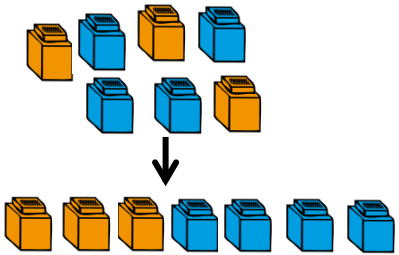
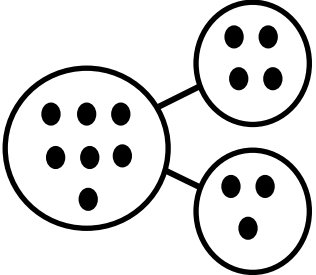
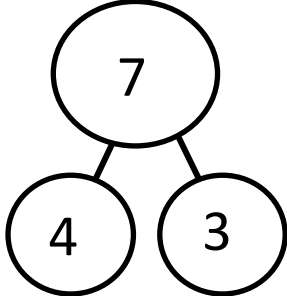
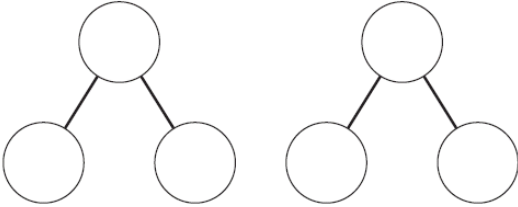
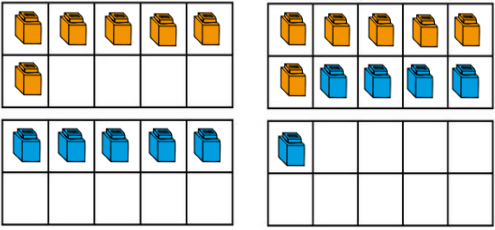
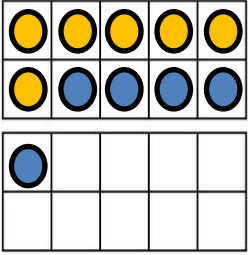
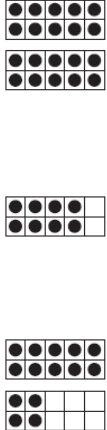
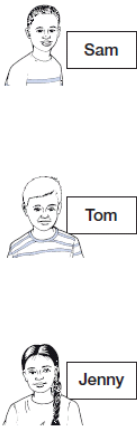




Pound Hill
Junior School

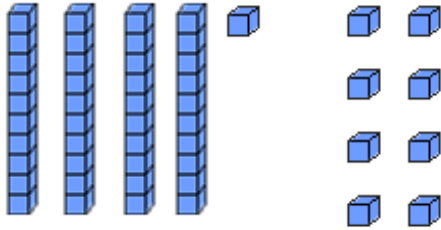
Calculation Policy

This policy has been designed to model the small steps needed when children are learning the four operations. The policy begins at the initial phase although most children will have secured this understanding in Key Stage 1. The greater depth demonstrates where learning can be made awkward to challenge children to think differently.

Addition			
Key Language	Sum, total, parts and wholes, plus, add, altogether, more,		
Concrete	Pictorial	Abstract	Greater Depth
<p>Combining two parts to make a whole (Use a wide range of resource to ensure children understand objects represent an amount)</p> 	<p>Represent the objects using dots or crosses. They can represent putting the parts together to make a whole in a part part whole diagram.</p> 	<p>Write the abstract number sentence.</p> <p>$4 + 3 = 7$ Four is a part, 3 is a part and the whole is 7.</p> 	<p>James wants to partition his number in different ways.</p> <p>Complete the part-whole models to show two ways he could do this.</p> 
<p>Regrouping to make 10; using ten frames and counters/cubes or numicon.</p> 	<p>Draw the ten frames and counters.</p> 	<p>Develop an understanding of equality e.g</p> <p>$6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$</p>	<p>Sam, Jenny and Tom each make a number.</p> <p>Sam has 6 more than Jenny and 6 less than Tom.</p> <p>Match each number to the correct position.</p>  

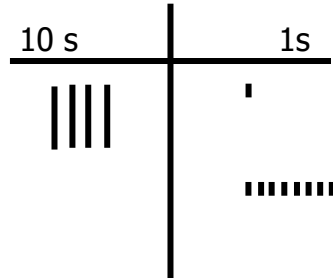
TO + O using diennes. Children need an understanding of partitioning and place value.

$41 + 8$



Represent the diennes as lines or a number on a place value grid.

$41 + 8$



Using part part whole model or partition the numbers mentally

$1 + 8 = 9$

$40 + 9 = 49$

Fill in the missing numbers and explain what you notice.

$23 + \square = 30$

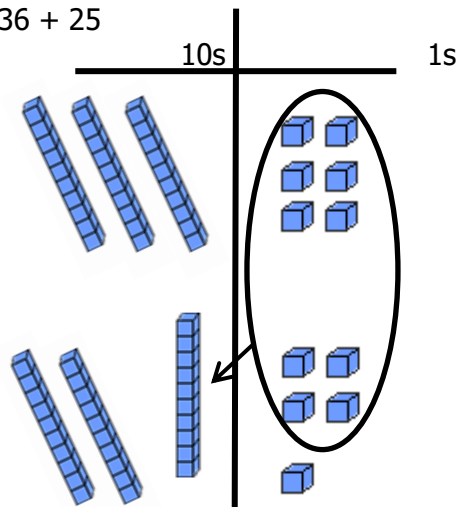
$33 - \square = 30$

$43 + \square = 50$

$53 - 3 = \square$

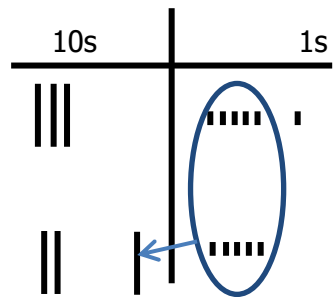
TO + TO using diennes. Children continue to develop understanding of partitioning

$36 + 25$



Represent the diennes as lines of a number on a place value grid.

$36 + 25$



Learning the strategy of number bonds to support adding and beginning to use a written method.

$36 + 25$
1 5

$30 + 20 = 50$

$5 + 5 = 10$

$50 + 10 + 1 = 61$

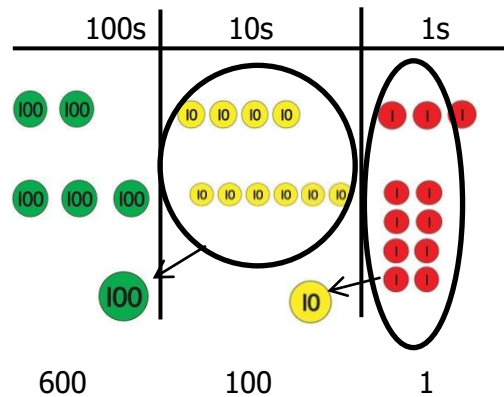
	3	6
+	2	5
	6	1
	±	

Anna buys a teddy and a pencil.



The teddy costs 20p more than the pencil. How much does she pay altogether.

Use of counters to add HTO + HTO/HTO + TO. Developing understanding that we can exchange 10 ones for 1 tens etc.
 $243 + 368$



Represent the counters in a place value chart as counter and then progressing onto numerical values.

100s	10s	1s
200	40	3
+ 300	60	8
500	100	11

$$500 + 100 + 11 = 611$$

Using a formal written method to add three digit numbers together.

	2	4	3
+	3	6	8
	6	1	1
	±	±	

Here are some addition calculation. Without solving the calculations, decide which ones

- Carry no digits
- Has the largest answer
- Have to carry 2 digits.

$$\begin{array}{r} 791 \\ +163 \\ \hline \end{array}$$

$$\begin{array}{r} 124 \\ +233 \\ \hline \end{array}$$

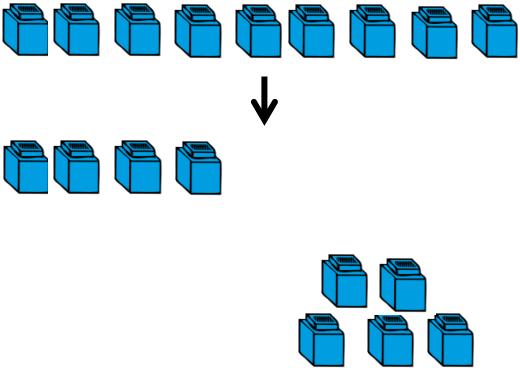
$$\begin{array}{r} 579 \\ +221 \\ \hline \end{array}$$

Subtraction

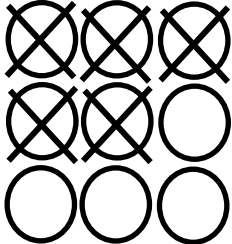
Key Language Take away, less than, the difference, minus, fewer, decrease

Concrete **Pictorial** **Abstract** **Greater Depth**

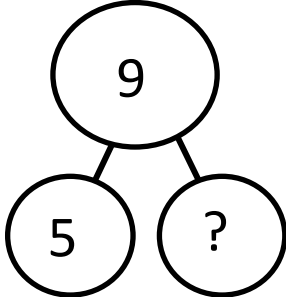
Physically taking away and removing objects from a whole.
(Use a wide range of resource to ensure children understand objects represent an amount)



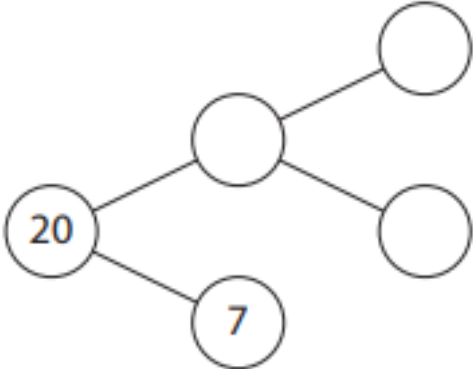
Draw the concrete resources they are using and cross out the correct amount.



Write the abstract number sentence.

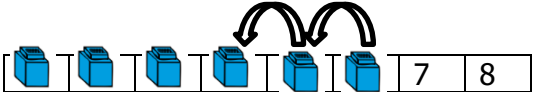
$$9 - 5 = 4$$


Complete:

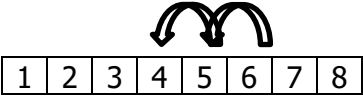


Create your own diagram.

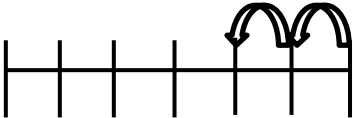
Counting back on a number line, starting with the biggest number.
 $6 - 2 = 4$



Represent what they see pictorially



Represent the calculation on a number line to show their jumps. This can include a blank number line.

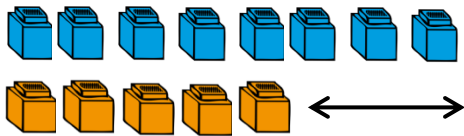


$$6 - 2 = 4$$

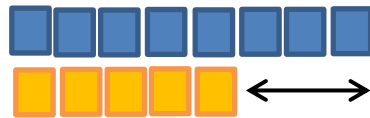
Miss Froggy can only leap in 2s on a numberline. She started on 20 and leapt back 6 Miss Froggy leaps. Show this on a number line.
Finish off the number sentence to show Miss Froggy's journey.

Finding the difference using physical objects.

Calculate the difference between 8 and 5.



Draw the object they have used or a bar model to illustrate what needs calculating.



Find the difference between 8 and 5.

$8 - 5$, the difference is 3

Children to explore why $9-6$, $8-5$, $7-4$ have the same difference.

Using ten frames and physical objects.

$$14 - 5$$

↙ ↘

4 1



-4

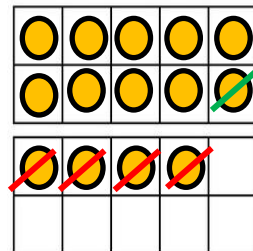


-1



Present the tens frame pictorially.

$$14 - 5$$



Show how to make 10 by partitioning the subtrahend (the part you are taking away)

$$14 - 5 = 9$$



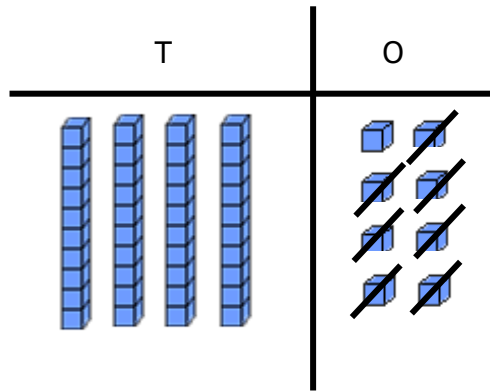
$$14 - 4 = 10$$

$$10 - 1 = 9$$

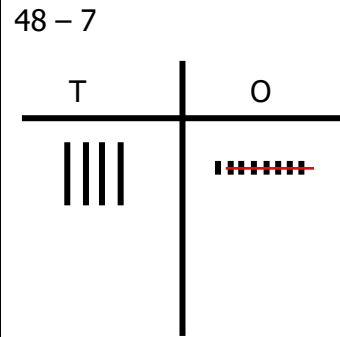
12 children are on a bus.
8 children get off the bus.
Then 4 more children get off the bus.
How many children were left on the bus?



Column method using diennes without exchanging
48-7



Represent the diennes pictorially



Partition the numbers mentally to subtract.
May introduce the column method without exchanging here.

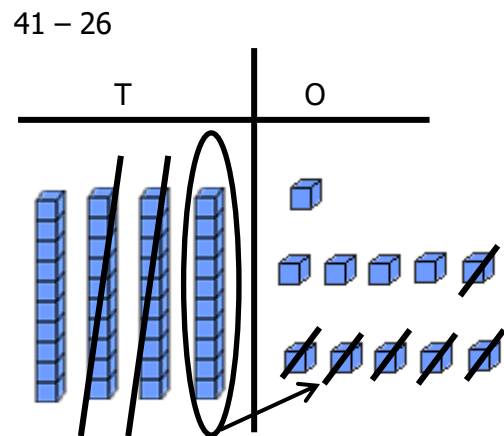
	4	8
-		7
	4	1

Flo and Jim are answering a problem:

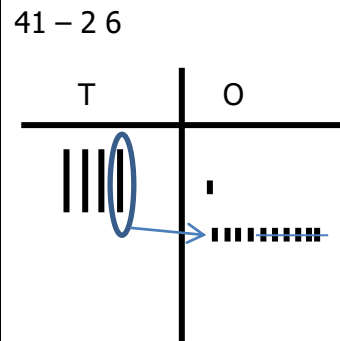
Danny has read 62 pages of the class book, Jack has read 41. How many more pages has Danny read than Jack?
Flo does the calculation $62 + 41$. Jim does the calculation $62 - 41$. Who is correct?

Explain how you know.

Column method using diennes to solve TO - TO with exchanging
41 - 26



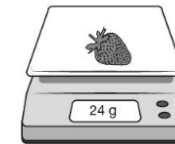
Represent the resource, remembering to show the exchange.



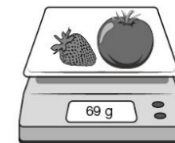
Formal column method.
Children must understand what has happened when they have crossed out digits.

	3	11
-	2	6
	1	5

The strawberry weighs 24 grams.



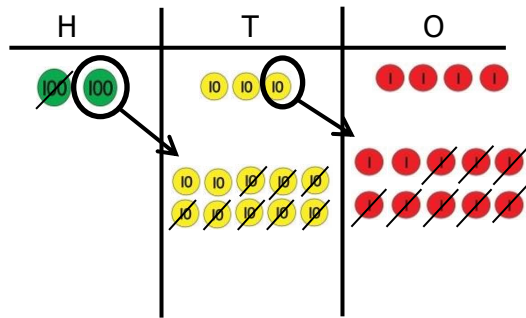
The strawberry and tomato together weigh 69 grams.



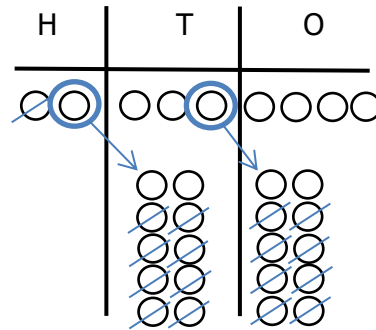
What does the tomato weigh?

Column method using counters to solve HTO-HTO

$$234 - 188$$



Represent the resource, remembering to show the exchange.



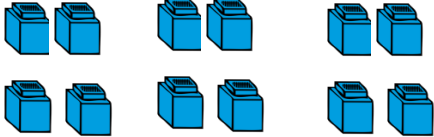
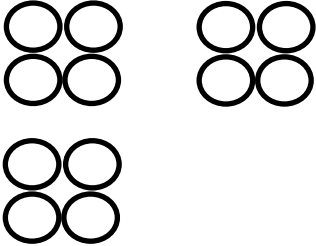

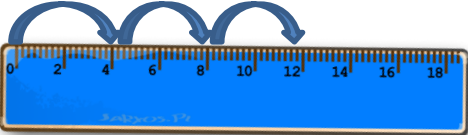
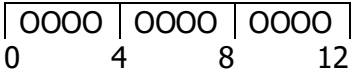
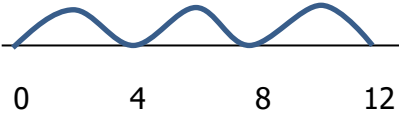

Formal column method. Children must understand what has happened when they have crossed out digits.

	¹ / 2	^{1 2} / 3	¹ 4
-	1	8	8
	0	4	6

$$5003 - 1998$$

What are the different ways you could do this calculation?

Which is the most efficient and why?

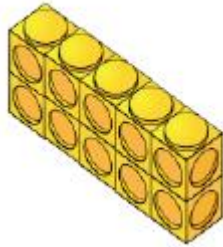
Multiplication			
Key Language		Times, multiplied by, product, groups of, lots of, equal groups.	
Concrete	Pictorial	Abstract	Greater Depth
<p>Repeated addition</p> <p>$4 + 4 + 4$</p> <p>There are 3 equal groups with 4 in each group.</p> 	<p>Represent the practical resource with a picture.</p> 	<p>$4 + 4 + 4 = 12$</p> <p>$4 + 4 + 4 = 3 \times 4$</p> <p>$3 \times 4 = 12$</p>	<p>Greater Depth</p> <p>Tara has 4 books. Ravi has 3 times as many books as Tara.</p>  <p>How many books do Tara and Ravi have altogether.</p>
<p>Repeated addition</p> <p>Shown on a numberline.</p> 	<p>Pictorially represented on a numberline.</p> <p>3 lots of 4 is 12.</p> 	<p>Show on a blank numberline.</p> <p>$3 \times 4 = 12$</p> 	<p>Amaan solved a multiplication calculation which had 3 equal jumps. He lands on 21. Show his workings.</p> 

Arrays

Highlights the commutativity of

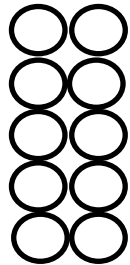
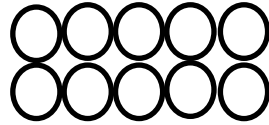


multiplication.
2 lots of 5



5 lots of 2

Represent the arrays in both directions.



Record a range of calculations from the arrays.

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

$$5 + 5 = 10$$

$$2 + 2 + 2 + 2 + 2 = 5 + 5$$

$$2 \times 5 = 10$$

$$5 \times 2 = 10$$

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

Amy plants 4 rows of carrots.

There are 3 carrots in each row.

A rabbit eats 2 of the carrots.

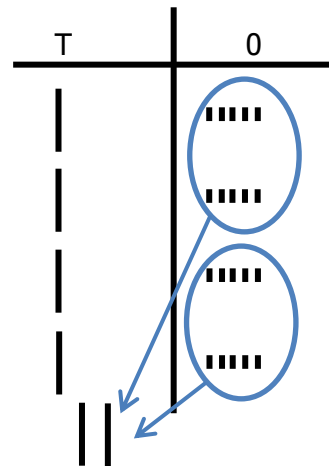
How many carrots are left?

Partitioning

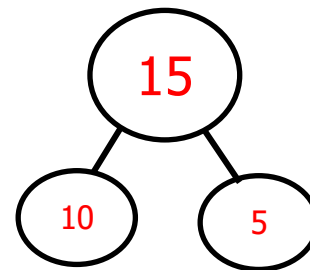
Use numicon to represent the number and rearrange
 4×15



Represent the numicon as tens and ones pictorially.



Partition the larger number and multiply the parts.



$$10 \times 4 = 40$$

$$5 \times 4 = 20$$

$$40 + 20 = 60$$

Jack is making cards.

One sheet of paper makes 15 cards.

Jack uses 5 sheets of paper.

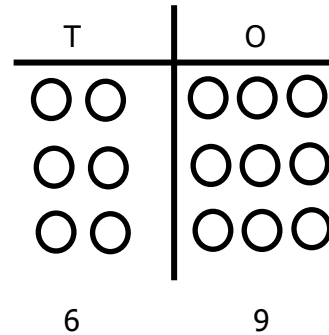
How many cards does he make?

Formal column method with counters

$$23 \times 3 = 69$$

T	O
10 10	1 1 1
10 10	1 1 1
10 10	1 1 1
60	9

Represent the counters pictorially.

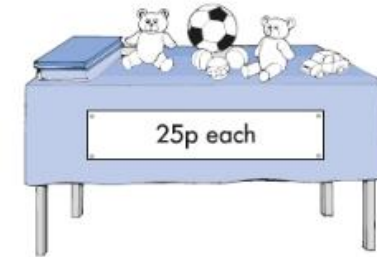


Record each step of the multiplication.

	2	3	
x		3	
		9	(3 x 3)
	6	0	(20 x 3)
	6	9	

Each toy cost 25p.

Jack buys 6 toys.



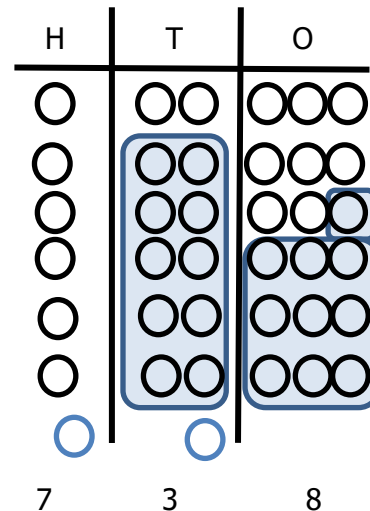
How much change does he get from £2.00

Formal column method with counters

$$6 \times 123 = 738$$

H	T	O
100	10 10	1 1 1
100	10 10	1 1 1
100	10 10	1 1 1
100	10 10	1 1 1
100	10 10	1 1 1
100	10 10	1 1 1
100	10	
700	30	8

Represent the counters pictorially.



Use a formal written method. Children must be confident with the value of each digit when multiplying.

	1	2	3
x			6
	7	3	8
	±	±	


There are 28 pupils in a class.

The teacher has 8 litres of orange juice.

She pours 225 millilitres of orange juice for every pupil

How much orange juice is left over?



Division			
Key Language	Share, group, divide		
Concrete	Pictorial	Abstract	Greater Depth
Repeated subtraction	Represent the subtraction pictorially.	Use an abstract numberline to represent equal groups are being subtracted.	Miss Smith needs 30 apples for her class. There are 5 apples in each bag. How many bags of apples does Miss Smith need altogether?
Sharing using a range of objects $6 \div 2$	Represent the sharing pictorially.	Use times table facts to support. If I know $2 \times 3 = 6$ then I know $6 \div 2 = 3$.	How many ways could you share 20 sweets between friends so everyone gets an equal amount?
Sharing using place value counters. $42 \div 3$	Represent the counters pictorially.	Partition the number into two parts linked to the divisible number.	A group of friends earn £80 by washing cars. They share the money equally. They get £16 each. How many friends are in the group?
Using resources to represent remainders. Use of lollipop sticks to form wholes – 4 sides as we are dividing by 4 $13 \div 4$ There are 3 whole squares, with 1 left over.	Represent the sticks pictorially. There are 3 whole squares, with 1 left over.	Use times table facts to support. If I know $4 \times 3 = 12$ then I know 13 is made up of 3 groups of 4, with 1 left over.	Jack wants to buy a bike that cost £107. He saves £10 each Saturday. How many Saturdays will it take him to save enough to buy the bike? 

Short division using place value counters

$$615 \div 5$$

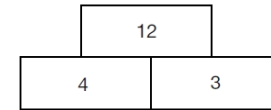
Make the value with counters. Ask how many 5 hundreds's go into 600 hundred, 50s in 10 and 5s in 5.

Represent the counters pictorially.

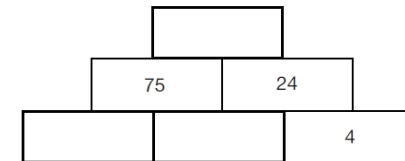
Use the short division written method

	1	2	3
5	6	11	15

In this tower, two numbers are multiplied to give the number above.



Write the missing numbers in the tower below to make it correct.



Long division using place value counters

$$2544 \div 12$$

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

			2	1	2
1	2	2	5	4	4
		2	4		
			1	4	
			1	2	
				2	4
				2	4
					0

Year 6 are calculating three thousand, six hundred and thirty three divided by twelve.

Whitney says that she knows there will be a remainder without calculating.

Is she correct? Explain your answer.