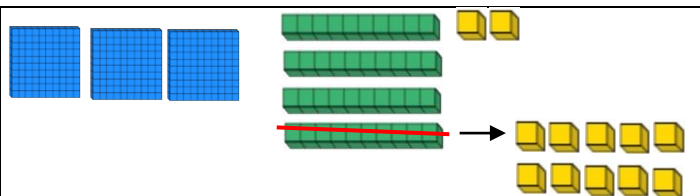
$$42 \div 3 = 14$$










When grouping alongside using the short division method, pupils should group starting with the largest place value.

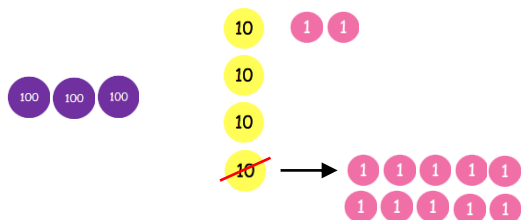
Pupils group by the **divisor**.










Note: language is important here: "How many groups of... can we make?"

Any **remainders** will be ungrouped.

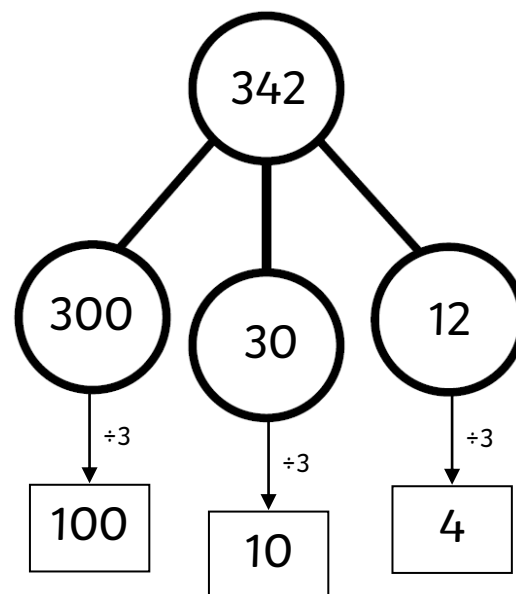


Hundreds	Tens	Ones
		
		
		



Hundreds	Tens	Ones
		
		
		

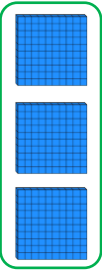
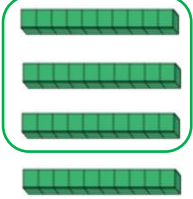

342		
?	?	?



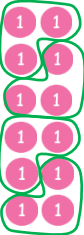


$$343 \div 3 = 114$$

Place value counters and Base 10 are used to help pupils **exchange** one ten for ten ones.  
Exchanging outside the place value grid will allow them to use the grid to share the resources equally after the **exchange**.  
Any resources left outside the grid represent the **remainder**.

Divide 3-digit by 1-digit (grouping)

Hundreds	Tens	Ones
		

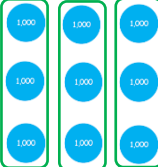


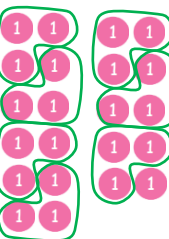
Hundreds	Tens	Ones
		

		1	1	4
	3	3	4	<sup>1</sup> 2

342 ÷ 3 = 114

Concrete methods allow pupils to group using the **divisor**.  
For a pictorial method, pupils can draw the counters into their books.  
Encourage pupils to move away from concrete and pictorial when there are multiple **exchanges**.

Divide 4-digit by 1-digit (grouping)

Thousands	Hundreds	Tens	Ones
			

		3	1	4	7	r 1
	3	9	4	<sup>1</sup> 4	<sup>2</sup> 2	

$$9,442 \div 3 = 3147 \text{ r } 1$$

Concrete methods allow pupils to group using the **divisor**.  
 For a pictorial method, pupils can draw the counters into their books.  
 Encourage pupils to move away from concrete and pictorial when there are multiple **exchanges**.  
 Please note: This method may be replicated for the division of decimals by changing the place value columns accordingly.

Divide multi-digits by 2-digits (short division)

		0	4	8	9
1	5	7	3	3	5

15	30	45	60	75	90	105	120	135	150
----	----	----	----	----	----	-----	-----	-----	-----

$$7,335 \div 15 = 489$$

As pupils progress with division, concrete resources become less efficient.  
 Pupils should write out the multiples to help them solve the calculation.  
 Some questions may involve the **quotient** being rounded such as when interpreting the **remainder** to answer the question.



		0	3	5	r	2		1 x 13 = 13
1	3	4	5	7				2 x 13 = 26
	-	3	9					3 x 13 = 39
			6	7				4 x 13 = 52
			6	5				5 x 13 = 65
				2				6 x 13 = 78
								7 x 13 = 91
								8 x 13 = 104
								9 x 13 = 117
								10 x 13 = 130

457 ÷ 13 = 35 r 2

		0	3	5	r	2		1 x 13 = 13
1	3	4	5	7				2 x 13 = 26
	-	3	9					3 x 13 = 39
			6	7				4 x 13 = 52
			6	5				5 x 13 = 65
				2				6 x 13 = 78
								7 x 13 = 91
								8 x 13 = 104
								9 x 13 = 117
								10 x 13 = 130

$$457 \div 13 = 35 \text{ r } 2$$

		0	3	5	r	2		1 x 13 = 13
1	3	4	5	7				2 x 13 = 26
	-	3	9					3 x 13 = 39
			6	7				4 x 13 = 52
			6	5				5 x 13 = 65
				2				6 x 13 = 78
								7 x 13 = 91
								8 x 13 = 104
								9 x 13 = 117
								10 x 13 = 130

$$457 \div 13 = 35 \text{ r } 2$$

		0	3	5	r	2		1 x 13 = 13
1	3	4	5	7				2 x 13 = 26
	-	3	9					3 x 13 = 39
			6	7				4 x 13 = 52
			6	5				5 x 13 = 65
				2				6 x 13 = 78
								7 x 13 = 91
								8 x 13 = 104
								9 x 13 = 117
								10 x 13 = 130

$$457 \div 13 = 35 \text{ r } 2$$

## Mathematical vocabulary that all pupils should be exposed to:

**Array** – An ordered collection using counters, cubes or other items in rows and columns.

**Commutative** – Numbers can be added in any order.

**Dividend** – In division, the number that is divided.

**Dividend** – In division, the number that is divided by another number.

**Exchange** – To substitute a number for another on an equal value.

**Factor** – A number that multiplies by another to make a product.

**Multiplicand** – In multiplication, a number to be multiplied by another.

**Partitioning** – Splitting a number into its component parts.

**Product** – The result of multiplying two numbers together.

**Quotient** – The result of division.

**Remainder** – The amount left over after a division when the divisor is not a factor of the dividend.

**Scaling** – Enlarging or reducing a number by a given amount.