Spring Block 1

Multiplication and division B

Small steps

Step 1	Multiply up to a 4-digit number by a 1-digit number
Step 2	Multiply a 2-digit number by a 2-digit number (area model)
Step 3	Multiply a 2-digit number by a 2-digit number
Step 4	Multiply a 3-digit number by a 2-digit number
Step 5	Multiply a 4-digit number by a 2-digit number
Step 6	Solve problems with multiplication
Step 7	Short division
Step 8	Divide a 4-digit number by a 1-digit number

Small steps

Step 9	Divide with remainders
Step 10	Efficient division
Step 11	Solve problems with multiplication and division

Multiply up to a 4-digit number by a 1-digit number

Notes and guidance

In Year 4, children used the formal written method to multiply numbers with up to three digits by a 1-digit number. This small step builds on this learning and extends the formal written method for short multiplication to multiplying 4-digit numbers by a 1-digit number.

Place value counters in place value charts are used to model the structure of the formal method, enabling children to gain a greater understanding of the abstract procedure. Children continue to use counters to exchange groups of 10 ones for 1 ten and this is extended to include exchanging 10 tens for 1 hundred, 10 hundreds for 1 thousand and 10 thousands for 1 ten-thousand.

Children can use their knowledge of rounding and multiplying by multiples of 10 to find estimates to the answers, as a check that their calculated answers are sensible.

Things to look out for

- Children may make errors when multiplying by zero.
- Children may omit the exchange or include the exchange in an incorrect column in the formal written method.
- Children may write more than one digit in a single column rather than make an exchange.

Key questions

- How does multiplication link to addition?
- How can you use counters to represent 284 × 3?
- How does the written method match the representation?
- Which column do you start with?
- Do you need to make an exchange?
- How could you estimate the answer to check your calculation?
- What is the same and what is different about multiplying a 4-digit number by a 1-digit number and multiplying a 3-digit number by a 1-digit number?

Possible sentence stems

- _____ ones × _____ = _____ ones + _____ tens
- _____ tens × _____ = _____ tens + _____ hundreds
- _____ hundreds × _____ = _____ hundreds + _____ thousands
- _____ thousands × _____ = _____ thousands + _____ ten-thousands

National Curriculum links

- Multiply numbers up to four digits by a 1- or 2-digit number using a formal written method, including long multiplication for 2-digit numbers

Multiply up to a 4-digit number by a 1-digit number

Key learning

- Complete the sentences to describe the multiplication.

Thousands	Hundreds	Tens	Ones
1,000 1,000	100		1 1 1
1,000 1,000	100		1 1 1
1,000 1,000	100		1 1 1

There are _____ ones altogether.

There are _____ tens altogether.

There are _____ hundreds altogether.

There are _____ thousands altogether.

2,103 × 3 = _____

- There are 1,152 seats in a cinema.

The cinema is fully booked for three showings of a film.

How many people go to the film altogether?

Th	H	T	O
1,000	100	10 10 10 10 10	1 1
1,000	100	10 10 10 10 10	1 1
1,000	100	10 10 10 10 10	1 1

		1	1	5	2	
	×				3	

- Ms Fisher earns £1,325 per week.

How much does she earn in 4 weeks?

Th	H	T	O
1,000	100 100 100	10 10	1 1 1 1 1
1,000	100 100 100	10 10	1 1 1 1 1
1,000	100 100 100	10 10	1 1 1 1 1
1,000	100 100 100	10 10	1 1 1 1 1

		1	3	2	5	
	×				4	

- Complete the calculations.

		2	3	2	3	
	×				4	

		2	4	5	1	
	×				2	

		1	3	4	2	
	×				6	

Multiply up to a 4-digit number by a 1-digit number

Reasoning and problem solving

Dani works out 1,432 × 4

		1	4	3	2	
	×				4	
		4	16	12	8	

1,432 × 4 = 416,128

Use estimation to show that Dani must be wrong.

What mistake has Dani made?

Dani has not exchanged when she has 10 or more in the tens and hundreds columns.

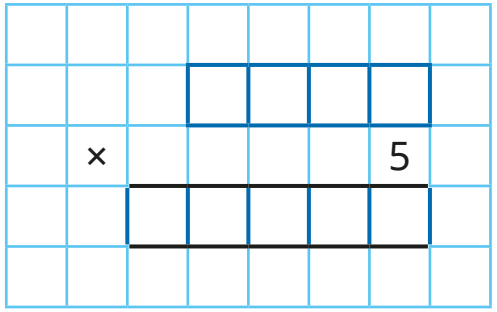
342 × 3 = 1,026

Without calculating, which is greater, 342 × 4 or 343 × 3?

Explain your answer.

342 × 4

Use the clues to work out the missing numbers.



- The four digits being multiplied are consecutive numbers.
- The first two digits of the product are the same.
- The fourth and fifth digits of the product add to make the third.

Find all the possible solutions.

2,345 × 5 = 11,725

4,567 × 5 = 22,835

6,789 × 5 = 33,945

Multiply a 2-digit number by a 2-digit number (area model)

Notes and guidance

In this small step, children build on their learning of multiplying by a 1-digit number and begin to multiply by a 2-digit number.

Children use the area model to multiply a 2-digit number by another 2-digit number before moving on to the formal written method in the next step. Linking the use of the area model to children's prior knowledge of arrays helps children to understand the model. They see that to find the total product, they can break the calculation down, find other products and then add them together.

Initially, the area model is represented using base 10, which will enable children to understand size, scale and place value. Once the children have a good understanding of place value within the area model, they use place value counters to work more efficiently. They then progress to using only numbers in the model.

Things to look out for

- Children may complete the area model and then forget to add together the parts.
- When moving away from using concrete resources, children may make errors when multiplying by powers of 10, for example thinking that 30 × 40 = 120 instead of 1,200

Key questions

- How can you partition the numbers?
- What other multiplications can you see?
- Which numbers did you multiply first?
- Once you have completed the area model, what do you need to do to find the total product of the two numbers?
- What is the same and what is different about 2 × 3 and 20 × 30?
- Does it matter what order you complete the area model in?

Possible sentence stems

- _____ ones × _____ = _____ ones, so _____ tens × _____ = _____ tens
- The products in my area model are _____, _____, _____ and _____, so the total product is _____ + _____ + _____ + _____ = _____

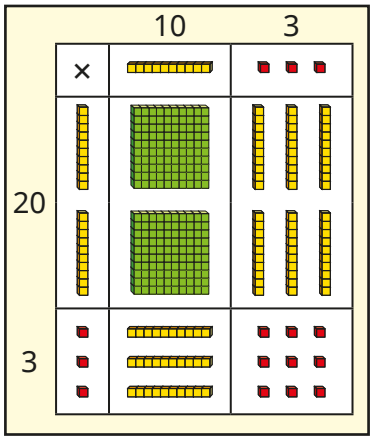
National Curriculum links

- Multiply numbers up to four digits by a 1- or 2-digit number using a formal written method, including long multiplication for 2-digit numbers

Multiply a 2-digit number by a 2-digit number (area model)

Key learning

- The base 10 in this area model represents 23 × 13



Complete the sentences.

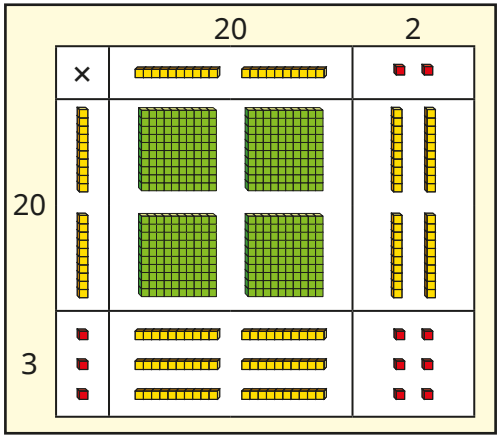
There are _____ hundreds.

There are _____ tens.

There are _____ ones.

23 × 13 = _____

- Esther uses base 10 and an area model to work out 23 × 22

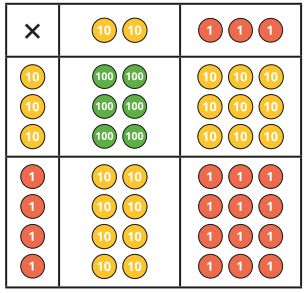


23 × 22
= 400 + 60 + 40 + 6
= 506

Use Esther's method to work out the multiplications.

32 × 24 | 25 × 32 | 35 × 32

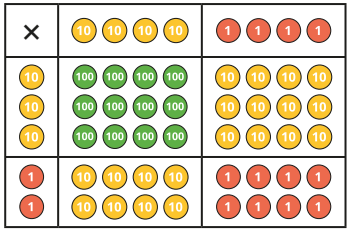
- Aisha uses place value counters and an area model to work out 34 × 23



34 × 23
= 600 + 90 + 80 + 12 = 782

Use Aisha's method to work out 24 × 32

- Dexter uses place value counters and an area model to work out 44 × 32



×	40	4
30	1,200	120
2	80	8

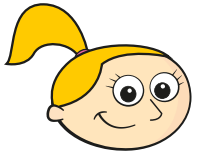
44 × 32 = 1,200 + 80 + 120 + 8 = 1,408

Use Dexter's method to work out the multiplications.

45 × 42 | 52 × 24 | 34 × 43

Multiply a 2-digit number by a 2-digit number (area model)

Reasoning and problem solving



To multiply 23 by 57, I just need to calculate 20 × 50 and 3 × 7 and then add the products.

What mistake has Eva made?

Explain your answer.

Eva's calculation does not include 20 × 7 and 50 × 3

42 × _____ = 504

Complete the area model to find the missing number.

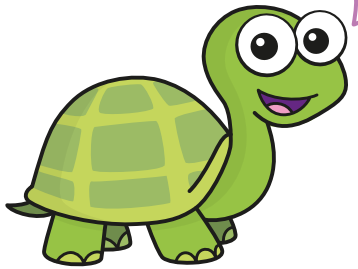
×		

12

Mr Trent has a field that measures 53 m long and 25 m wide.

Mrs Lee has a field that measures 52 m long and 26 m wide.

The fields have the same area because the length is 1 m less and the width is 1 m more.



Do you agree with Tiny?

Explain your answer.

No

Multiply a 2-digit number by a 2-digit number

Notes and guidance

In this small step, children progress from the area model to using the formal written method for multiplication.

Encourage children to recognise the links between the area model and the formal method, noting where the subtotals in the formal method match the totals of parts of the area model. This will support children's understanding of each step of the calculation process. A common error when using the formal written method for multiplication is for children to omit the zero placeholder in the ones column when multiplying by the tens digit. Comparing to the area model should make it clear to children why this is needed.

Children can check their answers by rounding to find estimates, for example 42 × 32 is about 40 × 30 = 1,200, so the actual answer should be close to this.

Things to look out for

- Children may omit the zero as a placeholder when multiplying by the tens digit.
- When an exchange is needed in the multiplication steps, children may accidently also add the exchanged number in the final addition. Crossing out the exchange once it has been used may help to prevent this.

Key questions

- What are you multiplying _____ by first?
  What are you multiplying _____ by next? Why is this different?
- Why is there a zero in the ones column when multiplying by _____? (for example, when multiplying 14 by 30)
- What do you do after you have multiplied both numbers?
- Where do you write the exchanged ones/tens/hundreds?
- Have you included all the exchanges in your totals?
- How can you use rounding to find an estimate for the answer to the calculation?

Possible sentence stems

- First, I multiply _____ by _____ ones.

  Then I multiply _____ by _____ tens.

  Finally, I add together _____ and _____

National Curriculum links

- Multiply numbers up to four digits by a 1- or 2-digit number using a formal written method, including long multiplication for 2-digit numbers

Multiply a 2-digit number by a 2-digit number

Key learning

- Annie and Tom are working out 32 × 13

Annie's method

×	10	3
30	300	90
2	20	6

300 + 90 + 20 + 6 = 416

Tom's method

			3	2	
	×		1	3	
			9	6	(32 × 3)
		3	2	0	(32 × 10)
		4	1	6	
		1			

What is the same and what is different about Annie's and Tom's methods?

- Complete the calculation to work out 23 × 14

			2	3	
	×		1	4	
			9_1	2	(23 × 4)
		2	3	0	(23 × 10)

Use this method to work out the multiplications.

34 × 26 | 58 × 15 | 72 × 35

- Complete the calculation.

			4	6	
	×		2	7	
		3	2_4	2	(_____ × _____)
		9_1	2	0	(_____ × _____)

Use this method to work out the multiplications.

27 × 39 | 46 × 55 | 94 × 49

- Work out the multiplications.

38 × 12 | 39 × 12 | 38 × 11

What is the same and what is different about the answers?

Could you have worked any of them out a different way?

- Mo reads 16 pages of his book every night for 4 weeks.

How many pages does he read in total?

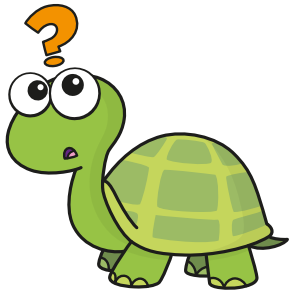
Compare methods with a partner.

Multiply a 2-digit number by a 2-digit number

Reasoning and problem solving

Tiny has multiplied 47 by 36

			4	7	
	×		3	6	
		2	8_4	2	
		1	4_2	1	
		4	2	3	
		1			



What mistake has Tiny made?

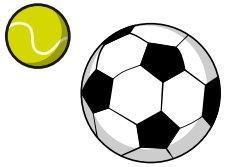
What is the correct answer?

Tiny has forgotten to use zero as a placeholder when multiplying by 3 tens.

1,692

Tennis balls are sold in packs of 34

Footballs are sold in packs of 14

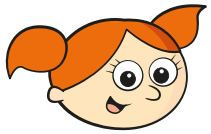


A school buys 20 packs of tennis balls and 42 packs of footballs.

How many more tennis balls were bought than footballs?

92

Alex is working out 59 × 32



59 × 32 = 448

Use estimation to show that Alex must be incorrect.

What is the correct answer?

60 × 30 = 1,800

1,888

Multiply a 3-digit number by a 2-digit number

Notes and guidance

In this small step, children build on their understanding of multiplying a 2-digit number by a 2-digit number using the formal written method for multiplication and extend it to multiplying a 3-digit number by a 2-digit number.

It is important that children are confident with the previous step before moving on to this one and it may be necessary to refer back to the area model for clarification. Again, ensure that children have an understanding of the role of zero in the ones column when multiplying by the tens digit.

Children use the formal written method for multiplication to solve multi-step problems, including problems from other topics of mathematics such as area.

Things to look out for

- Children may omit the zero as a placeholder when multiplying by the tens digit.
- Children may forget to include exchanges in their calculations.
- If children write the 3-digit number below the 2-digit number in the formal method, they may struggle to work out the answer.

Key questions

- What are you multiplying _____ by first?
  What are you multiplying _____ by next?
  Why is this different?
- Why is there a zero in the ones column when multiplying by _____? (for example, when multiplying 314 by 30)
- Where do you put the exchanged ones/tens/hundreds?
- What do you need to do to compete the calculation?
- What is the same and what is different about multiplying a 2-digit number by a 2-digit number and multiplying a 3-digit number by a 2-digit number?

Possible sentence stems

- First, I multiply _____ by _____ ones.

  Then I multiply _____ by _____ tens.

  Finally, I add together _____ and _____

National Curriculum links

- Multiply numbers up to four digits by a 1- or 2-digit number using a formal written method, including long multiplication for 2-digit numbers

Multiply a 3-digit number by a 2-digit number

Key learning

- Complete the calculation to work out 123 × 23

			1	2	3	
	×			2	3	
			3	6	9	
		2	4	6	0	

(123 × 3)
(123 × 20)

Use this method to work out the multiplications.

312 × 13 | 243 × 21 | 202 × 34

- Complete the calculation to work out 284 × 37

			2	8	4	
	×			3	7	
		1	9_5	8_2	8	
		8_2	5_1	2	0	

(_____ × _____)
(_____ × _____)

Use this method to work out the multiplications.

436 × 25 | 537 × 32 | 46 × 291

- Estimate the answers to the multiplications.

637 × 24 | 573 × 28 | 573 × 82

Work out the multiplications.

Compare your estimates to your answers.

- A playground is 128 yards by 73 yards.

Work out the area of the playground.

- Tickets for a plane flight cost £246

There are 64 seats on the plane.

How much does it cost to buy all 64 seats for the flight?

- A rugby pitch is 112 m long and 68 m wide.

What is the area of the pitch?

A football pitch is 1 m longer and 1 m narrower than the rugby pitch.

Which pitch has the greater area?

Multiply a 3-digit number by a 2-digit number

Reasoning and problem solving

$22 \times 111 = 2{,}442$

$23 \times 111 = 2{,}553$

$24 \times 111 = 2{,}664$

What do you think the answer to 25×111 will be?

Does this always work?

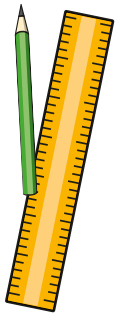
2,775

Pencils are sold in boxes of 64

Rulers are sold in boxes of 46

A school buys 270 boxes of pencils and 720 boxes of rulers.

How many more rulers than pencils does the school buy?



15,840

Tiny has done some calculations.

				9	8	7	
	×				7	6	
			5	9_{5}	2_{4}	2	
			6	9_{6}	0_{4}	9	
		1	2	8	3	1	
			1		1		

				3	2	4	
	×				7	8	
			2	5_{1}	9_{3}	2	
		2	2_{1}	6_{2}	8	0	
			3	2	7	2	
			1	1			

What mistakes has Tiny made?

Find the correct answers.

75,012

25,272

Multiply a 4-digit number by a 2-digit number

Notes and guidance

In this small step, children build on their understanding from the previous two steps to multiply a 4-digit number by a 2-digit number.

Children need to be confident with multiplying 2-digit numbers by both 2- and 3-digit numbers before moving on to this step. As they are now working with greater numbers, it is important that children understand the steps taken when using the long multiplication method. An area model using place value counters could potentially be useful to support children who need it, but the emphasis should be on using the formal written method.

As with the previous steps, children need to understand the role of zero in the ones column when multiplying by the tens.

The main focus of this small step is for children to practise completing multiplications of this sort before moving on to solve problems in the next step.

Things to look out for

- Children may omit the zero as a placeholder when multiplying by the tens digit.
- Children may forget to include exchanges in their calculations.
- If children write the 2-digit number on top when setting up their formal method, they may struggle to complete the calculation.

Key questions

- What are you multiplying _____ by first?
  What are you multiplying _____ by next?
  Why is this different?
- Why is there a zero in the ones column when multiplying by _____? (for example, when multiplying 2,314 by 30)
- Where do you put the exchanged ones/tens/hundreds/thousands?
- What do you do to compete the calculation?

Possible sentence stems

- First, I multiply _____ by _____ ones.

  Then I multiply _____ by _____ tens.

  Finally, I add together _____ and _____

National Curriculum links

- Multiply numbers up to four digits by a 1- or 2-digit number using a formal written method, including long multiplication for 2-digit numbers

Multiply a 4-digit number by a 2-digit number

Key learning

- Complete the calculations.

			3	2	4	2	
	×				2	1	
			3	2	4	2	
		6	4	8	4	0	

(3,242 × _____)

(3,242 × _____)

			3	2	4	2	
	×				2	6	
		1	9_1	4_2	5_1	2	
		6	4	8	4	0	

(3,242 × _____)

(3,242 × _____)

			4	2	3	6	
	×				5	2	

(_____ × _____)

(_____ × _____)

			3	4	7	2	
	×				6	4	

(_____ × _____)

(_____ × _____)

- Find the product of 3,064 and 43

- Estimate the answers to the multiplications.

3,282 × 32	7,132 × 21	9,708 × 38

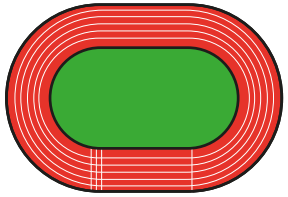
Work out the multiplications.

How close were your estimates to the actual answers?

- A race is 5,407 m long.

36 runners complete the race.

What is the combined total distance run?



- Write <, > or = to compare the calculations.

4,458 × 56 ◯ 4,523 × 54

4,458 × 55 ◯ 4,523 × 54

4,458 × 55 ◯ 4,522 × 54

Did you need to work out the calculations each time?

Multiply a 4-digit number by a 2-digit number

Reasoning and problem solving

			2	5	3	4	
	×				2	3	
			7_1	5	9_1	2	
			5_1	0	6	8	
		1	2	6	6	0	
				1	1		

What are the mistakes in this calculation?

Work out the correct answer.

58,282

Teddy has spilt some paint on this multiplication.

			2	✱	6	9	
	×				2	✱	
		2	2_6	9_5	5_7	2	
		5_1	7_1	3_1	✱	0	
		✱	0	3	3	2	
		1	1	1			

What are the missing digits?

All the missing digits are 8

Tiny thinks these multiplications will have the same answer.

1,342 × 23 1,341 × 24

Why might Tiny think this?

Is Tiny correct?

No

0	2	3	5	6	9

Arrange the digits in the multiplication to make the greatest possible product.

□□□□ × □□

6,520 × 93

Solve problems with multiplication

Notes and guidance

In this small step, children apply their knowledge of multiplication to solve problems.

Children practise both the formal written method for multiplication and the use of efficient mental strategies. It is important that children explore a variety of methods to solve multiplication problems and discuss which is the most efficient. They may refer to known facts to help them derive unknown facts. For example, to calculate 9,999 × 6, they can calculate 10,000 × 6 and then subtract 1 lot of 6

Building on their learning from Year 4 (where they multiplied three numbers), children should use their knowledge of multiplication being commutative to multiply the numbers in any order, depending on which is the most efficient.

Things to look out for

- Children may not identify the correct order in which to complete the different calculations.
- Children may become over-reliant on the formal multiplication method even when there is a more efficient mental strategy.
- If children are not confident with their times-tables, they may find it harder to derive unknown facts.

Key questions

- What operation do you need to do?
  How do you know?
- Why can you multiply the numbers in any order?
- What strategy can you use to solve this problem?
- How do the words in the problem tell you what to do?
- Is there a more efficient method?
- What calculation do you need to do? How do you know?
- Could you have worked it out a different way?

Possible sentence stems

- To calculate _____ × 24, I can do _____ × _____ × _____
- To calculate 9,999 × _____, I can do 10,000 × _____ – _____
- The most efficient strategy to calculate _____ × _____ is ...

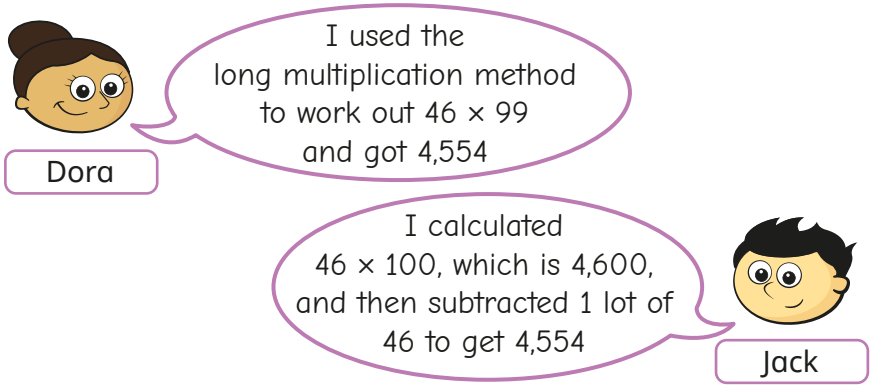
National Curriculum links

- Multiply numbers up to four digits by a 1- or 2-digit number using a formal written method, including long multiplication for 2-digit numbers

Solve problems with multiplication

Key learning

- Dora and Jack have worked out 46 × 99



  Explain why both methods work.

  Which method do you prefer? Why?

  Use your preferred method to work out the multiplications.

24 × 102	324 × 99	198 × 52

- Without calculating, write <, > or = to compare the calculations.

2,470 × 83 ◯ 247 × 830

4,642 × 24 ◯ 4,641 × 25

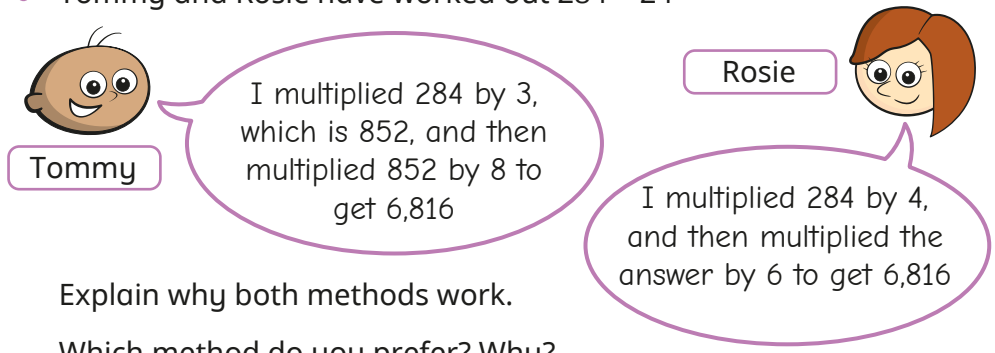
  Explain your reasoning.

- 30 children in Class 5 are raising money for charity.

  12 children raise £85 each, 8 children raise £240 each and the rest raise £100 each.

  How much have the children raised altogether?

- Tommy and Rosie have worked out 284 × 24



  Explain why both methods work.

  Which method do you prefer? Why?

  Work out the multiplications.

25 × 286	647 × 18	539 × 32

- A machine makes 2,346 bags every day.

  How many bags will it make in 3 weeks?

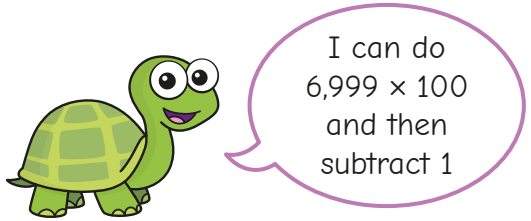
- A pilot flies a plane 1,268 miles every day in August and September.

  How many miles does the pilot fly in total?

Solve problems with multiplication

Reasoning and problem solving

Tiny is working out 6,999 × 99



Is Tiny correct?

Explain your answer.

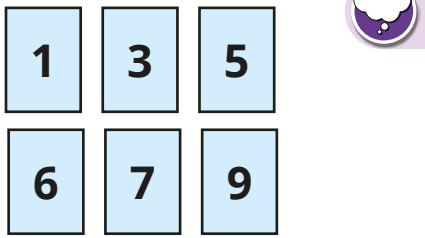
No

On a flight to Australia, there are 46 economy seats and 18 first class seats.

Tickets for all the seats are sold.

How much money does the airline receive from ticket sales?

£194,380



Arrange the digit cards in the multiplication.

□□□□ × □□

What is the greatest product that can be made?

What is the smallest product that can be made?

What is the difference between the greatest and smallest product?

9,531 × 76 = 724,356

3,679 × 15 = 55,185

669,171

Short division

Notes and guidance

Building on informal methods used in Years 3 and 4, this small step introduces children to the formal written method of short division.

The formal calculation is shown alongside familiar models, in particular part-whole models, place value counters and place value charts. In this way, the structure of short division becomes clear, enabling children to see the relationship between the model and the formal written method.

First, children use the formal method to divide a 2-digit number by a 1-digit number, initially without an exchange and then with an exchange. They then divide a 3-digit number by a 1-digit number, again without and then with an exchange. Dividing 4-digit numbers is covered in the next step, with calculations involving remainders following later in the block.

Things to look out for

- Children may need support to understand the process of exchanging in this new format.
- Children may work from right to left, as with addition, subtraction and multiplication.
- When dividing numbers that include zeros as placeholders, children may make errors with place value.

Key questions

- Which digit do you divide first?
- How many groups of hundreds/tens/ones are there?
- How can you set out the division using the formal written method?
- When using short division, do you start from the left or the right?
- When do you need to make an exchange?

Possible sentence stems

- _____ hundreds divided by _____ is equal to _____ hundreds with a remainder of _____
- Exchange the remainder, then _____ tens divided by _____ is equal to _____ tens with a remainder of _____
- Exchange the remainder, then _____ ones divided by _____ is equal to _____ ones.

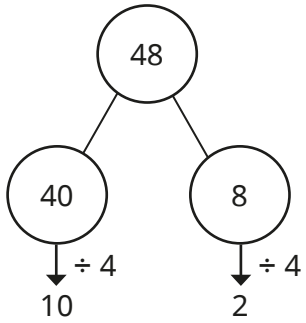
National Curriculum links

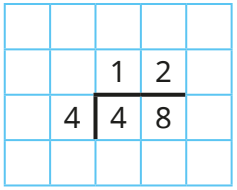
- Divide up to four digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context

Short division

Key learning

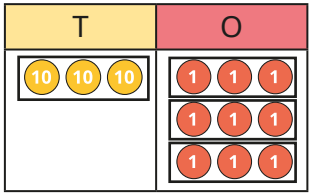
- What is the same and what is different about the two methods for dividing 48 by 4?

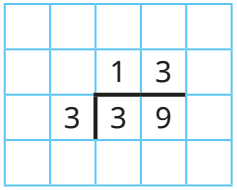




10 + 2 = 12, so 48 ÷ 4 = 12

- Complete the sentences to describe how the place value chart shows 39 ÷ 3





There is _____ group of 3 tens.

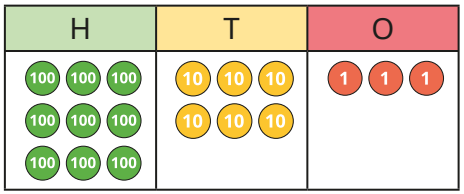
There are _____ groups of 3 ones.

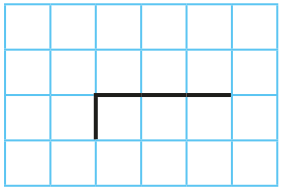
39 ÷ 3 = _____ + _____

= _____

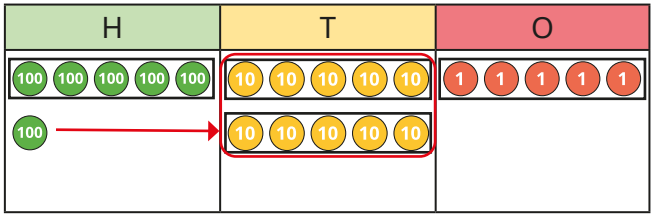
- Circle groups of 3 counters to calculate 963 ÷ 3

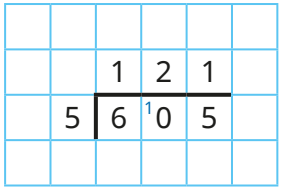
Complete the short division.





- Sam uses a place value chart and counters to work out 605 ÷ 5





Sam exchanges the remaining hundred counter for 10 ten counters.

Use Sam's method to work out the divisions.

426 ÷ 3	786 ÷ 6	532 ÷ 4

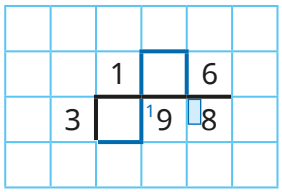
- Use short division to work out the divisions.

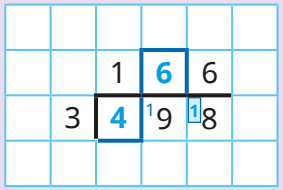
844 ÷ 4	684 ÷ 6	540 ÷ 4	804 ÷ 3

Short division

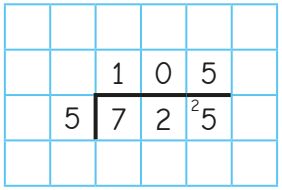
Reasoning and problem solving

Find the missing numbers.





Huan is calculating 725 ÷ 5



What mistake has Huan made?

In the first step of the division, Huan has not exchanged the 2 remaining hundreds for tens.

Which calculation is the odd one out?

363 ÷ 3

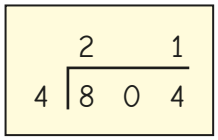
824 ÷ 2

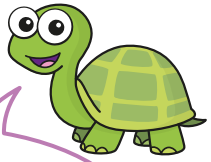
524 ÷ 4

777 ÷ 7

Explain your answer.

multiple possible answers, e.g. 524 ÷ 4, because this is the only calculation that requires an exchange





To divide 804 by 4, I worked out 8 divided by 4 is 2 and 4 divided by 4 is 1, so 804 ÷ 4 = 21

What mistake has Tiny made?

What is the correct answer?

Tiny has not included the zero as a placeholder.

201

Divide a 4-digit number by a 1-digit number

Notes and guidance

Following the introduction of formal short division in the previous step, in this small step children move on to dividing a 4-digit number by a 1-digit number.

Place value counters continue to be used to represent the calculations alongside the formal written method, so that children can visualise how one relates to the other. In particular, place value counters in place value charts help children to make sense of the steps that they are taking and how this relates to the context of the question.

Children begin with divisions that have no exchanges and then progress to those with exchanges. Divisions with remainders are covered in the next step.

Things to look out for

- Children may need support to understand the process of exchanging in divisions.
- Children may work from right to left, as with addition, subtraction and multiplication.
- When dividing numbers that include zeros as placeholders, children may make errors with place value.

Key questions

- How would you set out a division using the formal written method?
- Which digit do you divide first?
- When using short division, do you start from the left or the right?
- What do you do if the number you are dividing by does not divide exactly into the first digit?
- When do you need to make an exchange?

Possible sentence stems

- To use the formal method of division, I start with the digit on the _____ and work from _____ to _____
- There are _____ groups of _____ thousands/hundreds/tens/ones in _____ thousands/hundreds/tens/ones.

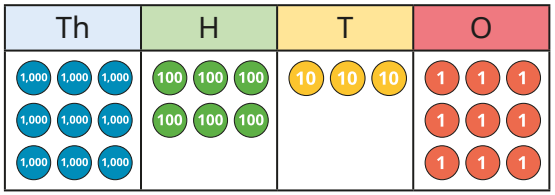
National Curriculum links

- Divide up to four digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context

Divide a 4-digit number by a 1-digit number

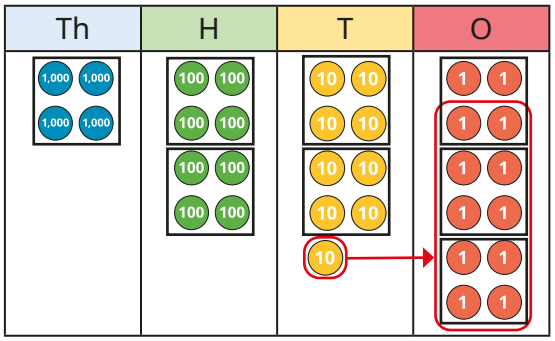
Key learning

- Use the place value chart to work out 9,639 ÷ 3



	3	9	6	3	9	

- Ron has worked out 4,892 ÷ 4 using place value counters and short division.



		1	2	2	3	
	4	4	8	9	$^{1}2$	

Use place value counters and short division to work out the divisions.

6,610 ÷ 5	2,472 ÷ 3	9,360 ÷ 4

- Complete the divisions.

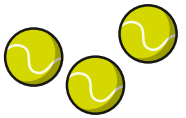
	8	8	9	7	6	

	3	5	0	2	2	

	7	9	1	2	8	

- 9,632 tennis balls are packed into boxes of 8

  How many boxes will be needed?



- A school raises £8,934 for charity.

  The money is shared equally between three charities.

  How much money does each charity receive?

- A plane travels the same distance every day.

  Altogether the plane travels 6,363 miles in a week.

  How far does it travel each day?

- 5,427 marbles are put into bags with 9 marbles in each bag.

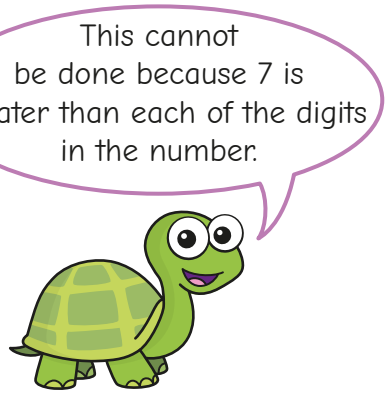
  The bags are shared equally between three boxes.

  How many bags of marbles are in each box?

Divide a 4-digit number by a 1-digit number

Reasoning and problem solving

Tiny is working out 2,240 ÷ 7



Do you agree with Tiny?

Explain your answer.

No

Fill in the missing numbers.

		1	3	□	4	
	□	7	8	2	□	

		1	3	0	4	
	6	7	8	2	4	

		3	1	0	1	
	3	9	4	1	4	

What mistakes have been made?

What is the correct answer?

3,138

Write <, > or = to compare the calculations.

3,495 ÷ 5 ◯ 3,495 ÷ 3

8,064 ÷ 7 ◯ 9,198 ÷ 7

4,244 ÷ 4 ◯ 8,488 ÷ 8

Did you need to work out all the divisions?

<

<

=

Divide with remainders

Notes and guidance

In previous years, children have looked at division with remainders informally. In this small step, they move on to formal calculations that result in a remainder.

The formal written method for short division continues to be used alongside familiar models. Children use place value charts and counters so that they associate the remainder with the amount "left over". The progression of examples is carefully chosen to focus children's attention on the link between the remainder and the number being divided by. They should generalise that a remainder must be less than the number being divided by. Remainders are represented in the calculation as r1, r2 and so on.

In this step, the focus is on completing and understanding the calculation procedure. Making decisions about the remainder based on the context of the question is covered in Step 11

Things to look out for

- Children may make the incorrect generalisation that the remainder is always 1
- Errors in calculation may lead to children writing remainders that are greater than the number being divided by.

Key questions

- What does "remainder" mean?
- How can you use your times-tables to know if a division by 2/5 will have a remainder? What other divisibility rules do you know?
- What do you notice about the size of the remainders compared to the number being divided by?
- What is the greatest possible remainder you can get when dividing by _____?
- How do you know this answer is incorrect, just by looking at the size of the remainder?

Possible sentence stems

- _____ ones divided by _____ = _____ ones remainder _____
- When dividing by _____, the greatest possible remainder is _____

National Curriculum links

- Divide up to four digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context

Divide with remainders

Key learning

- 13 sweets are shared equally between 4 people.

  How many sweets are left over?

- Mo wants to put 27 pencils into pots of 4

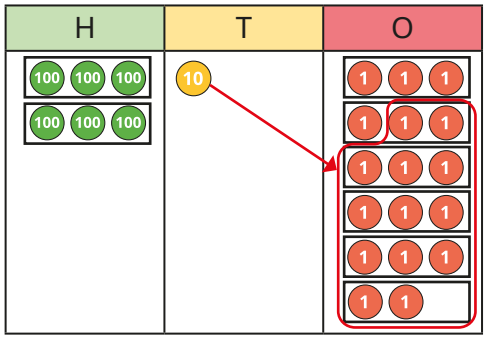
  How many pots of 4 pencils can he make?

  How many pencils are left over?

  Complete the division sentence.

  _____ ÷ _____ = _____ r_____

- Nijah works out 617 ÷ 3 using place value counters and a place value chart, and then writes the formal method.

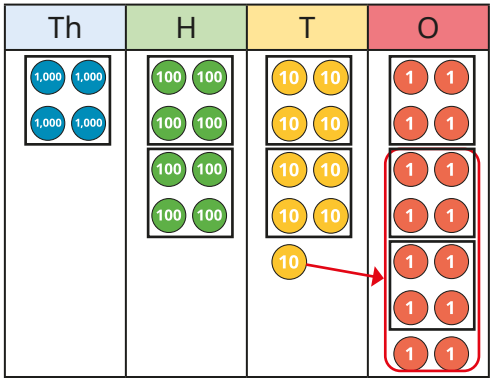


		2	0	5	r2	
	3	6	1	$^{1}7$		

Use Nijah's method to work out the divisions.

613 ÷ 5	473 ÷ 3	963 ÷ 4

- Scott is is working out 4,894 ÷ 4



		1	2	2	3	r2
	4	4	8	9	$^{1}4$	

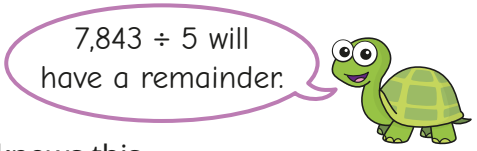
Use Scott's method to work out the divisions.

6,613 ÷ 5	2,471 ÷ 3	9,363 ÷ 4

- In a factory, muffins are packed into boxes of 6

  One day, the factory makes 5,625 muffins.

  How many muffins will not be boxed?

- 

  Explain how Tiny knows this.

Divide with remainders

Reasoning and problem solving

Work out the divisions.

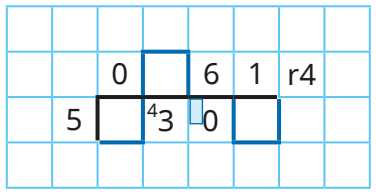
36 ÷ 3 37 ÷ 3 38 ÷ 3 39 ÷ 3

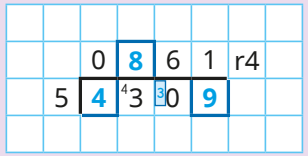
What do you notice about the remainders?

What does this tell you about remainders?

12, 12 r1, 12 r2, 13

Find the missing numbers.





Amir is thinking of a 3-digit number that is less than 500

When my number is divided by 9, the remainder is 3. When my number is divided by 2, the remainder is 1. When my number is divided by 5, the remainder is 4

What could Amir's number be?

129, 219, 309, 399, 489

Is the statement always true, sometimes true or never true?

When a 3-digit number made of consecutive, descending digits is divided by the next digit, the remainder is 1

For example, 765 ÷ 4 = 191 r1

Explain your answer.

sometimes true

Efficient division

Notes and guidance

So far in this block, children have divided numbers with up to four digits in a range of contexts, using various methods. They have used informal methods to understand the structure of division and the formal written method to promote efficiency.

In this small step, children consolidate their knowledge and understanding of division and begin to make decisions regarding the most efficient or appropriate methods to use in a range of contexts. They begin by looking at informal methods, such as partitioning, using known facts, factor pairs and number lines, and then compare these to the formal written method. They make decisions about which method they prefer or which would be more efficient for a given problem.

Things to look out for

- Children may become over-reliant on the formal written method instead of considering alternative approaches that may be more efficient.
- Children may partition the number being divided by, rather than using factors to break up the calculation, for example $12 \div 6 = 12 \div 4 \div 2$ rather than $12 \div 6 = 12 \div 2 \div 3$

Key questions

- Which method do you find the easiest?
- Which method do you find the most efficient?
- How would you explain how this method works?
- What is the most efficient way to divide _____ by _____?
- What happens if you double one factor and halve the other?
- How can you use factor pairs to help you?
- How can you divide multiples of ten?

Possible sentence stems

- To divide by 4, I can divide by _____ and then divide the result by _____
- To divide by 8, I can divide by 2 _____ times.
- To divide by 6, I can divide by _____ and then divide the result by _____

National Curriculum links

- Divide up to four digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context

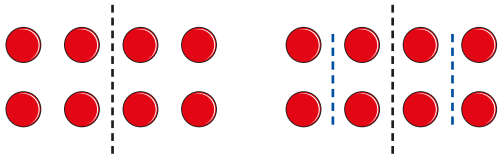
Efficient division

Key learning

- Complete the divisions.
  - 300 ÷ 1 = _____
  - 300 ÷ 10 = _____
  - 300 ÷ 100 = _____

  What do you notice?

- The array shows that 8 ÷ 4 = 8 ÷ 2 ÷ 2



Make your own arrays to show these divisions.

16 ÷ 4 = 16 ÷ 2 ÷ 2	32 ÷ 8 = 32 ÷ 2 ÷ 2 ÷ 2

- Mo uses factors to work out 810 ÷ 6

Factors of 6 are 2 and 3:

810 ÷ 2 = 405 405 ÷ 3 = 135	or	810 ÷ 3 = 270 270 ÷ 2 = 135

So 810 ÷ 6 = 135

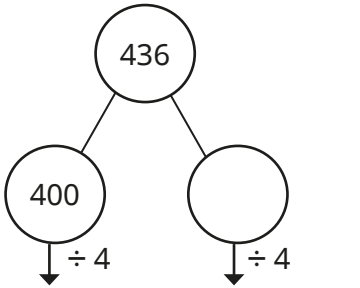
Use Mo's method to work out the divisions.

126 ÷ 6	960 ÷ 6	1,392 ÷ 6	2,052 ÷ 6

- Here are four different ways of working out 436 ÷ 4

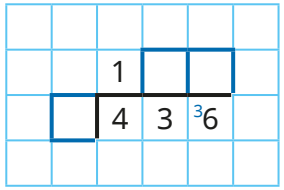
Complete the calculation in each method.

Method 1: Partitioning



_____ + 9 = _____

Method 2: Short division

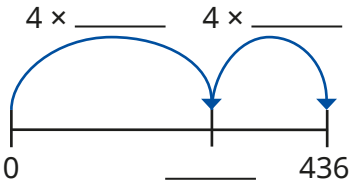


Method 3: Half and half again

436 ÷ _____ = 218

218 ÷ 2 = _____

Method 4: Finding groups of 4 along a number line



Which method would you use to work out these divisions?

220 ÷ 4	648 ÷ 6	805 ÷ 7	114 ÷ 6

Use your chosen method to work out each division.

Efficient division

Reasoning and problem solving

All numbers that end in 2 are divisible by 2, all numbers that end in 5 are divisible by 5 and all numbers that end in 0 are divisible by 10. So, all numbers that end in 3 will be divisible by 3

Is Whitney correct?

Explain your answer.

No

I know that $12 \div 4 = 3$ and $120 \div 4 = 30$, so $120 \div 40 = 300$

Do you agree with Ron?

Explain your answer.

No

Dexter, Eva and Annie each choose one of the number cards.

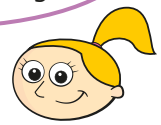
976	100,000	4,968

They divide their number by 8

I partitioned my number into 800, 160 and 16, then divided each part by 8

Dexter

I used short division and had just one exchange.



Eva

I halved my number, then halved it again, then halved it again.

Annie

Which number card did each child choose?

Which method would you use to divide each number?

Dexter: 976 Eva: 4,968 Annie: 100,000

Solve problems with multiplication and division

Notes and guidance

In this small step, children apply their knowledge of multiplication and division to solve problems. The main focus of the step is on giving children the opportunity to choose which operation is needed in order to answer a particular problem, and then to solve the problem. Pictorial representations, such as bar models, can support children's understanding.

Children also develop their understanding of the remainder when performing a division in context. For example, if pencils come in packs of 4 and a class needs 30 pencils, how many packs are needed? Children may recognise that they need to divide 30 by 4, which is equal to 7 remainder 2. However, in order to answer this question correctly, they need to be aware that 8 packs are needed. In a different context, 7 remainder 2 may mean only 7 full packs can be made.

Key questions

- What calculation do you need to do? How do you know?
- What does the remainder represent in this problem?
- Do you need more or fewer boxes/bags? What does the remainder mean here?
- How do you know if you need to add an extra box/bag?
- How many boxes can be filled? How many boxes do you need?
- Which operation is needed?

Possible sentence stems

- _____ ÷ _____ = _____ remainder _____
- There are _____ left over, so _____ are needed altogether.

Things to look out for

- Children may be unsure which operation is needed to solve a problem.
- Children may be able to divide using a procedure, but lack understanding of the remainder in a particular context.

National Curriculum links

- Divide up to four digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes

Solve problems with multiplication and division

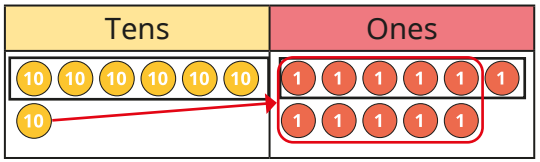
Key learning

- A minibus can seat 6 people.

  71 people are going on a trip.

  How many minibuses are needed?

  Complete the sentences.



		1	1	r5	
	6	7	11		

  There are _____ groups of 6 people.

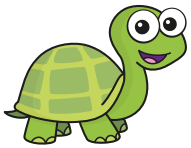
  There are _____ people left over.

  _____ minibuses are needed.

- There are 357 people at a wedding.

  They are sitting at tables in groups of 8

  Tiny works out how many tables are needed.



375 ÷ 8 = 44 r5

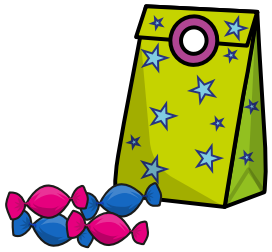
  Explain why 45 tables are needed.

- Dani is filling party bags.

  Each party bag has 7 sweets in it.

  Dani has 349 sweets altogether.

  How many party bags can she fill?



- A hockey pitch is 91 m long and 55 m wide.

  What is the area of the pitch?

  The area of a field is 25,000 m^2

  How many hockey pitches might fit in it?

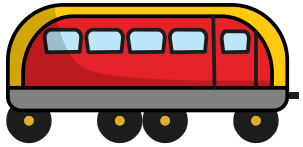
  How do you know what calculation to do?

- A train has 14 carriages.

  Each carriage can carry 42 people.

  512 people have reserved a seat.

  How many unreserved seats are there?



- A car park has 147 rows of 18 spaces.

  110 rows are full and the rest are empty.

  How many spaces are empty?

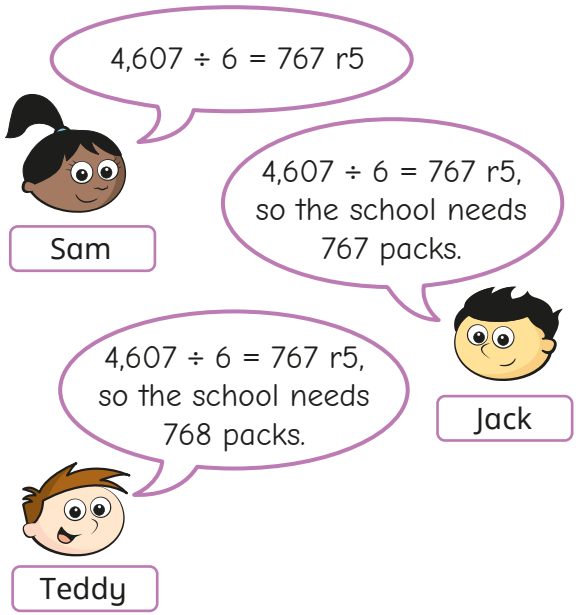
Solve problems with multiplication and division

Reasoning and problem solving

Textbooks come in packs of 6

A school needs 4,607 textbooks.

How many packs are needed?



Who do you agree with?

Explain your answer.

Teddy

767 r5 means that there are 767 packs of 6 textbooks with 5 textbooks left over. So for the school to have enough textbooks, they need to order 768 packs.

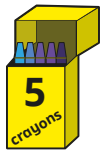
Beads come in packs of 8

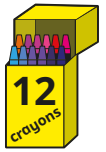
Scott uses 12 beads to make a bracelet.

He makes 33 bracelets.

How many packs of beads does he need?

50

pack A 

pack B 

Mrs Rose needs to buy some crayons. She orders 13 of pack A and 22 of pack B.

She puts the crayons into pots, with 8 crayons in each pot.

How many pots does she need?

Compare methods with a partner.

41