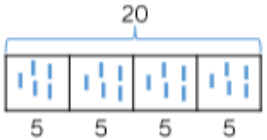
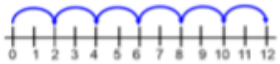
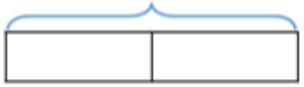
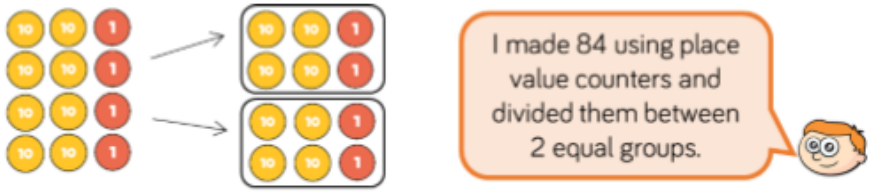
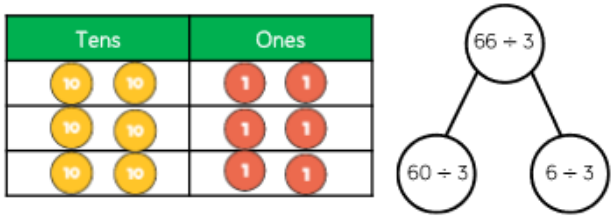
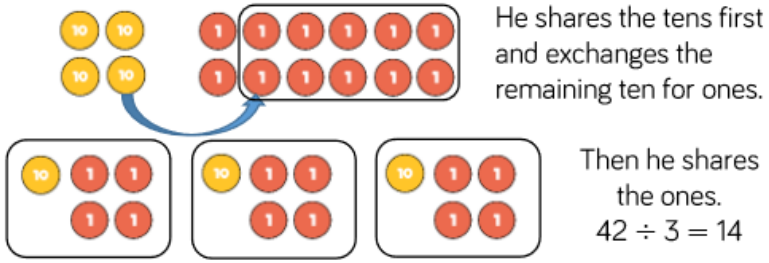
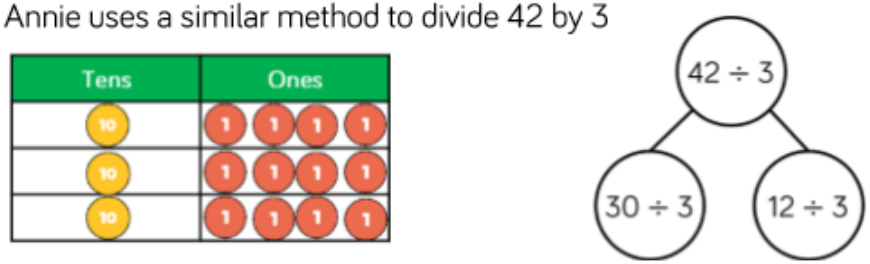
West Jesmond Calculation Policy Yr 1-Yr 6: Division

Progression In Written Division Methods

Year 1	Methods and Examples
Make Equal Groups - Grouping Children start with a given total and make groups of an equal amount. They record their understanding in sentences, not through formal division at this stage.	How many equal groups of 2 can you make with the mittens?  There are ___ groups of 2 mittens. If you had 10 mittens, how many equal groups of 2 mittens could you make?
Sharing Equally Children explore sharing as a model of division. They use 1:1 correspondence to share concrete objects into equal groups. Children also need to be given the opportunity to see when a number of objects cannot be shared equally into equal groups.	Share the muffins equally between the two plates. Complete the sentence. ___ cakes shared equally between 2 is ___ 
Year 2	**Methods and Examples**
Make Equal Groups – Sharing Children divide by sharing objects into equal groups using one-to-one correspondence. They need to do this using one-to-one correspondence. They need to do this using concrete manipulatives in different contexts, then move on to pictorial representations. Children will be introduced to the divide symbol. They will begin to see the link between division and multiplication.	Share the 12 cubes equally into the two boxes. There are ___ cubes altogether. There are ___ boxes. There are ___ cubes in each box.  Can you share the 12 cubes equally into 3 boxes? Ron draws this bar model to divide 20 into 4 equal groups. How does his model represent this? He writes 20 ÷ 4 = 5  What other number sentences could Ron create using his model?

Make Equal Groups – Grouping Children divide by making equal groups. They then count on to find the total number of groups.	Pencils come in packs of 20 We need to put 5 in each pot. How many pots will we need? There are ___ pencils altogether. There are ___ pencils in each pot. There are ___ pots.  Mrs Green has 18 sweets. She puts 3 sweets in each bag. How many bags can she fill? 18 ÷ ☐ = 3 18 ÷ 3 = ☐ 18  Mo uses a number line to work out how many equal groups of 2 he can make from 12  Use a number line to work out how many equal groups of 5 you can make from 30
Divide by 2 Children should be secure with grouping and sharing. They will use this knowledge to help them divide by 2. They will be secure with representing division as an abstract number sentence using the division and equals symbol.	Complete the stem sentences.  I have ___ cubes altogether. There are ___ in each group. There are ___ groups. ☐ ÷ ☐ = ☐ ☐ × ☐ = ☐ Group the socks into pairs.  ☐ ÷ ☐ = ☐ ☐ × ☐ = ☐ Complete the number sentences. Mo and Tommy have 12 sweets between them. They share them equally. How many sweets does each child get? There are ___ sweets altogether. There are ___ groups. There are ___ in each group. 12  Complete the bar model and write a calculation to match.

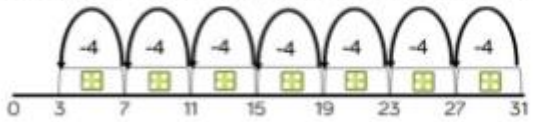
Divide by 5 During this step, children focus on efficient strategies and whether they should use grouping or sharing depending on the context of the question. They will continue to see the = sign before and after the calculation.	40 pencils are shared between 5 children.  ☐ ÷ ☐ = ☐ How many pencils does each child get? Group the 1p coins into 5s. How many 5p coins do we need to make the same amount of money? Draw coins and complete the missing information.  • ___ lots of 5p = 20 one pence coins • ___ lots of 5p = 20p • 20p = ___ × 5p • 20p ÷ 5 = ___
Divide by 10 Children will need to use both grouping and sharing to divide by 10 depending on the context of the problem. Children start to see that grouping and counting in 10's is more efficient than sharing into 10 equal groups.	Apples can be sold in packs of 10 How many packs can be made below?  ☐ ÷ ☐ = ☐ When 30 apples are sold in packs of 10, ___ packs of apples can be made. Can you show this in a bar model?  Label and explain what each part represents. I have 70p in my pocket made up of 10p coins. How many coins do I have? Draw a picture to prove your answer.  Fill in the missing numbers. • 70 ÷ 10 = ___ • 6 tens ÷ 1 ten = ___ • 5 = ___ ÷ 10 • There are ___ tens in 40

Year 3	Methods and Examples
Divide 2-digits by 1-digit (1) Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups. They divide numbers that do not involve exchange or remainders. It is important that children divide the tens first and then the ones.	Ron uses place value counters to solve 84 ÷ 2  Eva uses a place value grid and part-whole model to solve 66÷ 3 
Divide 2-digits by 1-digit (2) Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups. They divide numbers that involve exchanging between the tens and ones. The answers do not have remainders. Children use their times-tables to partition the number into multiples of the divisor.	Ron uses place value counters to divide 42 into three equal groups.  Annie uses a similar method to divide 42 by 3  Use Annie's method to calculate:

Divide 2-digits by 1-digit (3)

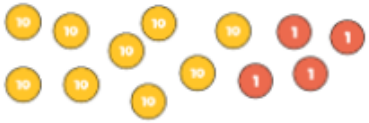
Children move onto solving division problems with a remainder. Links are made between division and repeated subtraction, which builds on learning in Year 2.

Tommy uses repeated subtraction to solve 31 ÷ 4



31 ÷ 4 = 7 r 3

Use place value counters to work out 94 ÷ 4
Did you need to exchange any tens for ones?
Is there a remainder?



Tens	Ones

Year 4

Methods and Examples

Divide 2-digits by 1-digit (1)

Children build on their knowledge of dividing a 2-digit number by a 1-digit number from Year 3 by sharing into equal groups.

Children use examples where the tens and the ones are divisible by the divisor. They then move on to calculations where they exchange between tens and ones.

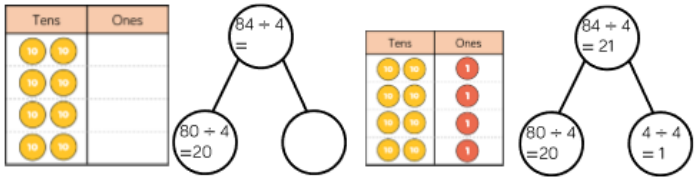
Presenting the problem:

'Eighty-one marbles are shared equally between three children. How many marbles does each child get?'

81 ÷ 3 = ?

Jack is dividing 84 by 4 using place value counters.

First, he divides the tens. Then, he divides the ones.



Divide 2-digits by 1-digit (2)

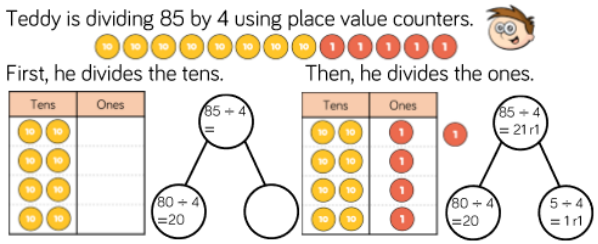
Children explore dividing 2-digit numbers by 1-digit numbers involving remainders. They continue to use the place value counters to divide in order to explore why there are remainders.

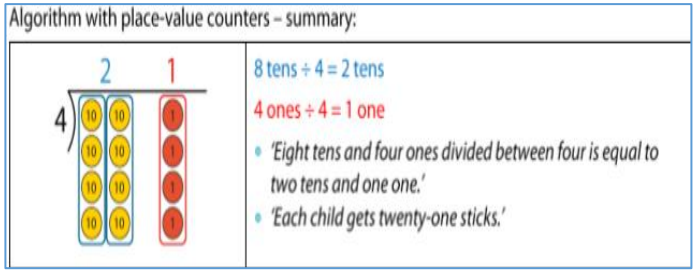
Short division

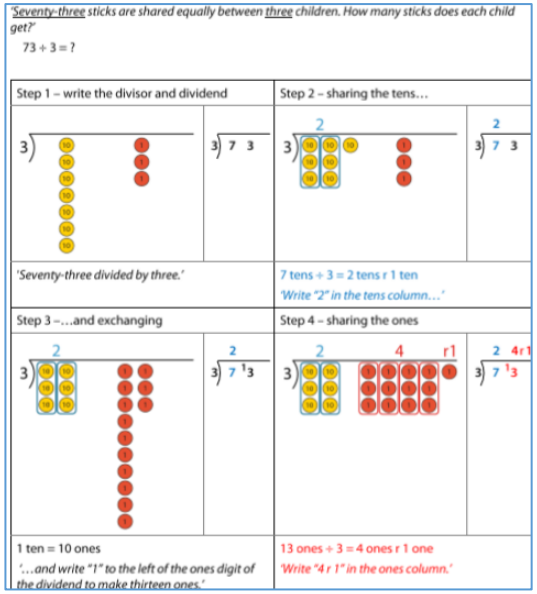
$$\begin{array}{r} 2\ 1 \\ 4\overline{)\ 8\ 4} \end{array}$$

- 8 tens ÷ 4 = 2 tens
  'Write "2" in the tens column.'
- 4 ones ÷ 4 = 1 one
  'Write "1" in the ones column.'

- *'First write the divisor: "4".'*
- *'Then draw the frame.'*
- *'Then write the dividend: "84".'*
- *'Now divide, starting with the tens: eight tens divided by four is equal to two tens; write "2" in the tens column.'*
- *'Then move to the ones: four ones divided by four is equal to one one; write "1" in the ones column.'*





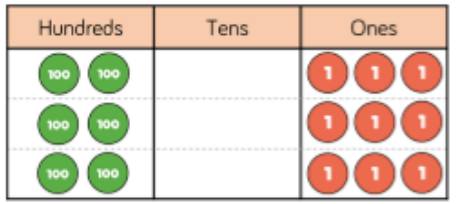


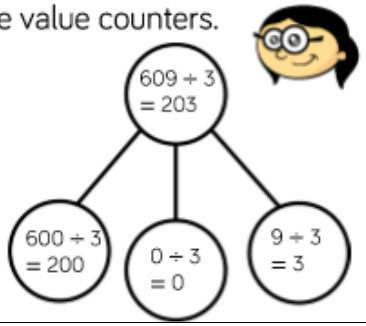
Divide 3-digits by 1-digit

Children apply their previous knowledge of dividing 2-digit numbers to divide a 3-digit number by a 1-digit number. They use place value counters and part-whole models to support their understanding. Children divide numbers with and without remainders.

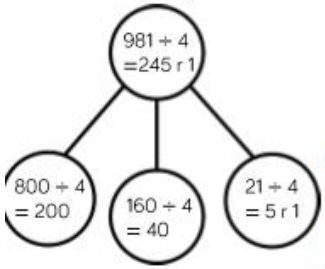
- *'First write the divisor: "5".'*
- *'Then draw the frame.'*
- *'Then write the dividend: "705".'*
- *'Now divide, starting with the hundreds: seven hundreds divided by five is equal to one hundred, with a remainder of two hundreds; write "1" in the hundreds column…'*
- *'and exchange the remainder: two hundreds is equal to twenty tens; write "2" to the left of the tens digit of the dividend to make twenty tens.'*
- *'Then move to the tens: twenty tens divided by five is equal to four tens; write "4" in the tens column.'*
- *'Then move to the ones: five ones divided by five is equal to one one; write "1" in the ones column.'*

Annie is dividing 609 by 3 using place value counters.





Rosie is using flexible partitioning to divide 3-digit numbers.
She uses her place value counters to support her.

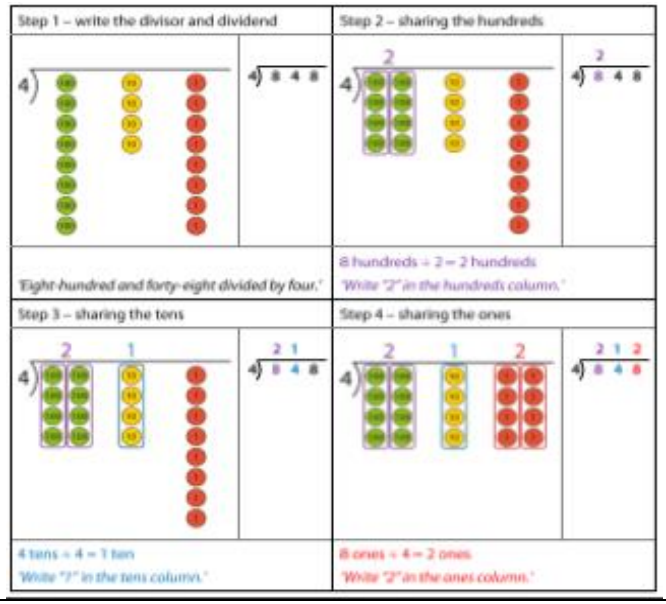


Use Rosie's method to solve:

726 ÷ 6

846 ÷ 6

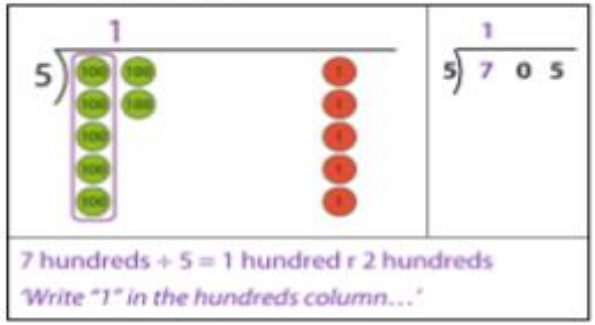
846 ÷ 7



'Seven hundred and five exercise books are shared equally between five year groups. How many books doe each year group get?'

705 ÷ 5 = ?

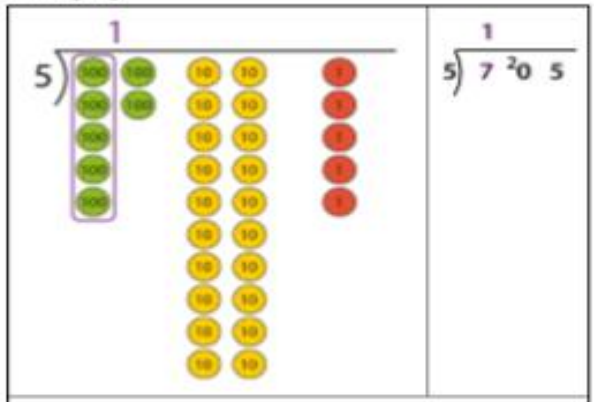
Sharing the hundreds:



7 hundreds ÷ 5 = 1 hundred r 2 hundreds

'Write "1" in the hundreds column…'

Exchanging:

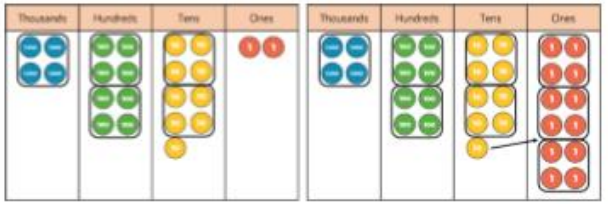
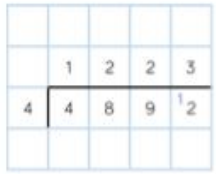
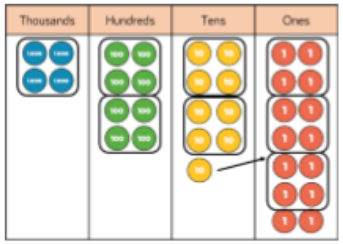
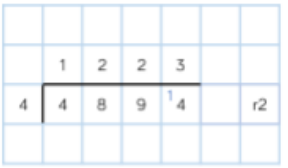


2 hundreds = 20 tens

'…and write "2" to the left of the tens digit of the dividend to make twenty tens.'

Short Division

$$4\overline{)\,6\,{}^{2}1\,{}^{1}2}\quad 1\;5\;3$$

Year 5	Methods and Examples
Divide 4-digits by 1-digit Children use their knowledge from Year 4 of dividing 3-digit numbers by a 1-digit number to divide up to 4-digit numbers by a 1-digit number. They use place value counters to partition their number and then group to develop their understanding of the short division method.	Here is a method to calculate 4,892 divided by 4 using place value counters and short division.  
Divide with Remainders Children continue to use place value counters to partition and then group their number to further develop their understanding of the short division method. They start to focus on remainders and build on their learning from Year 4 to understand remainders in context. They do not represent remainders as a fraction at this point.	Here is a method to solve 4,894 divided by 4 using place value counters and short division.  
Year 6	**Methods and Examples**
2-digit divisors Children build on their understanding of dividing up to 4-digits by 1-digit by now dividing by up to two digits. They use the short division method and focus on the grouping structure of division. **Short Division**	Calculate using short division.  List the multiples of the divisors to help you calculate.

Step 4 – subtract to find the remainder

$$\begin{array}{r} 0\ 1 \\ 31\overline{)4\ 3\ 4} \\ 3\ 1 \\ \hline 1\ 2 \end{array}$$

(1 ten × 31 = 31 tens)

43 tens – 31 tens = 12 tens

- *'Write "12" underneath the "31".'*

Step 5 – exchange tens for ones and combine with the existing ones

$$\begin{array}{r} 0\ 1 \\ 31\overline{)4\ 3\ 4} \\ 3\ 1 \\ \hline 1\ 2\ 4 \end{array}$$

(1 ten × 31 = 31 tens)

12 tens = 120 ones

120 ones + 4 ones = 124 ones

- *'Write "4" after the "12".'*

Step 6 – divide the ones

$$\begin{array}{r} 0\ 1\ 4 \\ 31\overline{)4\ 3\ 4} \\ 3\ 1 \\ \hline 1\ 2\ 4 \\ 1\ 2\ 4 \end{array}$$

(1 ten × 31 = 31 tens)

(4 ones × 31 = 124 ones)

124 ones ÷ 31 = 4 ones

(refer to the ratio chart)

- *'Write "4" in the ones column of the answer line and write "124" underneath the "124", aligning the digits.'*

Step 7 – subtract to show there is no remainder

$$\begin{array}{r} 0\ 1\ 4 \\ 31\overline{)4\ 3\ 4} \\ 3\ 1 \\ \hline 1\ 2\ 4 \\ 1\ 2\ 4 \\ \hline 0 \end{array}$$

(1 ten × 31 = 31 tens)

(4 ones × 31 = 124 ones)

124 ones – 124 ones = 0 ones

- *'Write "0" underneath the "31".'*

- *'Becky can wrap fourteen presents.'*

Step 2 – divide the hundreds

$$\begin{array}{r} 0 \\ 31\overline{)4\ 3\ 4} \end{array}$$

4 hundreds ÷ 31 = 0 hundreds r 4 hundreds

- *'Write "0" in the hundreds column of the answer line.'*

Step 3 – exchange hundreds for tens, combine with the existing tens and divide…

$$\begin{array}{r} 0\ 1 \\ 31\overline{)4\ 3\ 4} \\ 3\ 1 \end{array}$$

(1 ten × 31 = 31 tens)

4 hundreds = 40 tens

40 tens + 3 tens = 43 tens

43 tens ÷ 31 = 1 ten and a remainder

- *'Write "1" in the tens column of the answer line and write "31" underneath the "43".'*

Division using factors

Children use their number sense, specifically their knowledge of factors, to be able to see the relationship between the dividend (number being divided) and the divisor (number that the dividend is being divided by).

Calculate 780 ÷ 20

Now calculate 780 ÷ 10 ÷ 2

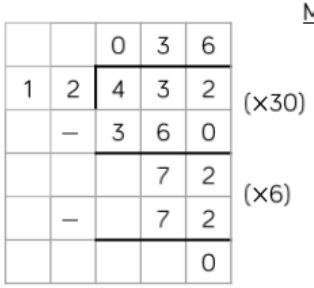
What do you notice? Why does this work?

Use the same method to calculate 480 ÷ 60

Long Division (1)

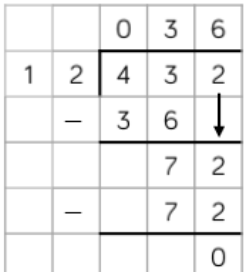
Children are introduced to long division as a different method of dividing by a 2-digit number.

They divide 3-digit numbers by a 2-digit number without remainders, starting with a more expanded method (with multiples shown), before progressing to the more formal long division method.



Multiples of 12:

12 × 1 = 12
12 × 2 = 24
12 × 3 = 36
12 × 4 = 48
12 × 5 = 60
12 × 6 = 72
12 × 7 = 84
12 × 8 = 96
12 × 7 = 108
12 × 10 = 120



Use the long division method to calculate:

836 ÷ 11
798 ÷ 14
608 ÷ 19

Long Division (2)

Building on using long division with 3-digit numbers, children divide 4-digit numbers by 2-digits using the long division method.

Here is a division method.

	0	4	8	9	
15	7	3	3	5	
–	6	0	0	0	(×400)
	1	3	3	5	
–	1	2	0	0	(×80)
		1	3	5	
–		1	3	5	(×9)
				0	

Long Division (3)

Children now divide using long division where answers have remainders. After dividing, they check that the remainder is smaller than the divisor.

Tommy uses this method to calculate 372 divided by 15
He has used his knowledge of multiples to help.

			2	4	r	1	2
1	5	3	7	2			
	–	3	0	0			
			7	2			
	–		6	0			
			1	2			

$1 \times 15 = 15$
$2 \times 15 = 30$
$3 \times 15 = 45$
$4 \times 15 = 60$
$5 \times 15 = 75$
$10 \times 15 = 150$

Long Division (4)

Children now divide four-digit numbers using long division where their answers have remainders. After dividing, they check that their remainder is smaller than their divisor.

Amir used this method to calculate 1,426 divided by 13

			1	0	9	r	9	
1	3	1	4	2	6			
	–	1	3	0	0			(× 100)
			1	2	6			
	–		1	1	7			(×9)
					9			

Children start to understand when rounding is appropriate to use for interpreting the remainder and when the context means that it is not applicable.

Four-digit ÷ two-digit calculation without remainder:

4,945 ÷ 23 = ?

Long division

```
      2  1  5
23 ) 4  9  4  5
     4  6
        3  4
        2  3
        1  1  5
        1  1  5
              0
```

Short division

```
      0   2   1   5
23 ) 4  ⁴9  ³4  ¹¹5
```

Four-digit ÷ two-digit calculation with remainder:

7,283 ÷ 28 = ?

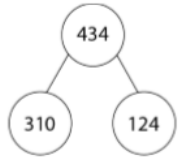
Long division

```
      2  6  0  r3
28 ) 7  2  8  3
     5  6
     1  6  8
     1  6  8
           0  3
```

Short division

```
                  3
28 ) 7  ⁷2  ¹⁶8   3
```

Partitioning



310 ÷ 31 = 10

124 ÷ 31 = 4

434 ÷ 31 = 14

Short division

```
      0   1   4
31 ) 4  ⁴3  ¹²4
```

Long division

```
      0  1  4
31 ) 4  3  4
     3  1          (1 ten × 31 = 31 tens)
     1  2  4
     1  2  4       (4 ones × 31 = 124 ones)
           0
```

Three-digit ÷ two-digit calculation with a remainder:

Ratio chart

	×33
1	33
2	66
3	
4	132

Short division

$$\begin{array}{r} 0\ 2\ 1\ \text{r}25 \\ 33\overline{)7\ {}^{7}1\ {}^{5}8} \end{array}$$

Long division

$$\begin{array}{r} 2\ 1\ \text{r}25 \\ 33\overline{)7\ 1\ 8} \\ 6\ 6 \\ \hline 5\ 8 \\ 3\ 3 \\ \hline 2\ 5 \end{array}$$

Long division – remainder expressed as a whole number:

'Sue has seven hundred and thirty books. She packs them into boxes of twenty-five.'

- *'How many full boxes are there?'*
- *'How many boxes does she need to pack all of the books?'*
- *'How many books are not in a full box?'*

730 ÷ 25 = ?

$$\begin{array}{r} 2\ 9\ \text{r}5 \\ 25\overline{)7\ 3\ 0} \\ 5\ 0 \\ \hline 2\ 3\ 0 \\ 2\ 2\ 5 \\ \hline 0\ 0\ 5 \end{array}$$

	×25
1	25
2	50
4	100
5	125
8	200
10	250

- So, 730 ÷ 25 = 29 r 5

Full boxes: 29
Boxes needed: 30
Books not in a full box: 5

Short division alternative:

$$\begin{array}{r} 0\ 2\ 9\ \text{r}5 \\ 25\overline{)7\ {}^{7}3\ {}^{23}0} \end{array}$$

Long division – remainder converted to decimal fraction:

'Dinesh sells twenty-five jumpers, each for the same amount, and makes a total of £730. How much did each jumper sell for?'

730 ÷ 25 = ?

Step 1 – calculate the whole-number quotient:

$$\begin{array}{r} 2\ 9 \\ 25\overline{)7\ 3\ 0} \\ 5\ 0 \\ \hline 2\ 3\ 0 \\ 2\ 2\ 5 \\ \hline 5 \end{array}$$

- 73 tens ÷ 25 = 2 tens and a remainder
  'Write "2" in the tens column of the answer line and write "50" underneath the "73".'
- 73 tens − 50 tens = 23 tens
  'Write "23" underneath the "50".'
- 23 tens = 230 ones
  'Write "0" after the "23".'
- 230 ones ÷ 25 = 9 ones and a remainder
  'Write "9" in the ones column of the answer line and write "225" underneath the "230".'
- 230 ones − 225 ones = 5 ones
  'Write "5" underneath the "225".'

Step 2 – introduce the decimal point:

$$\begin{array}{r} 2\ 9\ . \\ 25\overline{)7\ 3\ 0\ .\ 0} \\ 5\ 0 \\ \hline 2\ 3\ 0 \\ 2\ 2\ 5 \\ \hline 5 \end{array}$$

- *'There is a remainder. To represent this as a decimal fraction, first write a decimal point after the ones digit of both the dividend and the quotient. Write a place-holder zero in the tenths column of the dividend.'*

Step 3 – continue:

$$\begin{array}{r} 2\ 9\ . \\ 25\overline{)7\ 3\ 0\ .\ 0} \\ 5\ 0 \\ \hline 2\ 3\ 0 \\ 2\ 2\ 5 \\ \hline 5\ 0 \end{array}$$

- **5 ones = 50 tenths**
  'Write "0" after the "5".'

Step 4 – complete the calculation:

```
        2  9 . 2
25 ) 7  3  0 . 0
     5  0
     2  3  0
     2  2  5
           5  0
           5  0
              0
```

- 50 tenths ÷ 25 = 2 tenths
  'Write "2" in the tenths column of the answer line and write "50" underneath the "50".'
- 50 tenths − 50 tenths = 0 tenths
  'Write "0" underneath the "50".'

- So, 730 ÷ 25 = 29.2
- *'Each jumper sold for £29.20.'*

Short division alternative:

```
        0   2   9 . 2
25 ) 7  ⁷3  ²³0 . ⁵0
```

354 ÷ 15 = ?

`  2 3 r9`
`15)3 5 4`
`  3 0`
`  5 4`
`  4 5`
`  9`
	`  2 3 9/15`
	`15)3 5 4`
	`  3 0`
	`  5 4`
	`  4 5`
	`  9`
		`  2 3 . 6`
		`15)3 5 4 . 0`
		`  3 0`
		`  5 4`
		`  4 5`
		`  9 0`
		`  9 0`
		`  0`

So, 354 ÷ 15 = 23 r 9	$\frac{9}{15} = \frac{3}{5}$ So, $354 \div 15 = 23\frac{3}{5}$	So, 354 ÷ 15 = 23.6