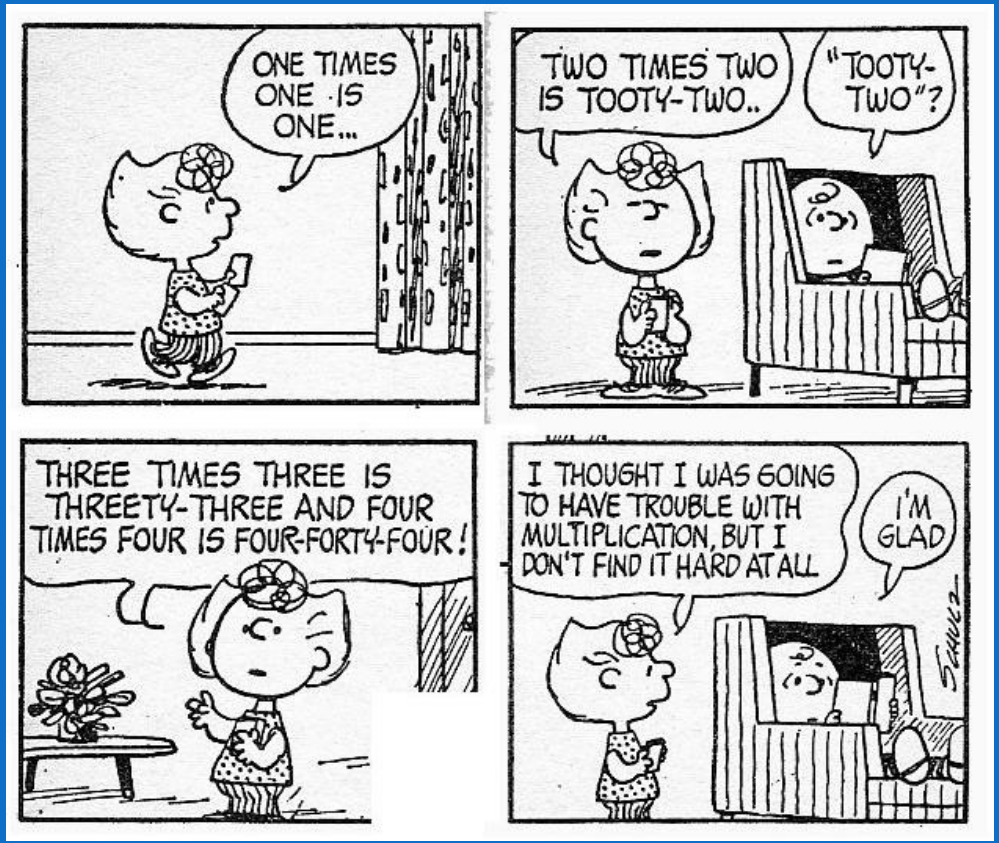
Supporting Calculations in KS2

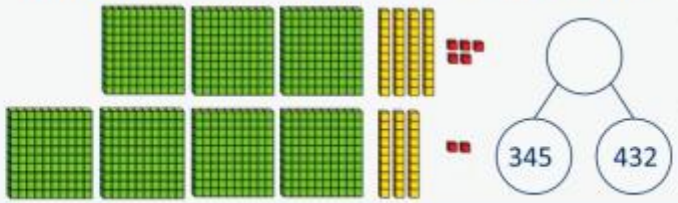
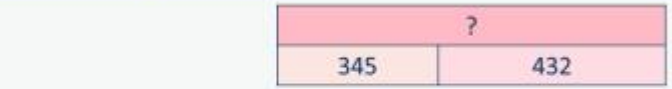


What we'll look at…

- When do we first learn written methods for +, -, x and ÷?
- What is the key vocabulary to use?
- Using visual representations to help understand the written method.
- Expectations for end of Year 6.

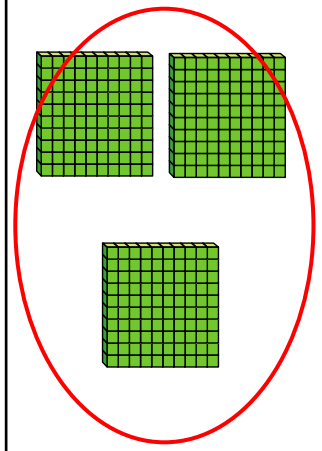
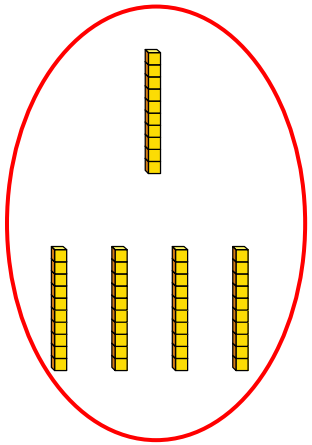
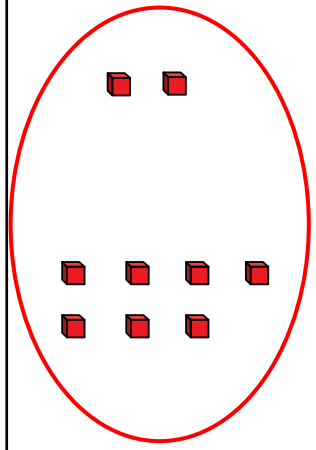
Addition…

- Written method first appears in Year 3.

Add two numbers (no exchange) Mental strategies and introduction of formal written method.	… ones + … ones = … ones … tens + … tens = … tens … hundreds + … hundreds = … hundreds    

Addition...

$$212 + 147 = 359$$

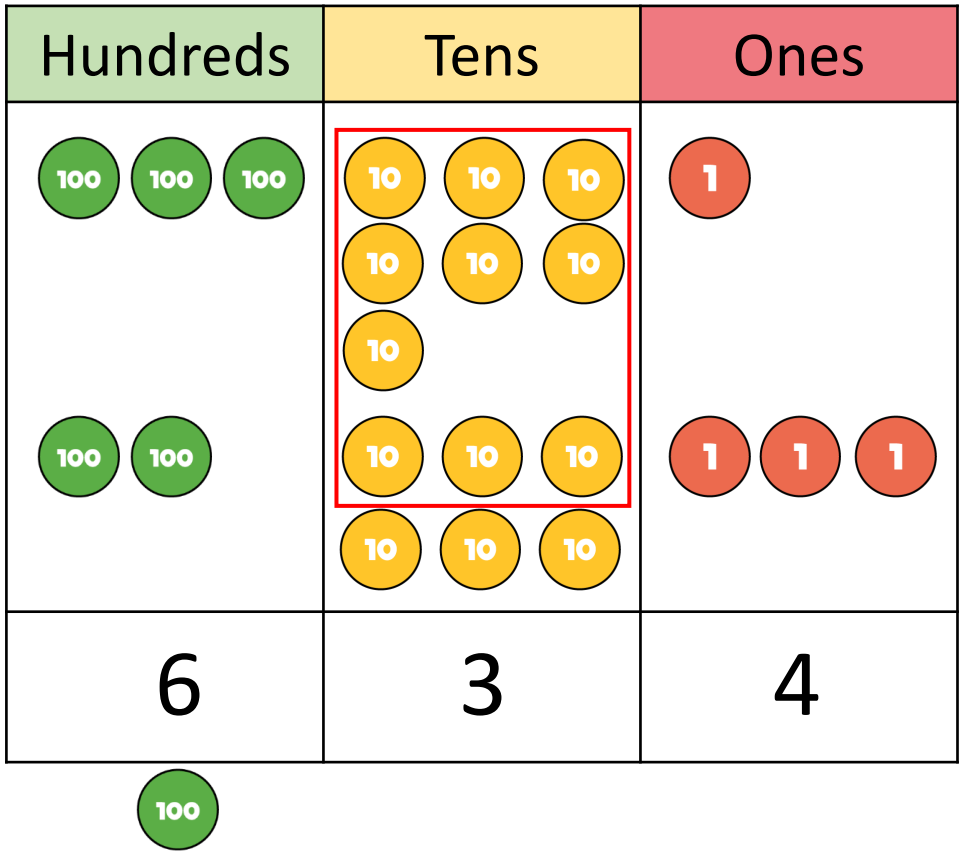
	Hundreds	Tens	Ones
+			
	3	5	9

	H	T	O
	2	1	2
+	1	4	7
	3	5	9

Do we have enough hundreds tens to make an exchange?

Addition...

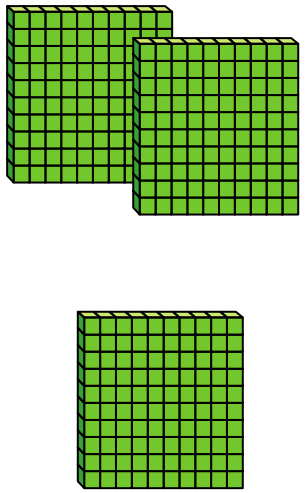
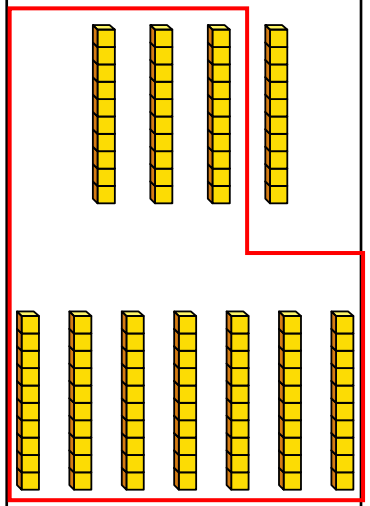
Dexter scores 371 points in a game.
Rosie scores 263 points.
How much do they score altogether? 634

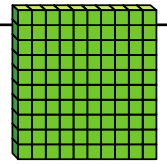


	H	T	O	
	3	7	1	
+	2	6	3	
	6	3	4	
	1			

Addition...

$243 + 172 = 415$

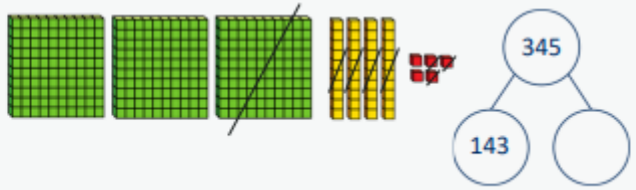
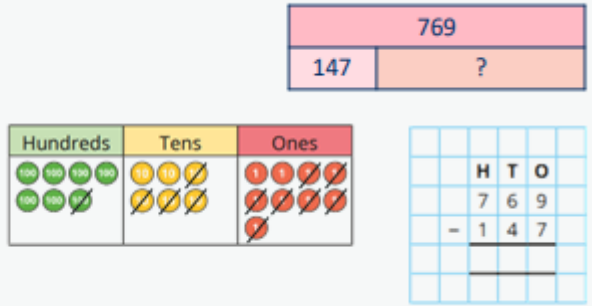
Hundreds	Tens	Ones
		
4	111	5



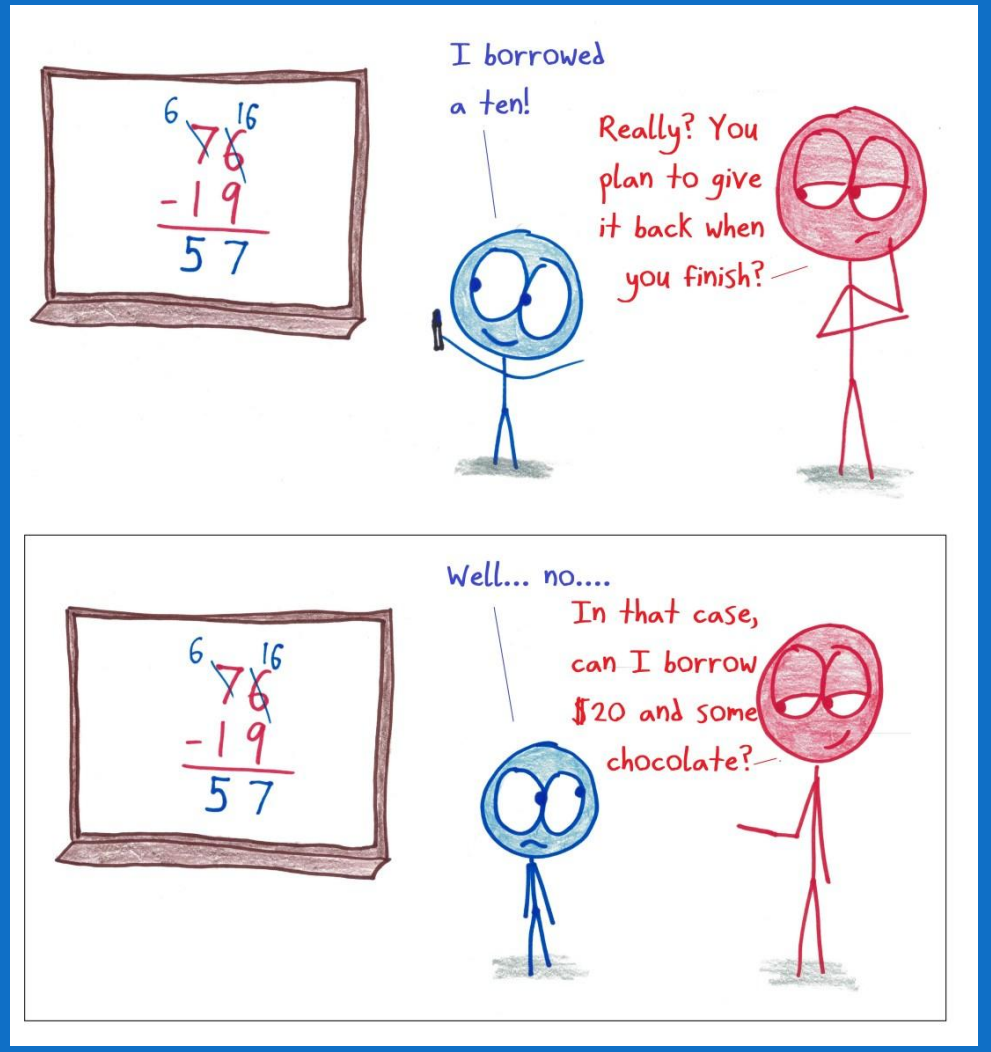
	H	T	O	
	2	4	3	
+	1	7	2	
	4	1	5	
	1			

Subtraction…

- Written method first appears in Year 3.

Subtract two numbers (no exchange) Mental strategies and introduction of formal written method.	… ones − … ones = … ones … tens − … tens = … tens … hundreds − … hundreds = … hundreds  

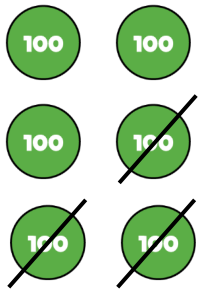
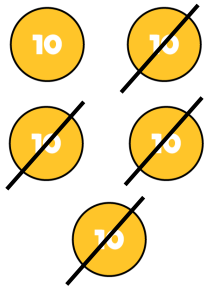
Subtraction…



Subtraction...

Have a think

$$652 - 340 = 312$$

Hundreds	Tens	Ones
		
3	1	2

		H	T	O	
		6	5	2	
−		3	4	0	
		3	1	2	

Do we need to make an exchange?

Subtraction...

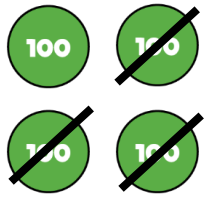
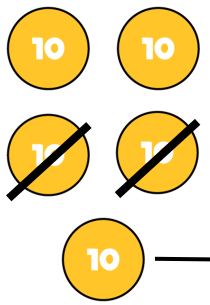
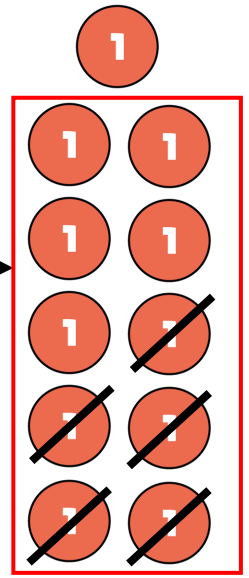
Have a think

$$451 - 325 =$$

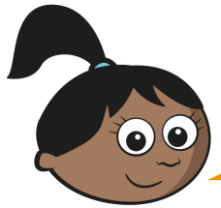
	H	T	O
	4	5	1
−	3	2	5

Subtraction...

$$451 - 325 = 126$$

Hundreds	Tens	Ones
		
1	2	6

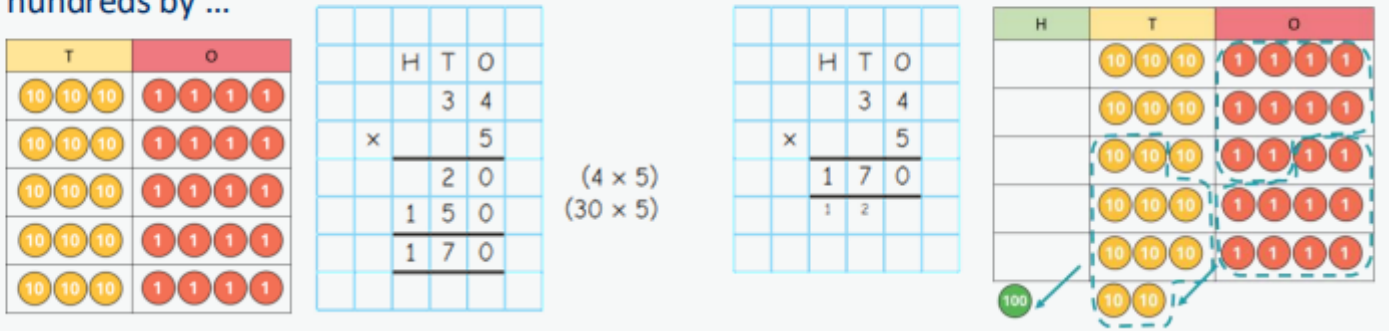
	H	T	O	
	4	$^{4}\not{5}$	$^{1}1$	
−	3	2	5	
	1	2	6	



I will exchange 1 ten for 10 ones.

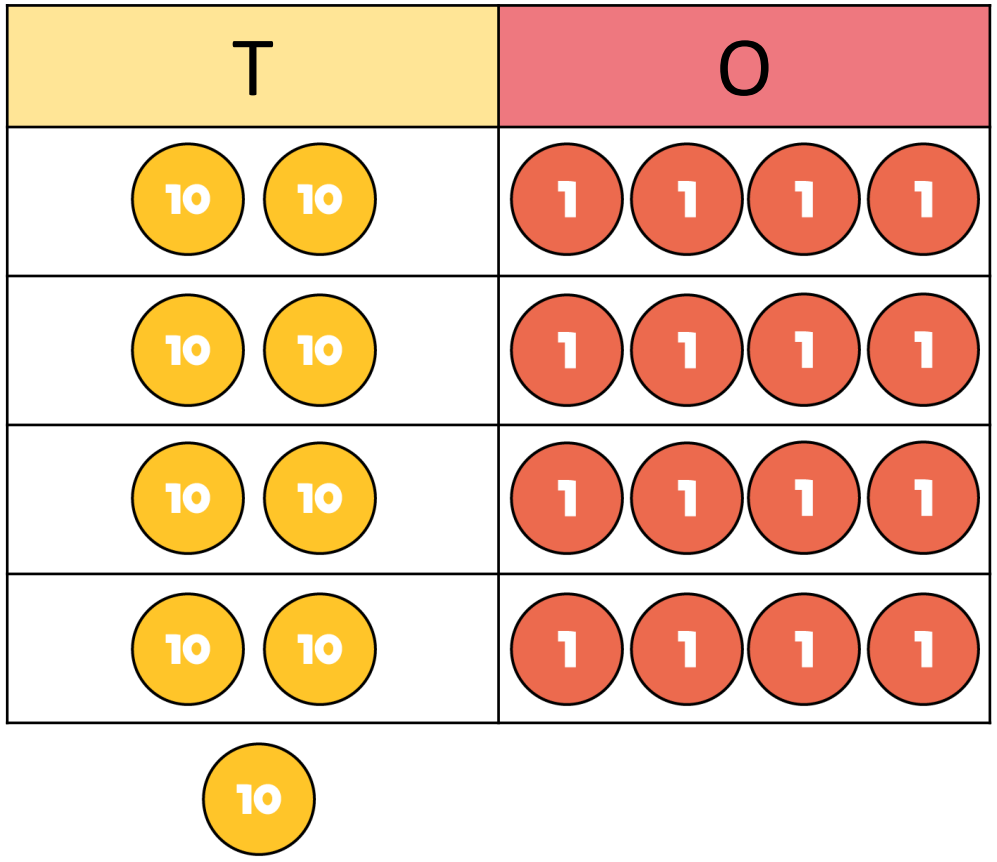
Multiplication…

- Written method first appears in Year 4.

Multiply a 2 or 3-digit number by a 1-digit number The short multiplication method is introduced for the first time, initially in an expanded form.	To multiply a 2-digit number by … , I multiply the ones by … and the tens by … To multiply a 3-digit number by … , I multiply the ones by … , the tens by … and the hundreds by … 

Multiplication...

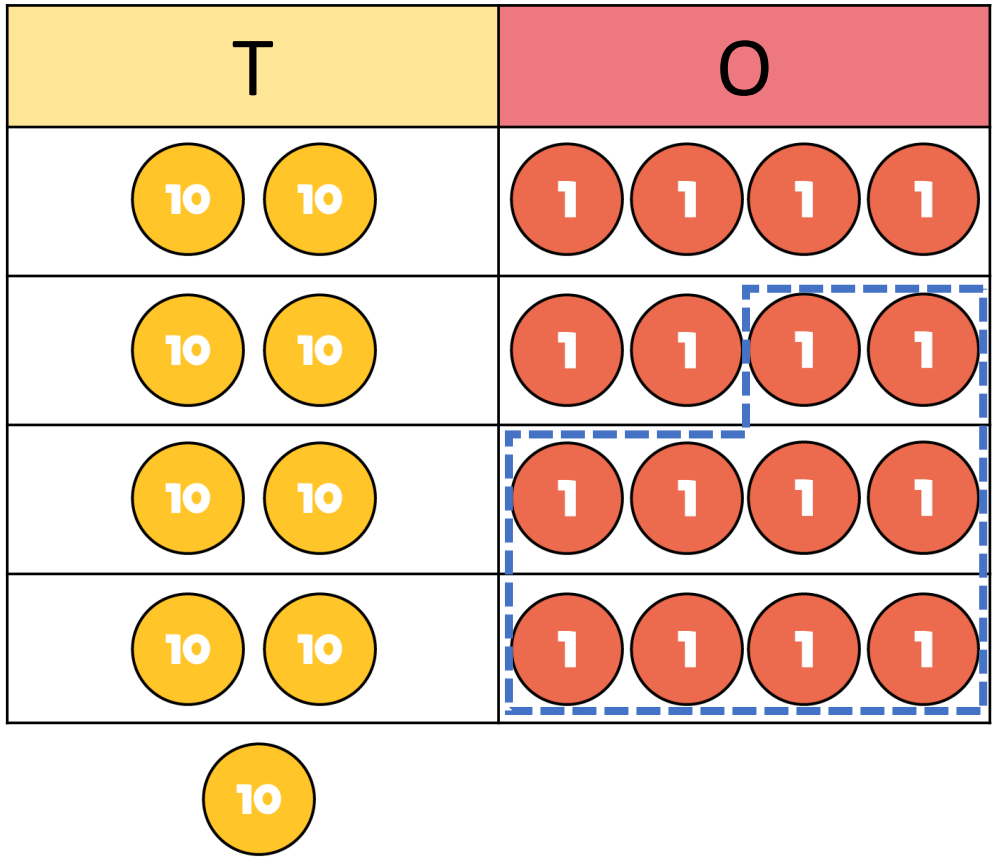
$4 \times 24 = 96$



	T	O		
	2	4		
×		4		
	1	6	(4 × 4)	
	8	0	(4 × 20)	
	9	6		

Multiplication…

$4 \times 24 = 96$



	T	O	
	2	4	
×		4	
	9	6	
	1		

Multiplication…

	T	O		
	2	4		
×		4		
	1	6	(4 × 4)	
	8	0	(4 × 20)	
	9	6		

	T	O	
	2	4	
×		4	
	9	6	
	1		

Have a think

What is the same about each method?

What is different about each method?

Which method do you prefer? Why?

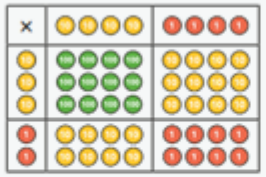
Multiplication…

- Written multiplying by two digits begins in Year 5.

Multiply numbers up to 4 digits by a 2-digit number

Numbers are first partitioned using an area model then long multiplication is introduced for the first time.

I can partition … into … and …



×	40	4
30	1,200	120
2	80	8

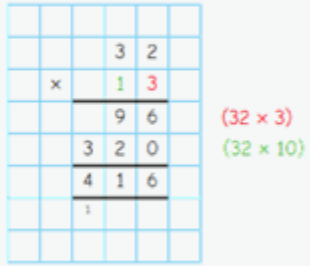
$32 \times 44 = 1{,}200 + 80 + 120 + 8$

$32 \times 44 = 1{,}408$

First, I multiply by the … Then I multiply by the …

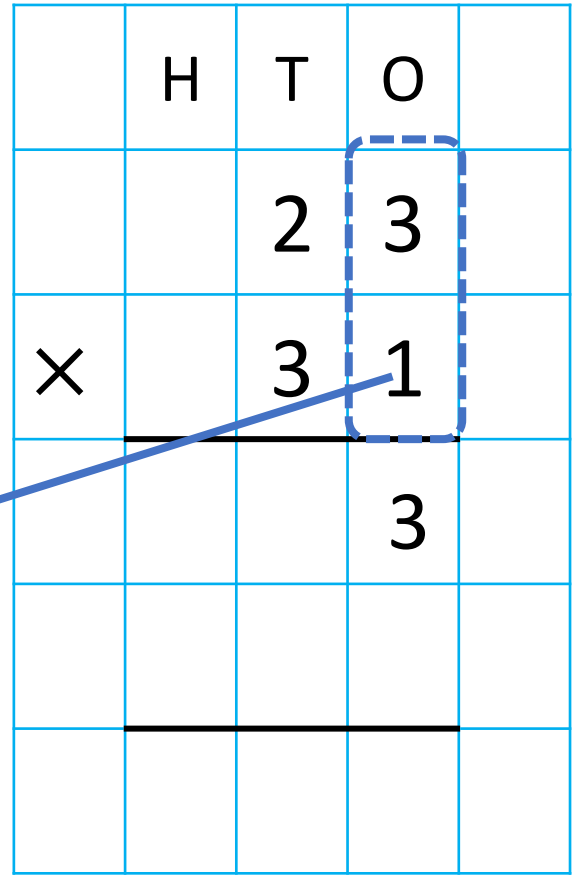
×	10	3
30	300	90
2	20	6

300 + 90 + 20 + 6 = 416



Multiplication…

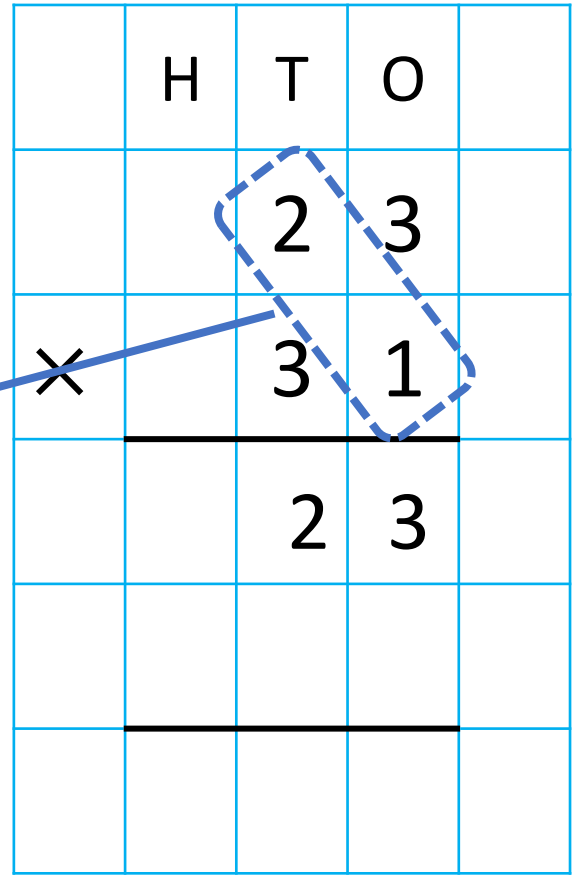
×	20	3
30	600	90
1	20	3



$600 + 90 + 20 + 3 = 713$

Multiplication…

×	20	3
30	600	90
1	20	3

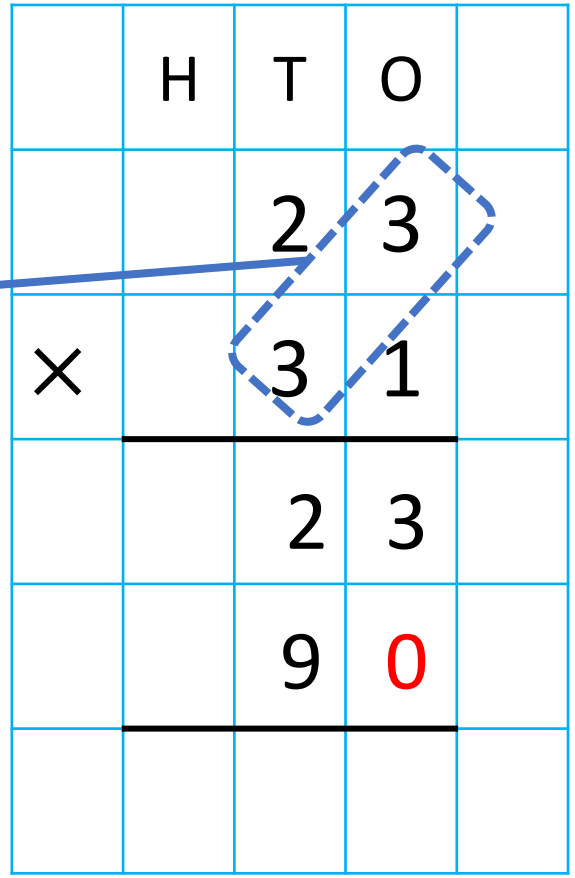


$600 + 90 + 20 + 3 = 713$

Multiplication…

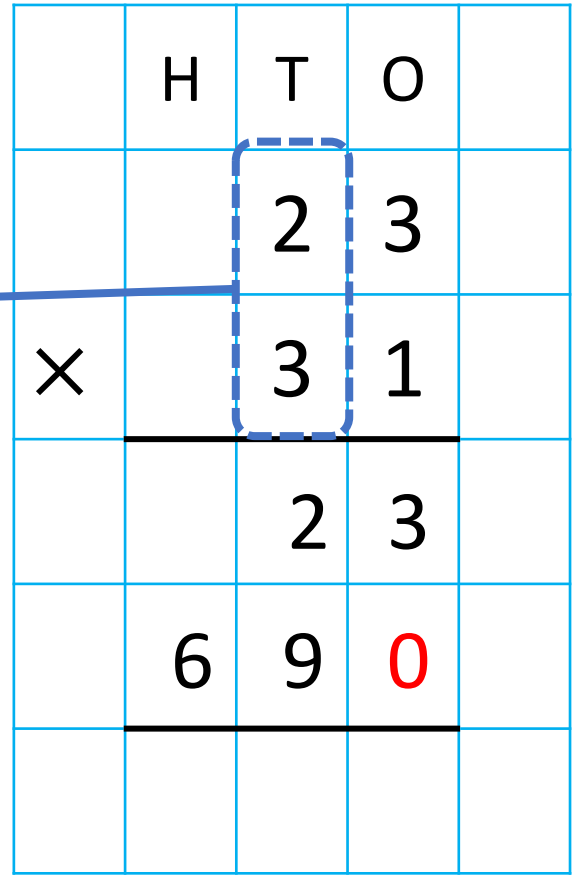
×	20	3
30	600	90
1	20	3

$600 + 90 + 20 + 3 = 713$



Multiplication…

×	20	3
30	600	90
1	20	3



$600 + 90 + 20 + 3 = 713$

Multiplication…

×	20	3
30	600	90
1	20	3

$600 + 90 + 20 + 3 = 713$

	H	T	O	
		2	3	
×		3	1	
		2	3	
+	6	9	0	
	7	1	3	

Multiplication...

×	20	3
30	600	90
1	20	3

$600 + 90 + 20 + 3 = 713$

	H	T	O	
		2	3	
×		3	1	
		2	3	
+	6	9	0	
	7	1	3	

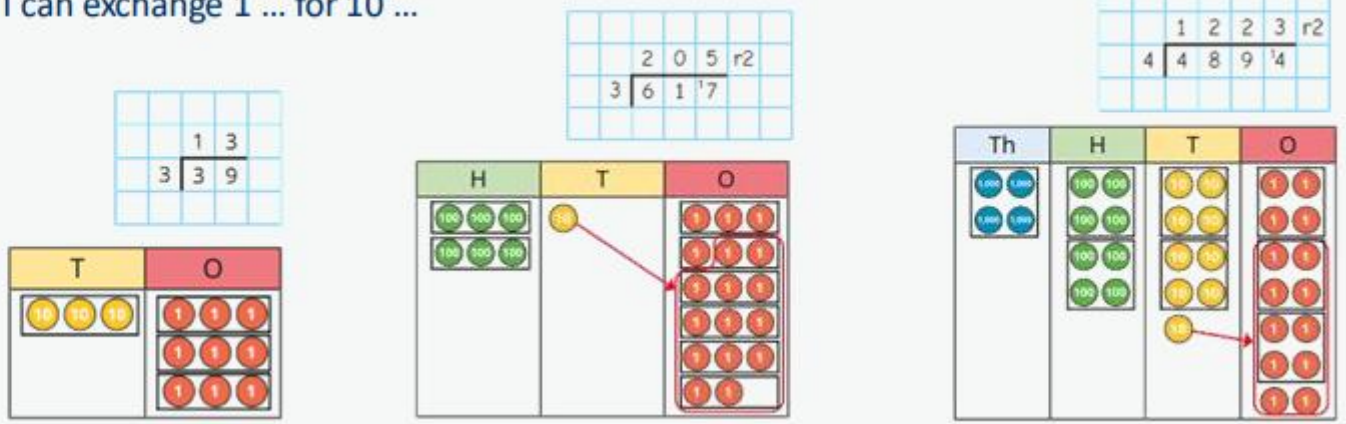
1

What is the same?

What is different?

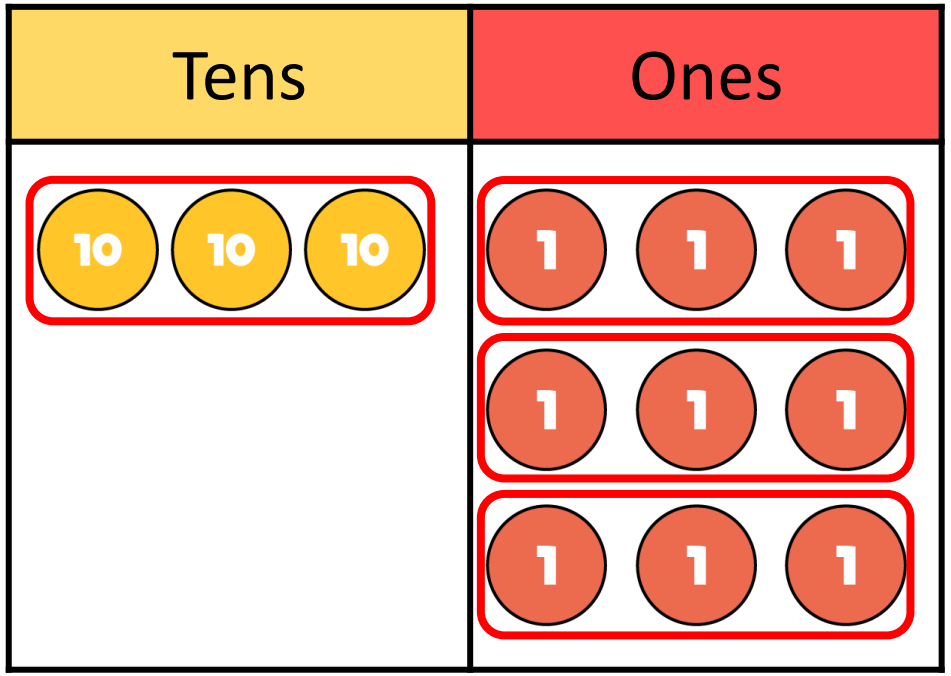
Division…

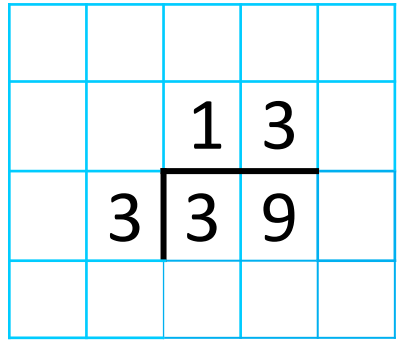
- Written method first appears in Year 5.

Divide numbers up to 4 digits by a 1-digit number The short division method is introduced for the first time.	There are … groups of … hundreds/tens/ones/ in … I can exchange 1 … for 10 … 

Division…

Complete the sentences.



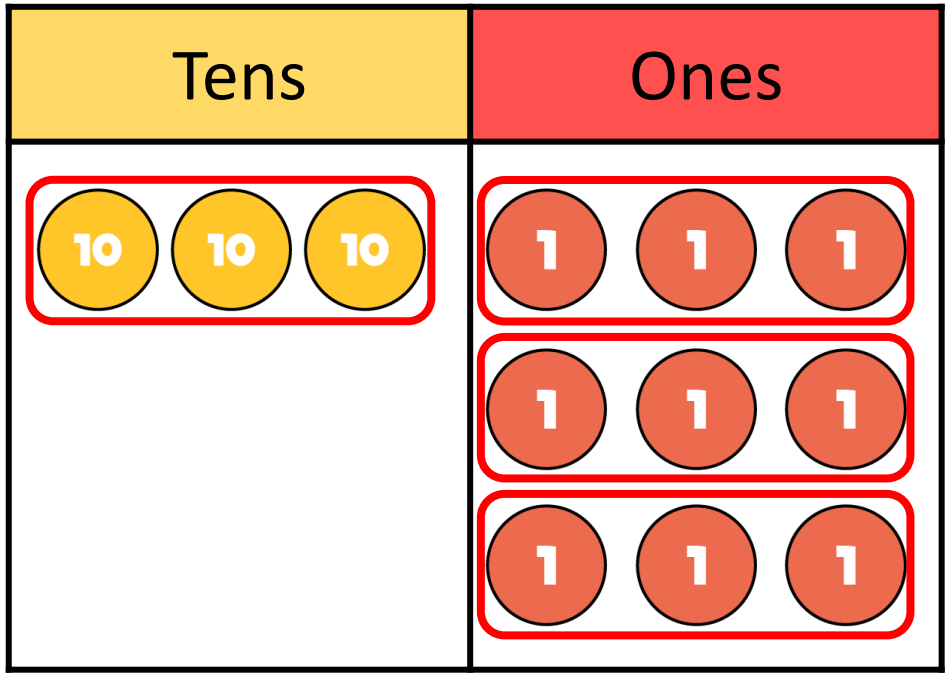


There is __1__ group of three tens.

There are __3__ groups of three ones.

$39 \div 3 = 13$

Division…



		1	3	
	3	3	9	

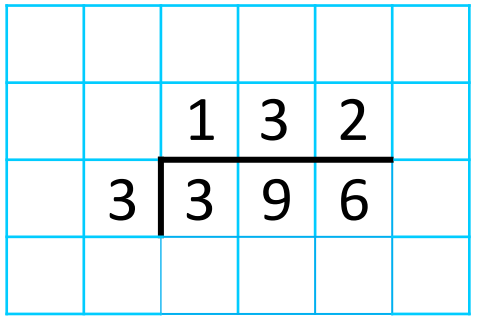
What is the same?

What is different?

Division…

$396 \div 3 =$

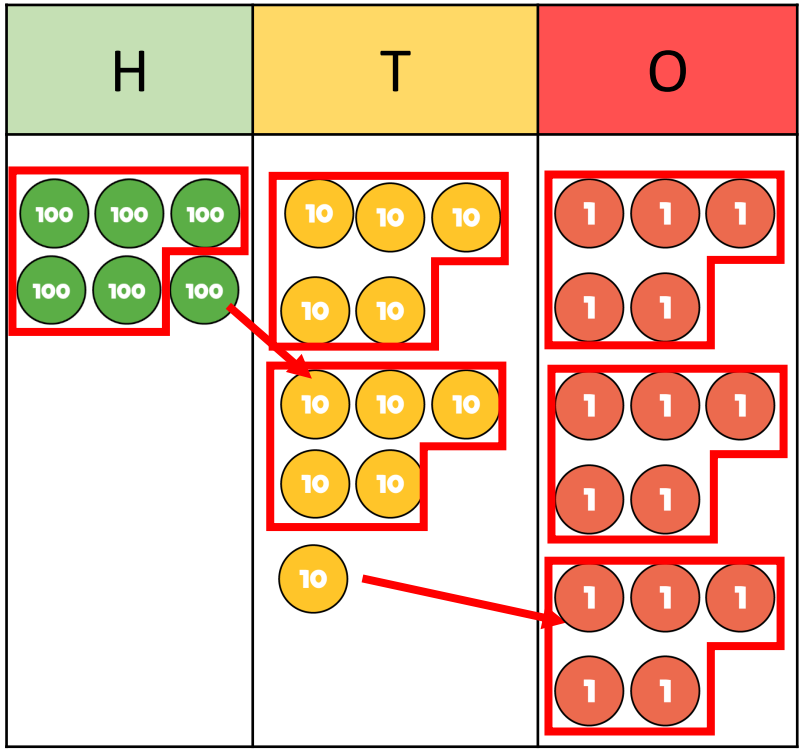
H	T	O
100 100 100	10 10 10 10 10 10 10 10 10	1 1 1 1 1 1



Have a think

Division…

615 ÷ 5 =



		1	2	3	
	5	6	$^{1}1$	$^{1}5$	

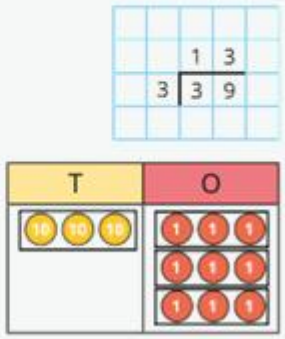
_6_ hundreds divided by _5_ is equal to _1_ hundred with a remainder of _1_

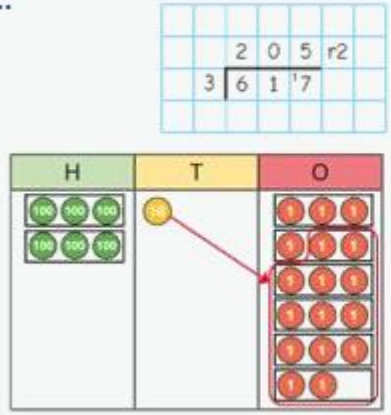
I can exchange _1_ hundred for _10_ tens.

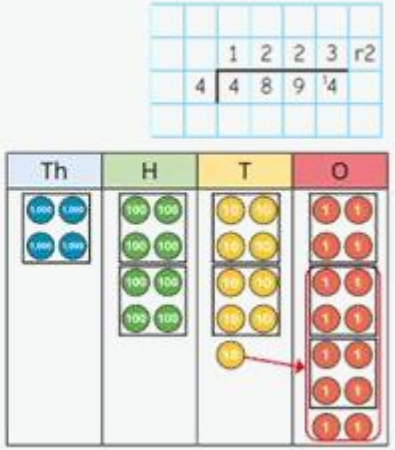
Division…

- Year 5 also introduces remainders.

Divide numbers up to 4 digits by a 1-digit number The short division method is introduced for the first time.	There are … groups of … hundreds/tens/ones/ in … I can exchange 1 … for 10 …		

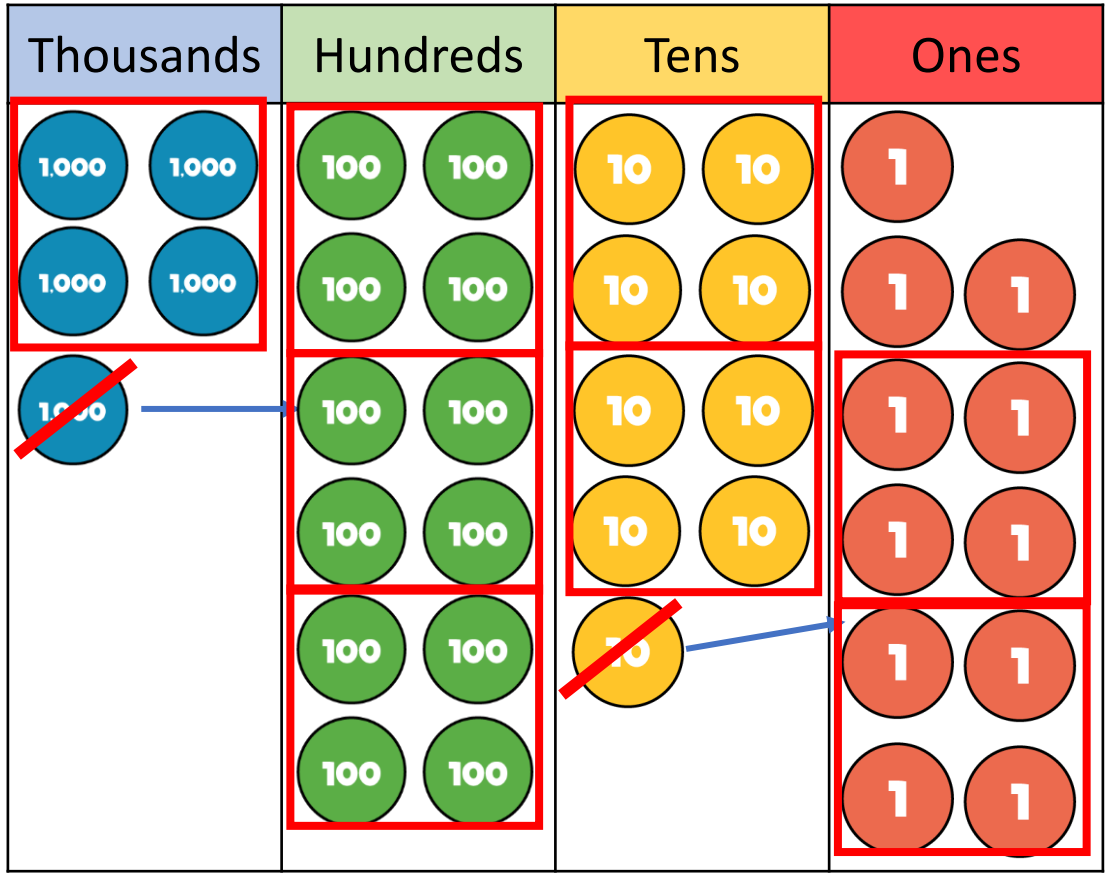






Division…

$5{,}291 \div 4 = 1{,}322$ r3



	1	3	2	2	r3
4	5	$^{1}2$	9	$^{1}1$	

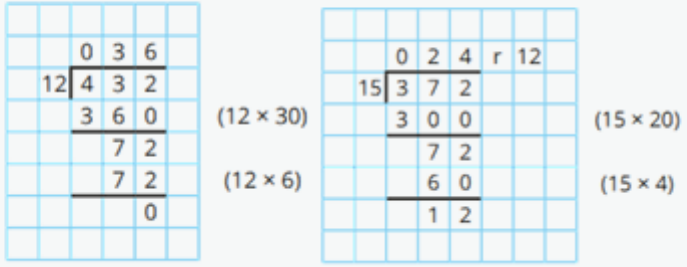
Division…

- Long division is introduced in Year 6.

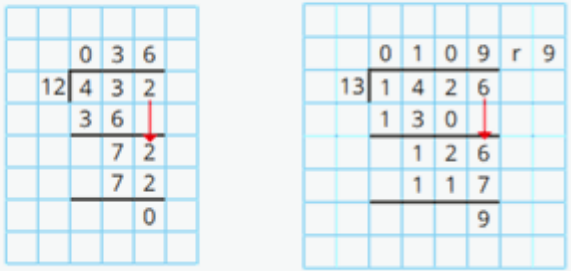
Long division

The long division method is introduced for the first time. Two alternative methods are shown.

Method 1



Method 2



Division...

Calculate:

$598 \div 13 = 46$

		4	6
13	5	9	8
–	5	2	0
		7	8
–		7	8
			0

(×40)

(×6)

$13 \times 1 = 13$
$13 \times 2 = 26$
$13 \times 3 = 39$
$13 \times 4 = 52$
$13 \times 5 = 65$
$13 \times 6 = 78$
$13 \times 7 = 91$

$13 \times 10 = 130$
$13 \times 20 = 260$
$13 \times 30 = 390$
$13 \times 40 = 520$
$13 \times 50 = 650$
$13 \times 60 = 780$
$13 \times 70 = 910$

Division...

Calculate $598 \div 13 = 46$

13	26	39	52	65	78	91	104	117	130

		4	6
13	5	9	8
–	5	2	↓
		7	8
–		7	8
			0

59 tens divided by 13 is equal to 4 tens with a remainder of 7 tens.

The remainder is exchanged into 70 ones.

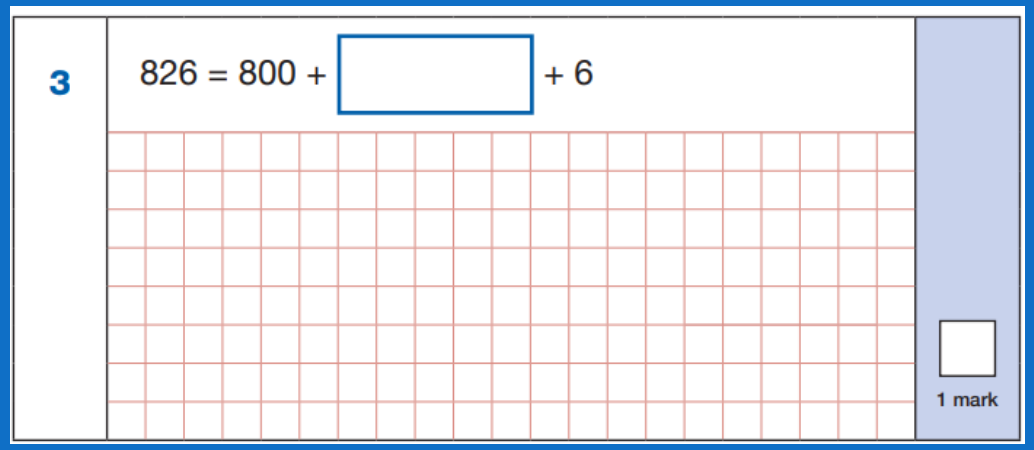
78 ones divided by 13 is equal to 6 ones.

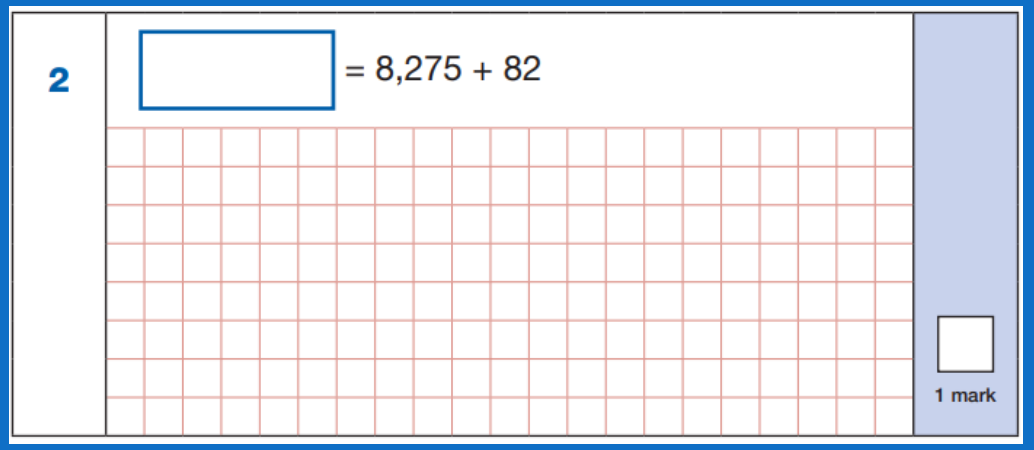
National Curriculum Tests…

- What are the expectations in the tests at the end of Year 6?

National Curriculum Tests…

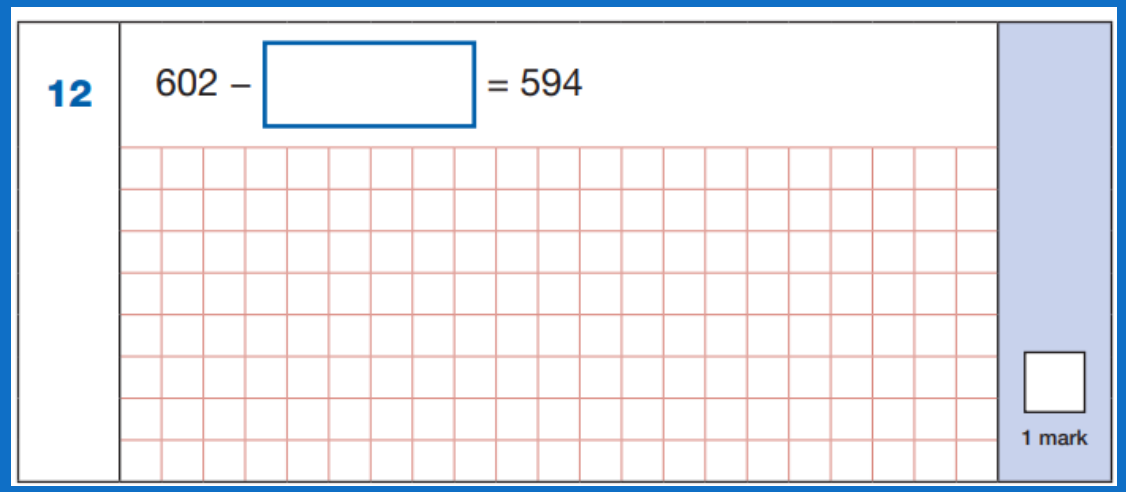
- Arithmetic addition questions

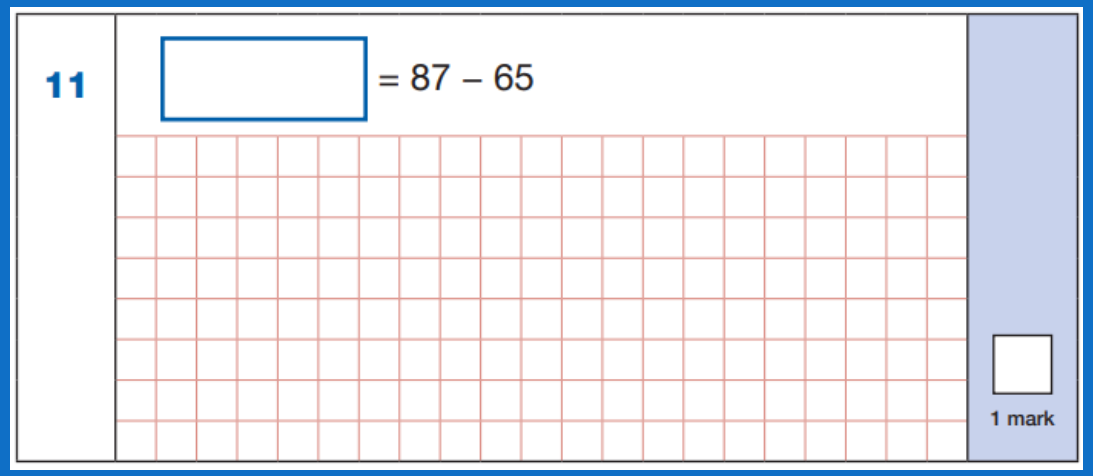




National Curriculum Tests…

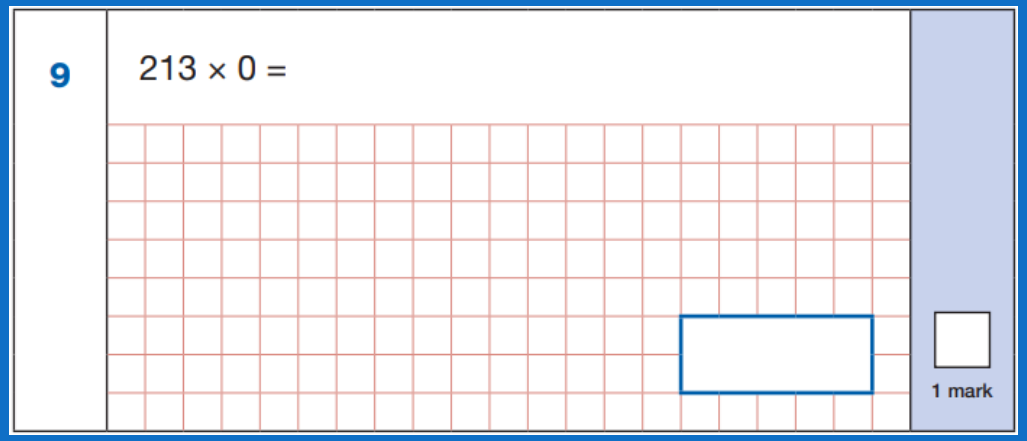
- Arithmetic subtraction questions

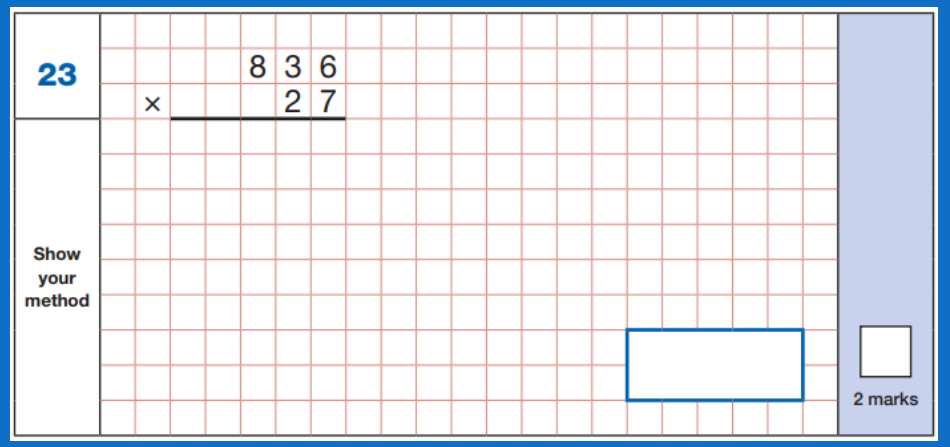


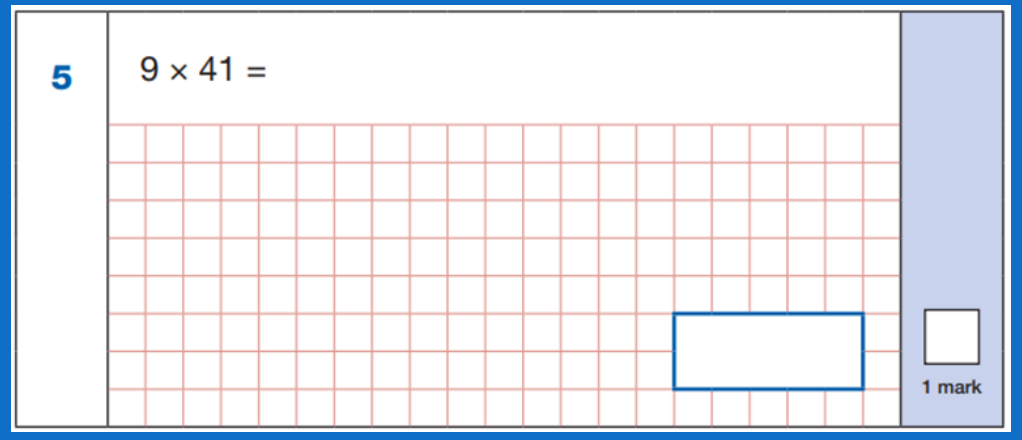


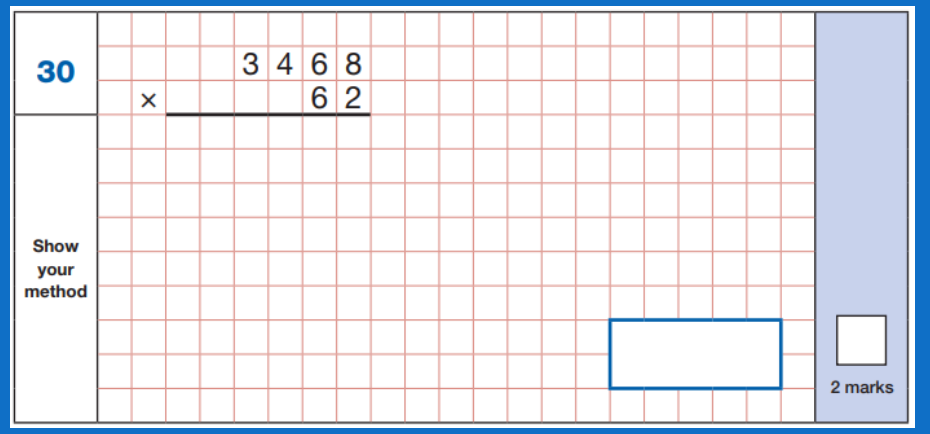
National Curriculum Tests…

- Arithmetic multiplication questions



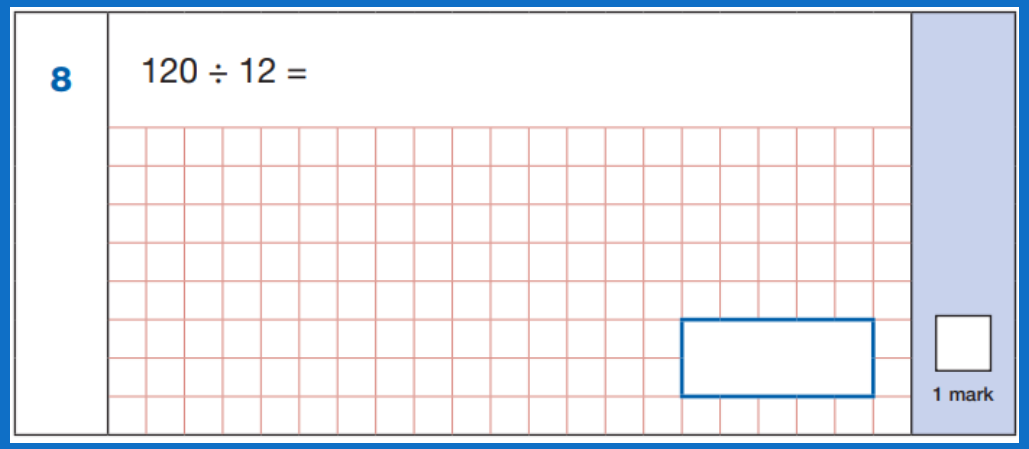


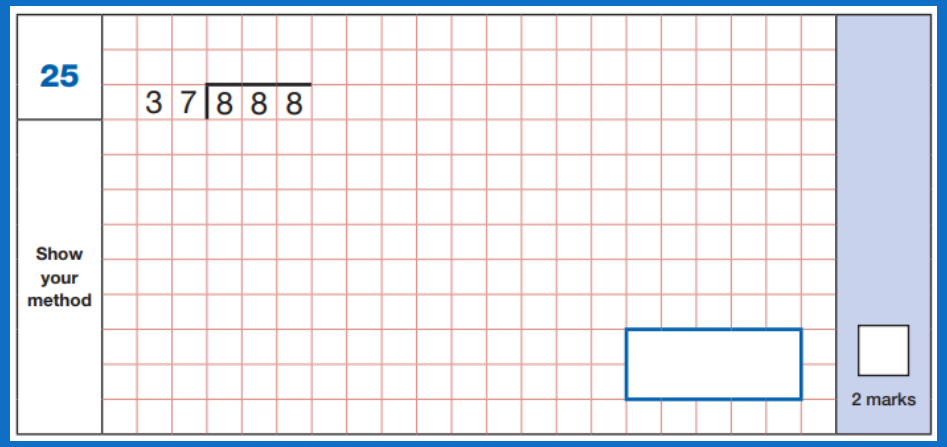


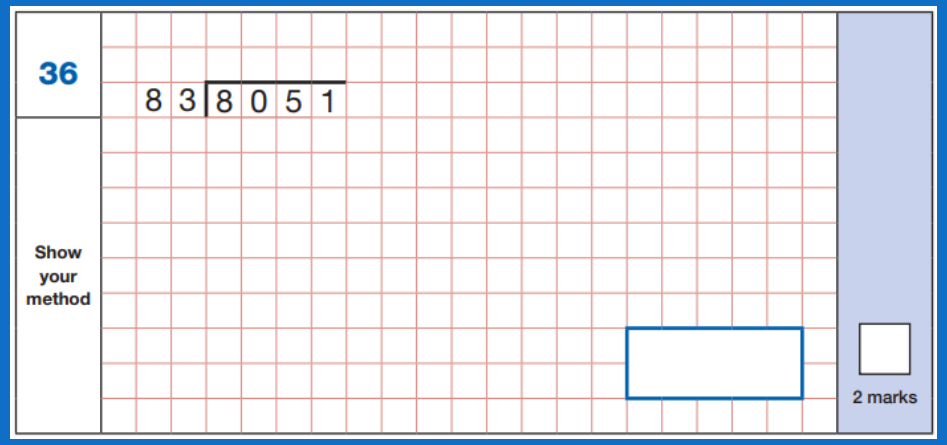


National Curriculum Tests…

- Arithmetic division questions







National Curriculum Tests…

- Reasoning questions

8 Ken is playing a game. He has 4,289 points.

Then he scores another 355 points.

Ken's target is 6,000 points.

How many **more** points does Ken need to reach his target?

Show your method

7 This picture shows the masses of eight kittens.

What is the **difference** in mass between the heaviest kitten and the lightest kitten?

g

1 mark

National Curriculum Tests…

- Reasoning questions

9 Jack chose a number.

He multiplied the number by 7

Then he added 85

His answer was 953

What number did Jack choose?

Show your method

2 marks

19 A machine pours 250 millilitres of juice every 4 seconds.

How many **litres** of juice does the machine pour every **minute**?

Show your method

litres

National Curriculum Tests…

- Reasoning questions

19 Layla makes jewellery to sell at a school fair.

Each bracelet has **53** beads.

She makes **68** bracelets.

Each necklace has **105** beads.

She makes **34** necklaces.

How many beads does Layla use **altogether**?

Show your method

beads

3 marks

15

The International Space Station orbits the Earth at a height of 250 miles.

What is the height of the International Space Station in **kilometres**?

Use 8 kilometres equals 5 miles.

km

1 mark

Where can you find more help?

- White Rose Maths videos for home learning.