Unit 3
Addition and subtraction

Mastery Expert tip! "The bar model is useful for representing additions and subtractions, but don't just show it to children, ask them to explain it and to draw their own!"

Don't forget to watch the Unit 3 video!

WHY THIS UNIT IS IMPORTANT

This unit is important because it focuses on learning a range of addition and subtraction strategies, in particular the column method. Mastering this will lead to confidence in many other areas of mathematics, especially when children apply their strategies to word problems and puzzles.

WHERE THIS UNIT FITS

- Unit 2: Place value – 4-digit numbers (2)
- **Unit 3: Addition and subtraction**
- Unit 4: Measure – perimeter

This unit builds on children's Year 3 work on adding and subtracting with 3-digit numbers. It further develops their estimation and answer-checking strategies and their problem-solving skills. This unit provides essential preparation for beginning to add and subtract numbers with more than four digits.

Before they start this unit, it is expected that children:

- have a firm understanding of place value (up to 4-digit numbers)
- know a range of mental addition and subtraction strategies
- can apply these strategies to a range of contexts including measure.

ASSESSING MASTERY

Children who have mastered this unit can find totals and differences using the column method of addition and subtraction. They should not, however, always rely on the column method, but should understand when there is a more efficient method. They can confidently apply their knowledge when solving word problems and explain all answers clearly, using the correct vocabulary.

COMMON MISCONCEPTIONS	STRENGTHENING UNDERSTANDING	GOING DEEPER
Children may not align the columns correctly when using the column method.	Run an intervention in which children use place value grids to support aligning columns and understanding the importance of this.	Solve some addition and subtraction sentences that have missing numbers. Provide children with some multi-step word problems. Can they represent them with a diagram and then solve them? Ask children to make up their own word problems to fit an addition or subtraction sentence.
Children may not understand the place value behind the method of exchanging.	Practise exchanging using place value grids and place value counters.	
Children may not know whether to add or subtract when solving a problem.	Ask children to represent the problem with a bar model.	

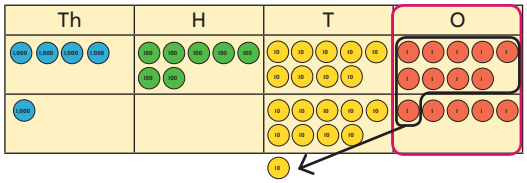
Unit 3: Addition and subtraction

WAYS OF WORKING

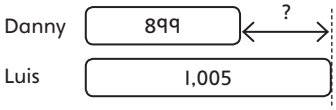
Go through the unit starter pages of the **Pupil Textbook**. Talk through the key learning points that the characters mention and the key vocabulary.

STRUCTURES AND REPRESENTATIONS

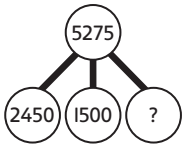
Place value grid: This model uses counters to show the value of each column, which supports the column method layout.



Bar model: This model can be used to represent the situation in some addition and subtraction word problems.



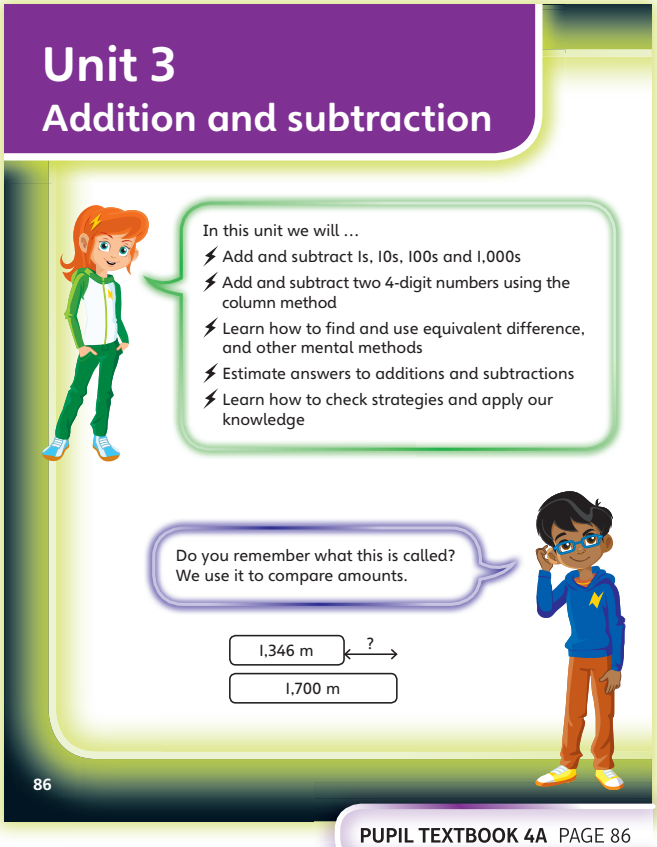
Part-whole model: This model is an alternative way to represent the situation in addition and subtraction word problems.



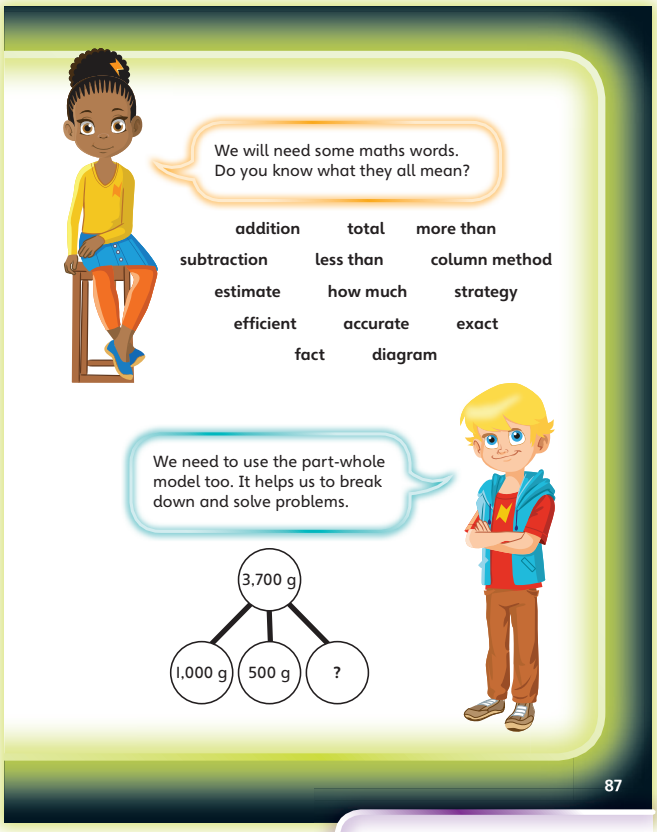
KEY LANGUAGE

There is some key language that children will need to know as a part of the learning in this unit.

- addition, subtraction
- total
- more than, less than
- difference, exchange
- column method
- estimate, accurate, efficient, exact
- strategy
- diagram



PUPIL TEXTBOOK 4A PAGE 86



PUPIL TEXTBOOK 4A PAGE 87

Adding and subtracting 1s, 10s, 100s, 1,000s

Learning focus

In this lesson children will use their knowledge of place value to add and subtract 1, 10, 100 and 1,000 to and from 4-digit numbers.

Small steps

- Previous step: Negative numbers (2)
- **This step: Adding and subtracting 1s, 10s, 100s, 1,000s**
- Next step: Adding two 4-digit numbers (1)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

Year 4 Number – Number and Place value

Solve number and practical problems that involve [addition and subtraction] with increasingly large positive numbers.

ASSESSING MASTERY

Children can quickly make mental calculations when adding and subtracting 1, 10, 100 and 1,000. Children can explain their method, demonstrating a deep understanding of place value, and can solve related problems in a range of contexts.

COMMON MISCONCEPTIONS

Children may have place value misconceptions, i.e. they may think 3,423 + 100 = 4,423. Ask:

- *Can you put the numbers into a place value grid to help?*

STRENGTHENING UNDERSTANDING

Give children the opportunity to practise adding 1, 10, 100, 1,000 to a range of numbers with a place value grid to help. Repeat until children can calculate place value additions and subtractions mentally.

GOING DEEPER

Give children a variety of missing number place value problems which will require them to think more deeply about the relationship between digits and what information they can use to find the missing numbers. For example, 3,487 + 2,000 = ?, 1,298 – 70 = ?, 6,815 + ? = 6,819, 2,731 – ? = 2,131.

KEY LANGUAGE

In lesson: more, fact

Other language to be used by the teacher: place value, thousands, hundreds, tens, ones, add, subtract, reduce, increase

STRUCTURES AND REPRESENTATIONS

place value grid

RESOURCES

Mandatory: place value counters, base 10 equipment

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- Would base 10 equipment help some children with their understanding of place value in this lesson?
- Which children do you think will need support in this lesson?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *What is the same about 3, 30, 300 and 3,000? What is different?*
- Question 1 b): *Can you explain your answer?*

IN FOCUS Ask children what is similar and what is different about +3, +30, +300 and +3,000. Doing this will help them to think about the relationship and connections between these numbers.

PRACTICAL TIPS For this activity, some children may benefit from representing the numbers in the place value grids with concrete objects – use base 10 equipment for this.

ANSWERS

Question 1 a): 4,256 + 300 = 4,556

Reena's score is 4,556 points.

Question 1 b): 4,556 + 3 = 4,559

4,559 < 7,267

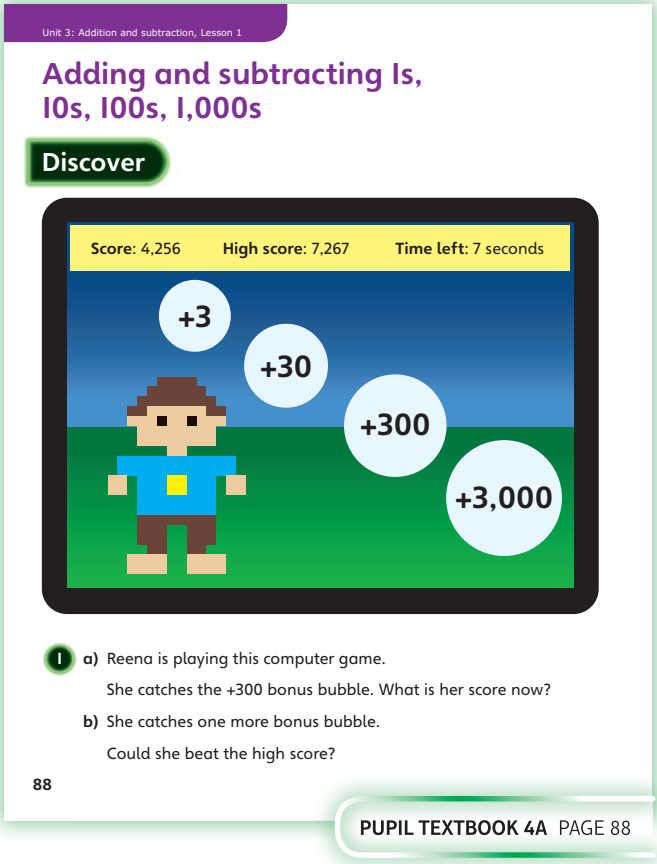
4,556 + 30 = 4,586

4,586 < 7,267

4,556 + 3,000 = 7,556

7,556 > 7,267

The +3,000 bonus beats the high score.



Adding and subtracting 1s, 10s, 100s, 1,000s

Discover

1 a) Reena is playing this computer game.
She catches the +300 bonus bubble. What is her score now?

b) She catches one more bonus bubble.
Could she beat the high score?

88

PUPIL TEXTBOOK 4A PAGE 88

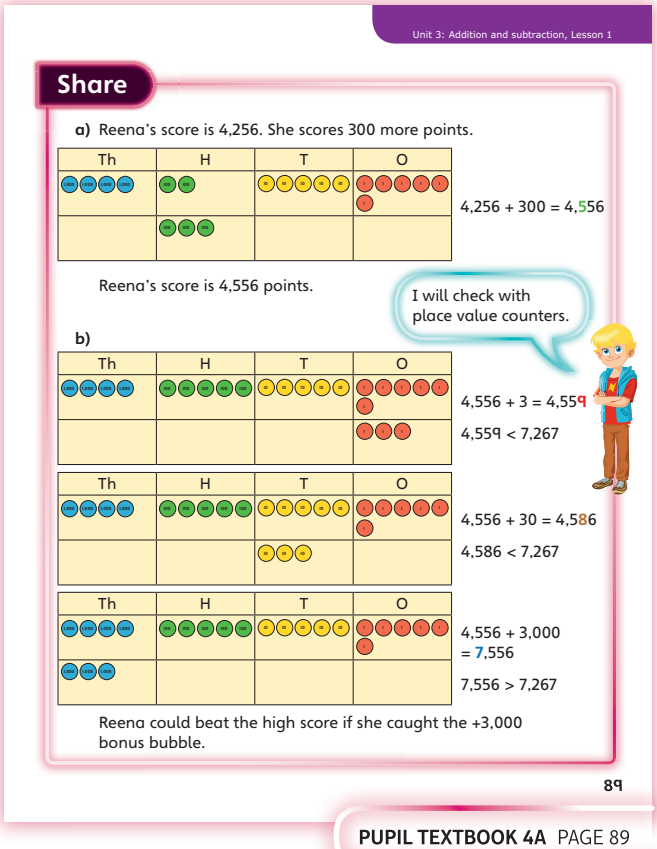
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 b): *Can you tell me what the signs < and > mean?*
- Question 1 b): *Can you use the vocabulary 'more than' and 'less than' to explain your answer?*

IN FOCUS The place value grids support children with their understanding of place value. Count the counters in the grids aloud as a whole class – doing this will help children understand the numbers at a deeper level, and will also help them to make comparisons between numbers.



Share

a) Reena's score is 4,256. She scores 300 more points.

Th	H	T	O

4,256 + 300 = 4,556

Reena's score is 4,556 points.

I will check with place value counters.

b)

Th	H	T	O

4,556 + 3 = 4,559

4,559 < 7,267

Th	H	T	O

4,556 + 30 = 4,586

4,586 < 7,267

Th	H	T	O

4,556 + 3,000 = 7,556

7,556 > 7,267

Reena could beat the high score if she caught the +3,000 bonus bubble.

89

PUPIL TEXTBOOK 4A PAGE 89

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 1: *Which is changing in each calculation – the 1s, 10s, 100s or 1,000s?*
- Question 1: *Why do you need 0s in numbers like 1,001?*
- Question 2: *How can you work out calculations with missing numbers?*

IN FOCUS In question 1, you may need to highlight that in the second example there are no tens left, and so you need to include 0 as a placeholder, i.e. 7,646 – 40 = 7,606. Some children may not understand how to write this and so may give 766 as their answer.

STRENGTHEN For each question provide base 10 equipment to visually represent place value for children who need it.

Asking children to explain their working will strengthen learning.

DEEPEN Give children some calculations with mistakes, e.g. 4,576 – 30 = 4,276. Challenge them to correct the mistakes and explain where the person who made the mistake went wrong.

ASSESSMENT CHECKPOINT Use question 2 to assess whether children can work mentally, or whether they still rely on place value grids.

ANSWERS

Question 1 a): 7,646 – 4 = 7,642

b): 7,646 – 40 = 7,606

c): 7,646 – 400 = 7,246

d): 7,646 – 4,000 = 3,646

Question 2 a): 8,888 – 500 = 8,388

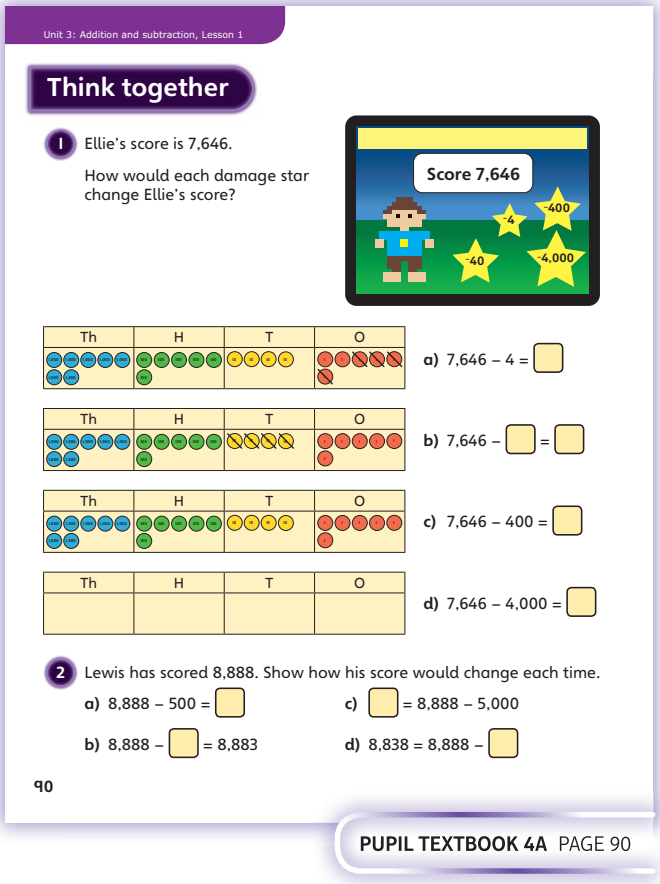
b): 8,888 – 5 = 8,883

c): 3,888 = 8,888 – 5,000

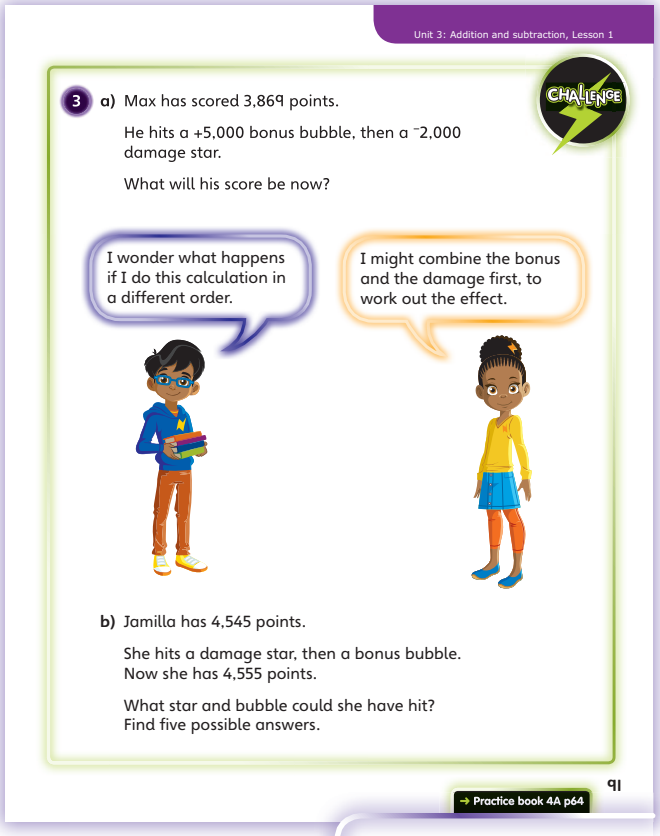
d): 8,838 = 8,888 – 50

Question 3 a): 6,869 points

Question 3 b): There are many solutions for this question, as long as the star and the bubble lead to a score increase of 10.



PUPIL TEXTBOOK 4A PAGE 90



PUPIL TEXTBOOK 4A PAGE 91

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Make sure children understand the contexts in question 4: what the prices were originally and how they have now been reduced.

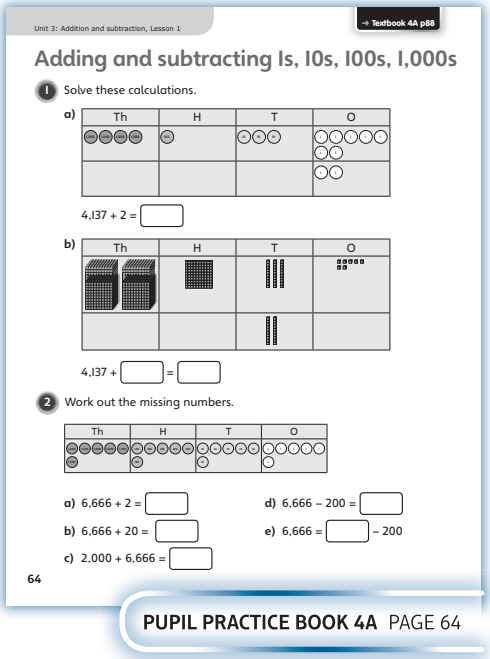
STRENGTHEN Question 6 will strengthen learning by encouraging children to think about place value relationships across a variety of numbers. The task may seem difficult at first, but reassure children that if they think hard they can reach a solution. Build children's confidence by explaining that there are multiple answers for each question.

DEEPEN Deepen learning by providing two-step questions with missing numbers, for example 4,264 + ? – 200 = 4,564.

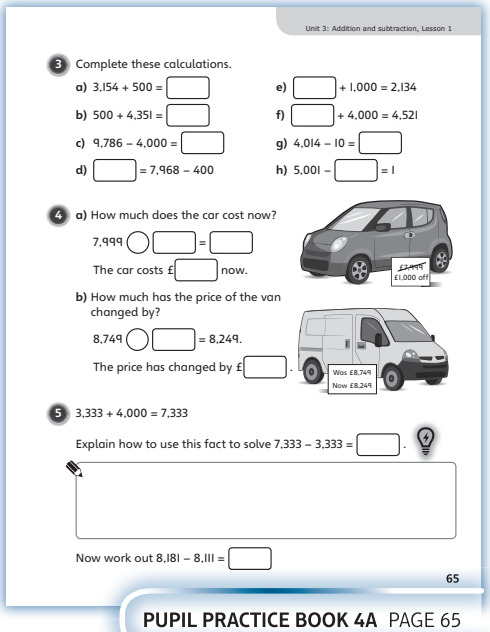
THINK DIFFERENTLY Question 5 challenges children to relate addition and subtraction. Listen carefully to children's reasoning for this question.

ASSESSMENT CHECKPOINT Question 4 will allow you to assess which children are able to apply their knowledge in context. Children should demonstrate problem-solving skills to work with with what they know and complete the steps needed to find the solution.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 64



PUPIL PRACTICE BOOK 4A PAGE 65

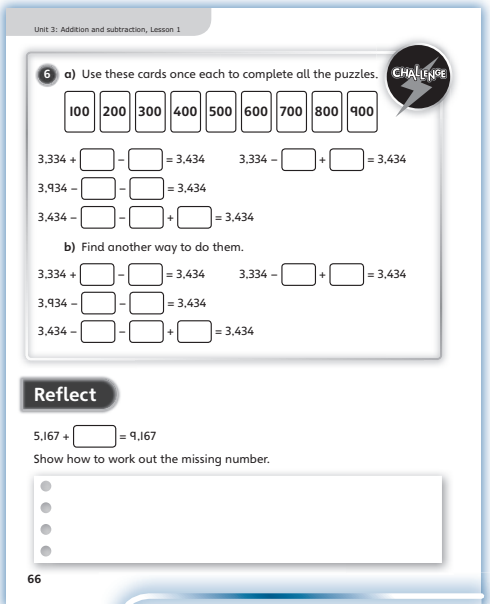
Reflect

WAYS OF WORKING Pair work

IN FOCUS This section will give children the opportunity to explain their understanding of the lesson. Encourage them to use a place value grid and place value counters as part of their answer.

ASSESSMENT CHECKPOINT Can children explain the method correctly? Do they use the correct vocabulary?

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 66

After the lesson

- How will you support children who found the learning difficult in this lesson? What intervention sessions would be useful?
- Which children mastered the lesson?
- Could you make a display to support children in the subsequent lessons?

Adding two 4-digit numbers (1)

Learning focus

In this lesson children will add 4-digit numbers using the column method (without exchanging). This is closely paired with a place value grid to ensure children have a deeper understanding.

Small steps

- Previous step: Adding and subtracting 1s, 10s, 100s, 1,000s
- **This step: Adding two 4-digit numbers (1)**
- Next step: Adding two 4-digit numbers (2)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

ASSESSING MASTERY

Children can use the column method to calculate. They can explain their working clearly, and understand fully what they are doing when using this method.

COMMON MISCONCEPTIONS

Children may think that they are simply adding the digits (rather than 10s, 100s etc.). Ask:

- *In 2,323 + 7,111, what does each digit represent?*

Children may not understand the importance of layout, and so may not align the columns correctly. Ask:

- *Why is it important to lay out your work correctly?*

STRENGTHENING UNDERSTANDING

To strengthen understanding, ask children to represent the numbers with base 10 equipment. This will give them a more concrete understanding.

GOING DEEPER

Deepen learning by providing children with some column additions with mistakes. Can they spot the mistakes and explain why the errors may have been made?

KEY LANGUAGE

In lesson: total, ones (1s), tens (10s), hundreds (100s), thousands (1,000s), add, place value, digit, altogether, addition, column

STRUCTURES AND REPRESENTATIONS

place value grid, number line

RESOURCES

Mandatory: base 10 equipment, place value counters

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How did children get on in the previous lesson?
- What is children's prior knowledge of column addition?
- How will you deal with misconceptions?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *What methods could you use?*
- Question 1 a): *Do you remember how you solved a calculation like this one in Year 3?*
- Question 1 b): *How do you know you are correct?*

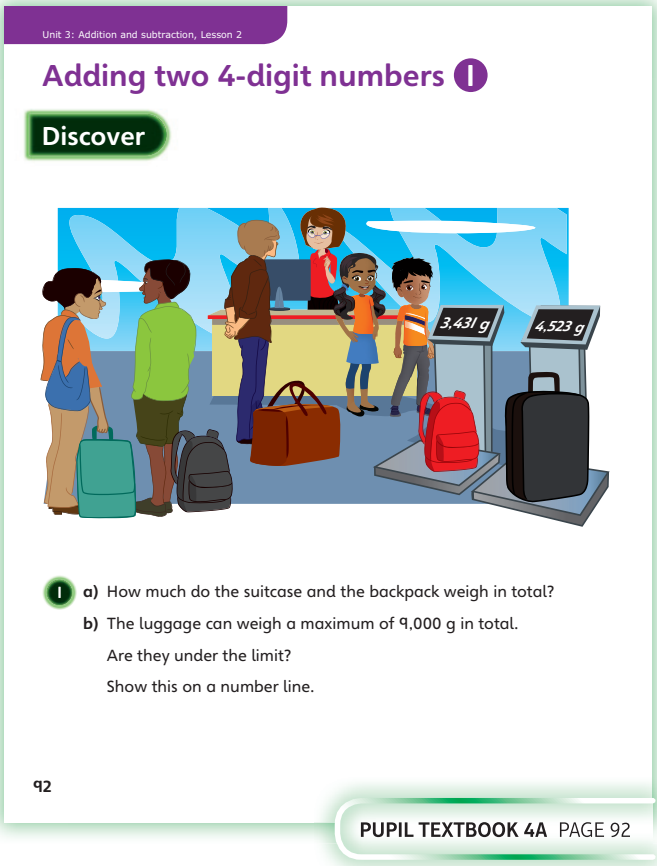
IN FOCUS For question 1 a), observe the different methods that children use. Many will partition the numbers and use the expanded method (which they learnt in the previous year).

PRACTICAL TIPS For this activity, leave blank place value grids on the tables for children to use if they wish.

ANSWERS

Question 1 a): 4,523 + 3,431 = 7,954. The luggage weighs 7,954 g in total.

Question 1 b): 7,954 < 9,000. They are under the weight limit.



Unit 3: Addition and subtraction, Lesson 2

Adding two 4-digit numbers 1

Discover

1 a) How much do the suitcase and the backpack weigh in total?

b) The luggage can weigh a maximum of 9,000 g in total.
Are they under the limit?
Show this on a number line.

92

PUPIL TEXTBOOK 4A PAGE 92

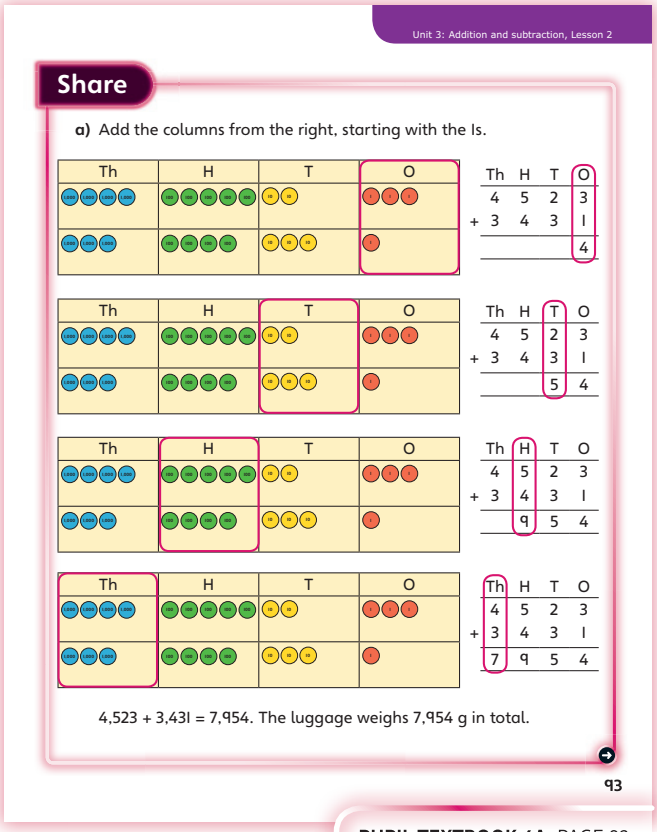
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 a): *Do you know what to call this method of addition?*
- Question 1 b): *What sign has been used in the answer? Why?*

IN FOCUS For question 1 a), the column addition is broken down into steps, which is very important for children to see. Discuss the steps and explain them. You may want to ask children if they can think why they do not start with the thousands.



Unit 3: Addition and subtraction, Lesson 2

Share

a) Add the columns from the right, starting with the Is.

Th	H	T	O
			4
		5	
	4		
3			

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

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

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

4,523 + 3,431 = 7,954. The luggage weighs 7,954 g in total.

93

PUPIL TEXTBOOK 4A PAGE 93

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 3: *How can you work out the missing numbers?*
- Question 4: *Why is it important to lay out your work correctly?*
- Question 4: *What can you use to explain your answer?*

IN FOCUS Question 3 has a column addition with missing numbers. Talk to children about how they might solve it. They will soon realise that they must do a subtraction to find the correct answer.

STRENGTHEN Provide base 10 equipment for children who need it. Children progressing from place value grids to written columns may need support with labelling the columns.

DEEPEN Deepen learning by challenging children to become the teacher. Show them a list of additions, some of which have mistakes, for example 4,556 + 2,002 = 6,008. Challenge them to mark the additions, correct the mistakes and explain where the person who made the error may have gone wrong.

ASSESSMENT CHECKPOINT Use question 4 to see if children understand the importance of laying out their work correctly. This will also give you an insight into their understanding of place value.

ANSWERS

Question 1: 3,142 + 2,306 = 5,448

The two bags weigh 5,448 g in total.

Question 2:

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

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

Each pair weighs the same, because the digits in the additions are the same, but in a different order.

Question 3:

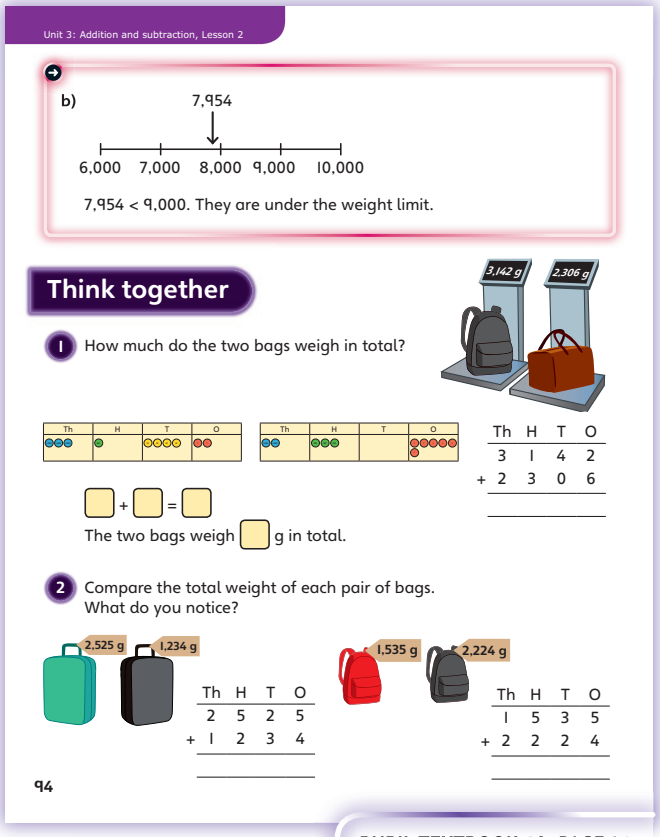
	3	4	5	2
+	**4**	**3**	**2**	**5**
	7	7	7	7

3,452 + 4,325 = 7,777

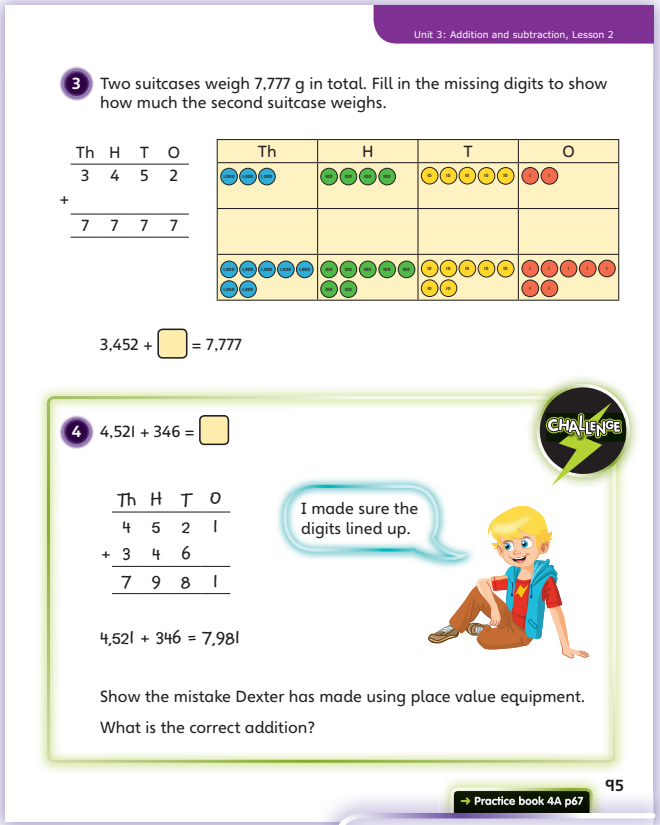
Question 4:

	4	5	2	1
+		3	4	6
	4	8	6	7

4,521 + 346 = 4,867



PUPIL TEXTBOOK 4A PAGE 94



PUPIL TEXTBOOK 4A PAGE 95

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Question 1 uses column addition in the context of money. Explain to children that this is still the same method, but ensure they understand the importance of the units.

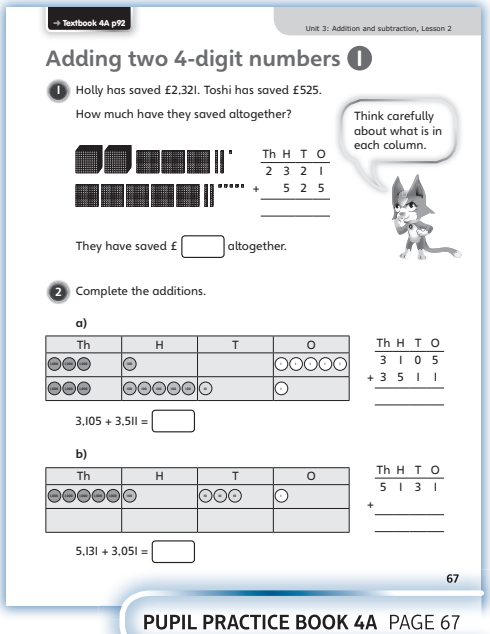
STRENGTHEN If children are struggling with the method, work through some more additions with them, linking the column method to place value grids, base 10 equipment or both.

DEEPEN Give children some word problems in which they need to add 4-digit numbers.

THINK DIFFERENTLY In question 4 children have to spot the mistakes. If they are struggling, prompt them to look carefully at the layout of the column additions and the numbers that are being used.

ASSESSMENT CHECKPOINT Question 7 will allow you to assess which children have achieved mastery in this lesson. Those who have will be able to find multiple solutions using a mixture of place value knowledge and mental calculations.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



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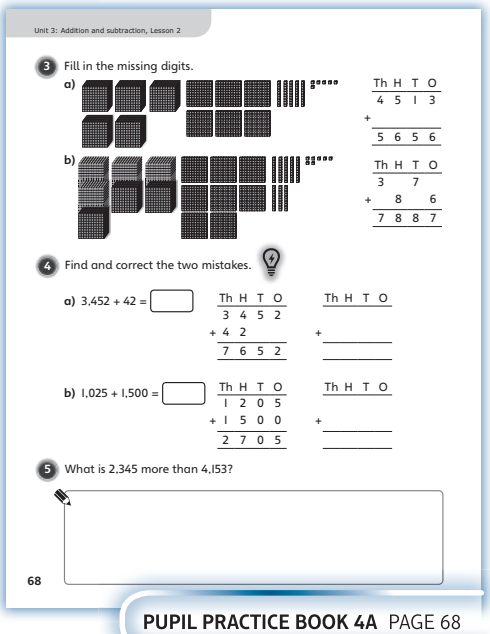


PUPIL PRACTICE BOOK 4A PAGE 68

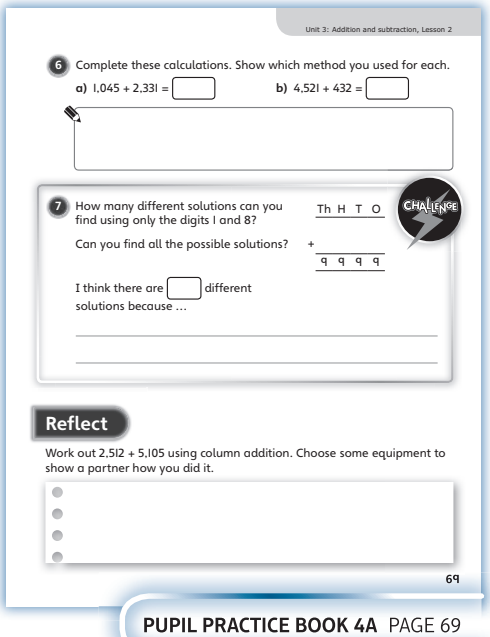
Reflect

WAYS OF WORKING Pair work

IN FOCUS This activity is an excellent opportunity for children to show their understanding by teaching this topic themselves. This reinforces the saying that by learning you will teach, and by teaching you will learn.

ASSESSMENT CHECKPOINT Assess whether children can articulate their answers in simple steps, using the correct vocabulary.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 69

After the lesson

- Do you need to run any intervention activities to give some children a boost?
- Which children depended heavily on using apparatus or place value grids?
- Was the layout that children used in their books neat and aligned?

Adding two 4-digit numbers 2

Learning focus

In this lesson children will add 4-digit numbers using the column method with an exchange in one column.

Small steps

- Previous step: Adding two 4-digit numbers (1)
- **This step: Adding two 4-digit numbers (2)**
- Next step: Adding two 4-digit numbers (3)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

ASSESSING MASTERY

Children can use the column method to calculate with one exchange. They can explain their working clearly and understand what the exchange means, and they can use their methods in context to solve problems.

COMMON MISCONCEPTIONS

Children often make mistakes with an exchange, for example if a column is 7 + 6, they just put the total as 0, or just put 3 without exchanging. Ask:

- *Can you explain your method to me?*

Children often do not understand that they are exchanging 10 or 100 etc., but instead think of it as 1. Ask:

- *Can you show me the exchange using place value counters?*

STRENGTHENING UNDERSTANDING

Variation in the types of addition (find the total, or add on more) will strengthen learning in this lesson.

Model the exchanges with place value counters, to ensure children know what an exchange looks like.

GOING DEEPER

Use missing digit problems to deepen learning in this lesson. Can children identify what information they have and how they can use it to find missing information? Do they understand what to do when exchanges occur with missing digits?

KEY LANGUAGE

In lesson: **strategy**, total, addition, exchange, ones (1s), tens (10s), hundreds (100s), story problem, altogether, column method, digits

Other language to be used by the teacher: place value, thousands (1,000s)

STRUCTURES AND REPRESENTATIONS

place value grid

RESOURCES

Mandatory: base 10 equipment, place value counters

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How will you explain the word 'exchange'?
- Would a display showing diagrams similar to those in the **Share** section of the **Textbook** support children?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *What are the key words in this question?*
- Question 1 a): *What is the question asking you to do?*
- Question 1 a): *Can you write down the number sentence?*
- Question 1 b): *What methods could you use?*

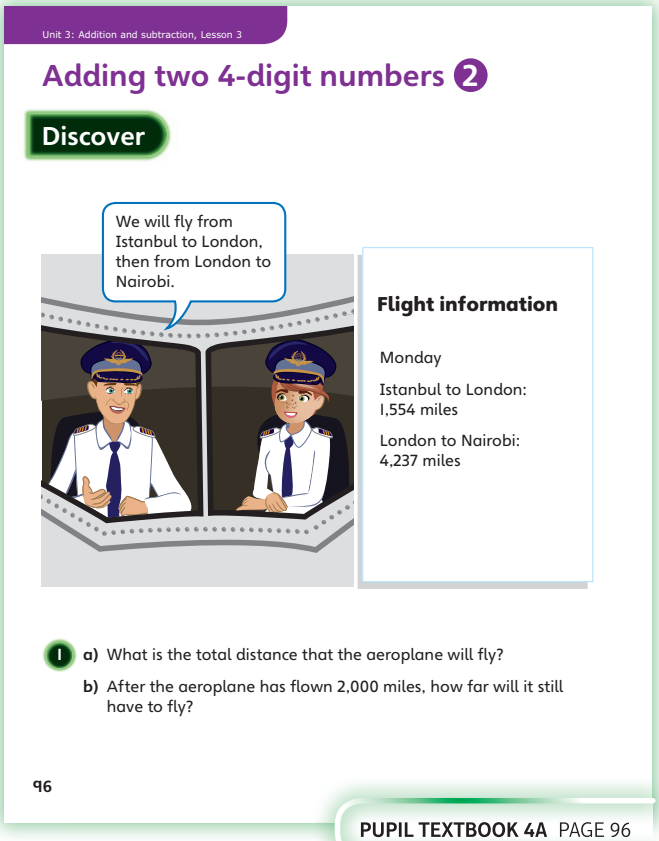
IN FOCUS Some children will need support with question 1 b). They must find the answer to question 1 a), and then work out how to find the difference between it and 2,000. You may want to remind children of Lesson 1 in this unit (using knowledge of place value to subtract).

PRACTICAL TIPS For this activity, ask children to draw out and discuss the key words in the problem.

ANSWERS

Question 1 a): 4,237 + 1,554 = 5,791. The aeroplane will fly 5,791 miles in total.

Question 1 b): 5,791 – 2,000 = 3,791. It will still have 3,791 miles to fly.


Unit 3: Addition and subtraction, Lesson 3

Adding two 4-digit numbers 2

Discover

We will fly from Istanbul to London, then from London to Nairobi.

Flight information

Monday

Istanbul to London: 1,554 miles

London to Nairobi: 4,237 miles

1 a) What is the total distance that the aeroplane will fly?

b) After the aeroplane has flown 2,000 miles, how far will it still have to fly?

96

PUPIL TEXTBOOK 4A PAGE 96

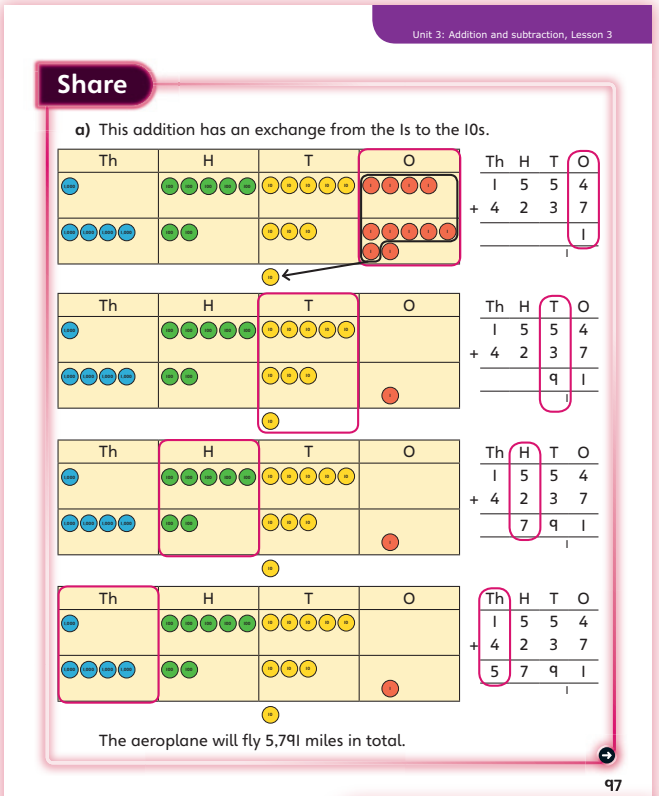
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 a): *Why can you not have 11 counters in the ones column?*
- Question 1 a): *What does 'exchange' mean?*

IN FOCUS For question 1 a), discuss why it is not possible to have 11 counters in the ones column. Show children clearly how the 10 ones are exchanged for 1 ten. In question 1 b), the subtraction could be solved using a column method. A number line is also a helpful way of approaching this calculation, based on the number of exchanges required. Children will need to make decisions about which methods suit the calculations in terms of efficiency and accuracy.


Unit 3: Addition and subtraction, Lesson 3

Share

a) This addition has an exchange from the 1s to the 10s.

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

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

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

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

The aeroplane will fly 5,791 miles in total.

97

PUPIL TEXTBOOK 4A PAGE 97

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 3 a): *Can you solve all of the additions mentally?*
- Question 3 a): *How do you know when you need to exchange?*
- Question 3 b): *Can you check your partner's story problems?*

IN FOCUS Question 3 a) gives a chance to draw out children's reasoning about when an exchange is necessary. Discuss how they can tell that an exchange is needed.

STRENGTHEN Some children may need help with layout (especially when writing the '1' when exchanging). Other children may forget to count the exchange, so give plenty of practice of this.

DEEPEN For question 3 b), deepen learning by asking children to add an extra line to their story problem making it a multi-step problem.

ASSESSMENT CHECKPOINT Use question 3 b) to see if children can create addition problems using 4-digit numbers with an exchange.

ANSWERS

Question 1: 5,791 + 1,154 = 6,945

It flies 6,945 miles on Tuesday.

Question 2: Accept any answer with an 8 or 9 in the hundreds column.

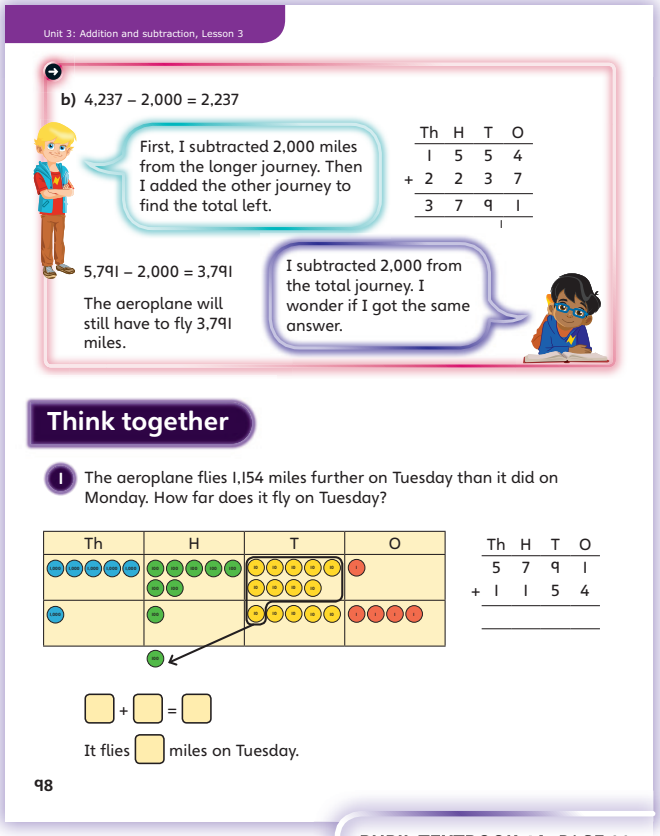
Question 3 a): Exchange 10 tens: 2,341 + 1,593 = 3,934

No exchange needed: 1,010 + 2,549 = 3,559

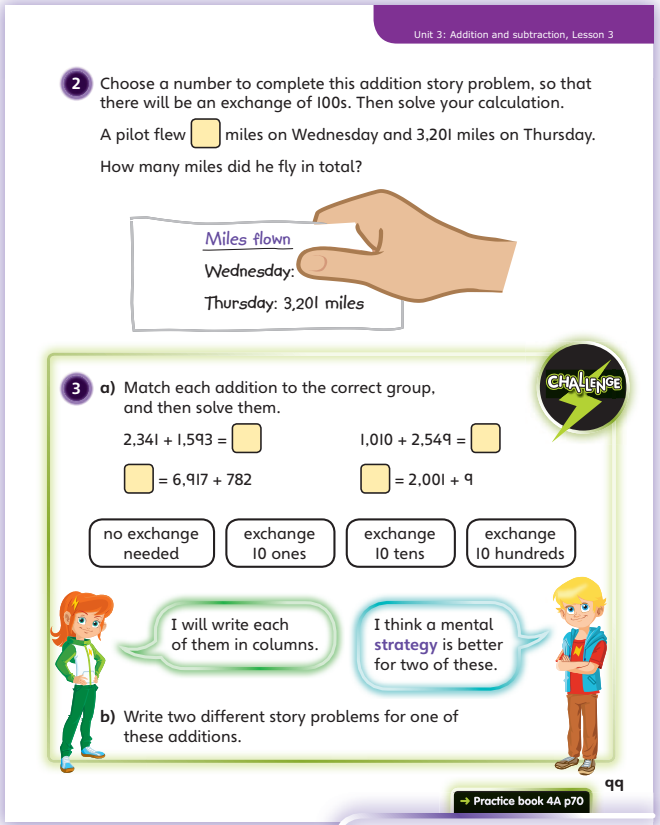
Exchange 10 hundreds: 7,699 = 6,917 + 782

Exchange 10 ones: 2,010 = 2,001 + 9

Question 3 b): Check that the children's story problems are appropriate and correct.



PUPIL TEXTBOOK 4A PAGE 98



PUPIL TEXTBOOK 4A PAGE 99

Practice

WAYS OF WORKING Independent thinking

IN FOCUS You will notice that in this section there are place value counters and grids to support at the start, but not later on. This is to gradually reduce scaffolding, encouraging children to become more independent with solving additions.

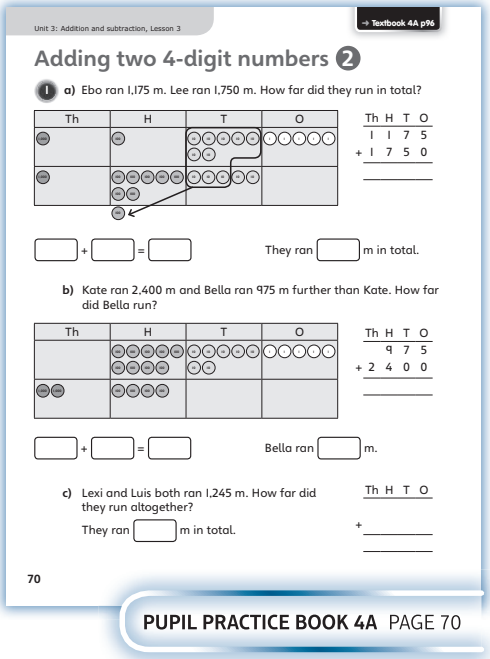
STRENGTHEN If children are struggling with using the vertical column method, provide more opportunities to practise additions with an exchange.

DEEPEN Challenge children to think of number sentences in which the ones, tens and hundreds all require an exchange, for example 1,345 + 1,886. Ask them to investigate the solutions that they will get.

Give children an answer, such as 4,533. Tell them to create a question with that answer, which involves only one exchange, for example 2,822 + 1,711.

ASSESSMENT CHECKPOINT Question 4 will allow you to assess which children can complete a problem by thinking about the exchanges involved. Children who can do this confidently are likely to have mastered the lesson.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Unit 3: Addition and subtraction, Lesson 3

→ Textbook 4A p96

Adding two 4-digit numbers 2

1 a) Ebo ran 1,175 m. Lee ran 1,750 m. How far did they run in total?

Th H T O

1 1 7 5
+ 1 7 5 0

They ran ☐ m in total.

b) Kate ran 2,400 m and Bella ran 975 m further than Kate. How far did Bella run?

9 7 5
+ 2 4 0 0

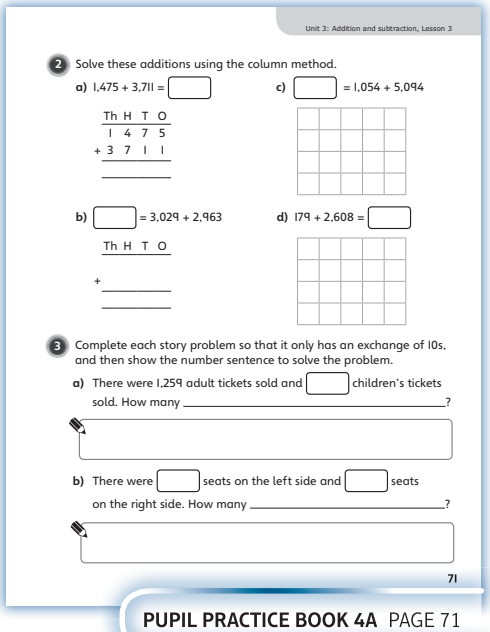
Bella ran ☐ m.

c) Lexi and Luis both ran 1,245 m. How far did they run altogether?

They ran ☐ m in total.

70

PUPIL PRACTICE BOOK 4A PAGE 70


Unit 3: Addition and subtraction, Lesson 3

2 Solve these additions using the column method.

a) 1,475 + 3,711 = ☐

1 4 7 5
+ 3 7 1 1

c) ☐ = 1,054 + 5,094

b) ☐ = 3,029 + 2,963

d) 179 + 2,608 = ☐

3 Complete each story problem so that it only has an exchange of 10s, and then show the number sentence to solve the problem.

a) There were 1,259 adult tickets sold and ☐ children's tickets sold. How many ____?

b) There were ☐ seats on the left side and ☐ seats on the right side. How many ____?

71

PUPIL PRACTICE BOOK 4A PAGE 71

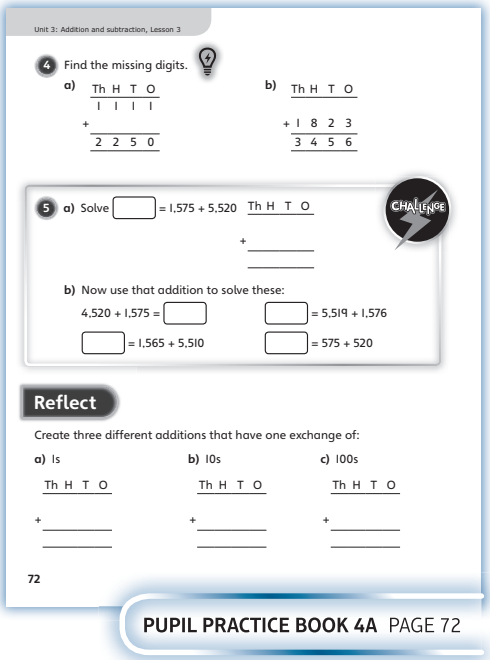
Reflect

WAYS OF WORKING Pair work

IN FOCUS In this section, children will have to think carefully about the numbers they choose and the exchanges that will happen.

ASSESSMENT CHECKPOINT Assess whether children can reason why they chose the numbers they did. You may hear comments such as, 'I needed to create an addition with an exchange of ones, so I used 9 and 2 in this column.'

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Unit 3: Addition and subtraction, Lesson 3

4 Find the missing digits.

a)

1 1 1 1
+
2 2 5 0

b)

+ 1 8 2 3
3 4 5 6

5 a) Solve ☐ = 1,575 + 5,520

+

b) Now use that addition to solve these:

4,520 + 1,575 = ☐

☐ = 5,519 + 1,576

☐ = 1,565 + 5,510

☐ = 575 + 520

Reflect

Create three different additions that have one exchange of:

a) 1s b) 10s c) 100s

72

PUPIL PRACTICE BOOK 4A PAGE 72

After the lesson

- Can children explain what an exchange is?
- Can children represent an exchange with place value counters?
- Did any misconceptions crop up in this lesson?

Adding two 4-digit numbers 3

Learning focus

In this lesson children will add 4-digit numbers using the column method with exchanges across more than one column.

Small steps

- Previous step: Adding two 4-digit numbers (2)
- **This step: Adding two 4-digit numbers (3)**
- Next step: Subtracting two 4-digit numbers (1)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

ASSESSING MASTERY

Children can use the column method to calculate with more than one exchange. Children can correctly explain the methods they use, and can identify calculations that would be more suited to mental methods.

COMMON MISCONCEPTIONS

Children often make mistakes when there are multiple exchanges, for example forgetting to do the second exchange. Ask:

- *Did you remember to count the exchange?*

Children sometimes forget to add on the exchange (especially when there are multiple exchanges). Ask:

- *How could you check your answer?*

STRENGTHENING UNDERSTANDING

Together use place value counters to work through and solve several calculations with multiple exchanges. Model making each exchange and discuss what effect it will have on the next column and on the total.

GOING DEEPER

Look at examples where one exchange leads to another exchange in the next column, such as 189 + 13. Can children mentally spot calculations where this will happen?

KEY LANGUAGE

In lesson: total, exchange, addition, ones (1s), tens (10s), hundreds (100s), method, digit, columns

Other language to be used by the teacher: place value, thousands (1,000s)

STRUCTURES AND REPRESENTATIONS

place value grid, number line

RESOURCES

Mandatory: base 10 equipment, place value counters

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How will you introduce calculations with multiple exchanges?
- Have you got place value counters to support children whose understanding needs strengthening?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *What happens when there is more than one exchange in a calculation?*
- Question 1 b): *Do you have to write down the calculation to see the exchanges? Can you tell by looking at the digits in each number?*

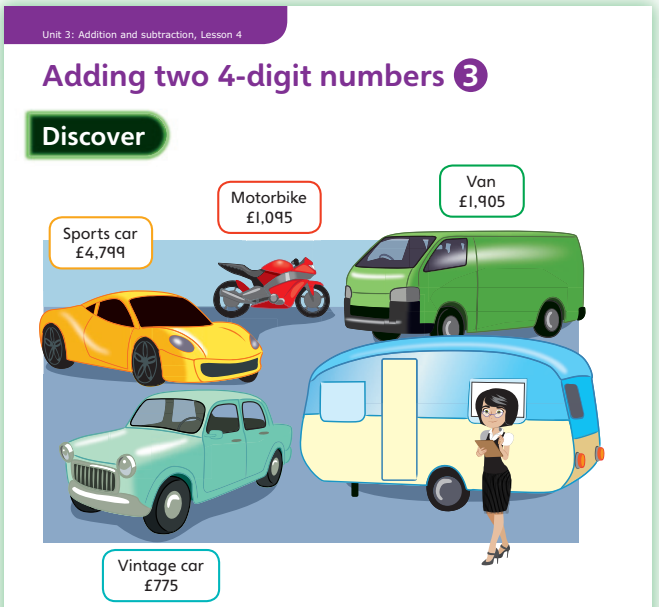
IN FOCUS In questions 1 a) and 1 b), focus on children's explanations of how to add with more than one exchange. Listen carefully to their vocabulary and reasoning skills.

PRACTICAL TIPS For this activity, ask children to write the calculations neatly and to highlight each of the exchanges using a different colour.

ANSWERS

Question 1 a): 4,799 + 1,095 = 5,894. The total value of the sports car and the motorbike is £5,894.

Question 1 b): Adding the prices of the sports car and the vintage car would need three exchanges.



PUPIL TEXTBOOK 4A PAGE 100

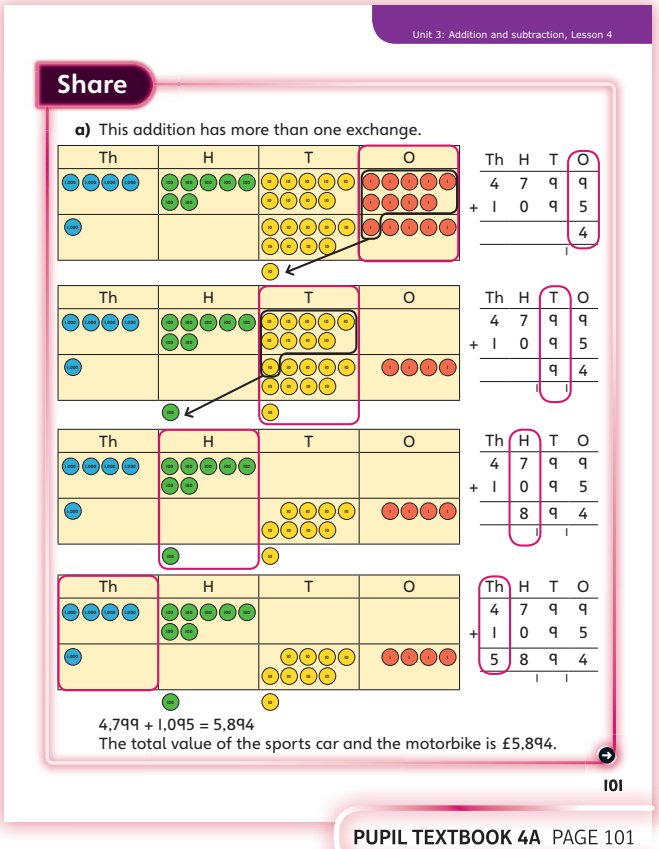
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 a): *Can you explain this working to me?*
- Question 1 b): *How can you spot where there will be an exchange?*

IN FOCUS Question 1 b) focuses children on how they might spot where there will be an exchange. They should start to realise that their knowledge of number bonds to 10 will come in handy.



PUPIL TEXTBOOK 4A PAGE 101

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 1: *How will you lay out your work correctly?*
- Question 3 a): *Which method would be best with these numbers?*
- Question 3 b): *Can you check your partner's additions?*

IN FOCUS Question 3 gives children the opportunity to discuss the merits of the column written method and the mental method, and to find that they both give the same answer. The question does not teach the mental method as a trick, instead it gives children the chance to evaluate both methods themselves. You may want to model the mental method using a number line.

STRENGTHEN Give children place value equipment to help them explain their workings. Children may need support in laying out calculations correctly on squared paper. If necessary you could label the ones, tens, hundreds and thousands columns for them before they start their working.

DEEPEN Deepen learning in this section by providing children with a range of calculations where they must decide whether a written method or a mental method would be more effective.

ASSESSMENT CHECKPOINT Use question 3 to see whether children can choose between a written method and a mental method. In particular, listen to their reasoning.

ANSWERS

Question 1: 1,905 + 775 = 2,680

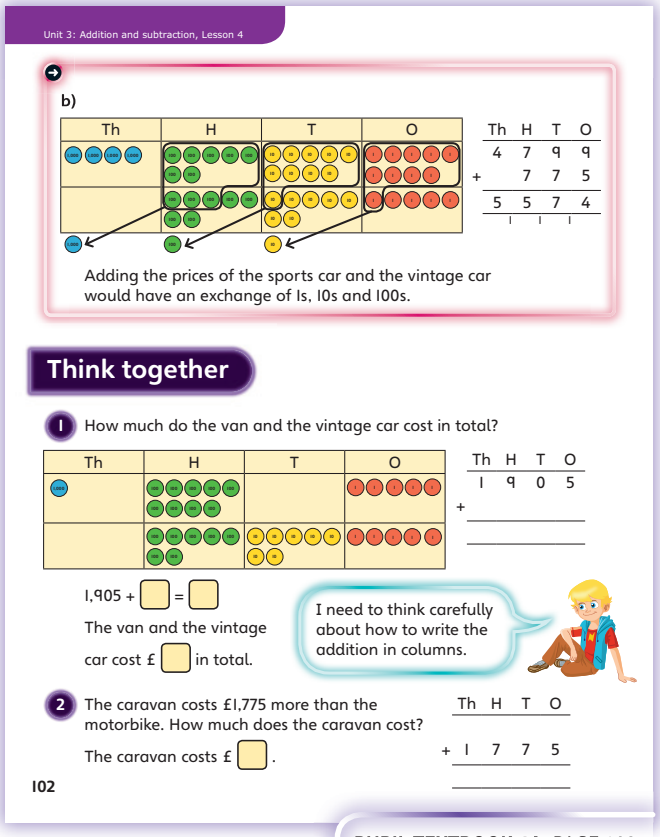
The van and the vintage car cost £2,680 in total.

Question 2: 1,095 + 1,775 = 2,870

The caravan costs £2,870.

Question 3 a): Look for children using both the column method of addition and mental strategies, for example a number line showing a jump on of 2,000 from 575 to 2,575, and then a jump back of 1 to 2,574. Children should find that both methods give the same answer but that the mental method is more efficient because there is a near multiple of 1,000 and you can avoid the exchanges.

Question 3 b): Answers will vary. Look for examples of additions where a mental method is more efficient.



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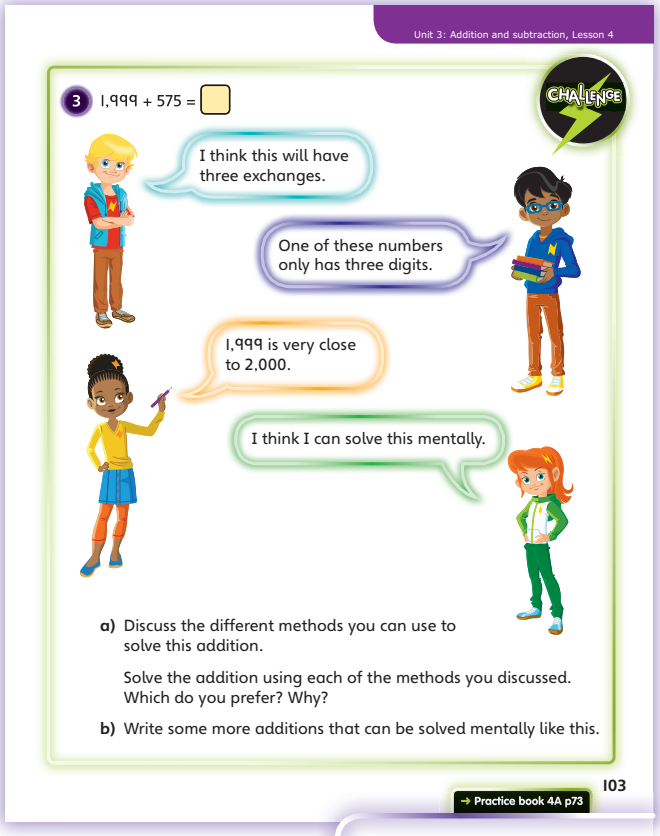


PUPIL TEXTBOOK 4A PAGE 103

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Question 2 will focus children's learning on finding calculations that have two exchanges, which should lead to mastery. Encourage children to explain their thinking verbally.

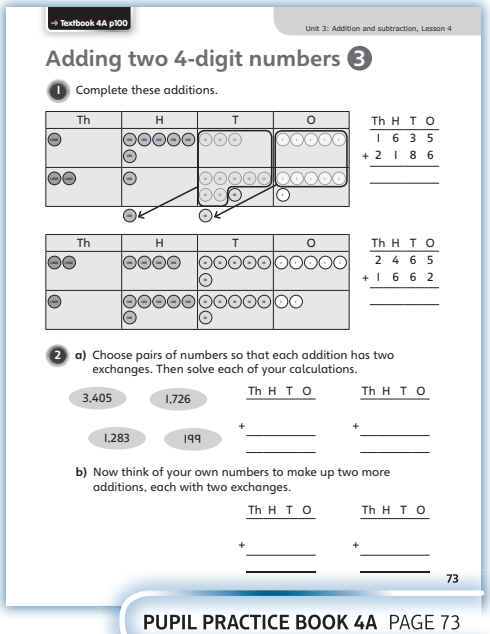
STRENGTHEN Question 3 gives the opportunity to strengthen learning through correcting mistakes. Provide children who need it with other questions like this where they address examples of common misconceptions.

DEEPEN Challenge children to solve an addition with exchanges in all four columns, including the thousands. Discuss how sometimes adding two 4-digit numbers can lead to a 5-digit answer, and model the need for a ten thousands column.

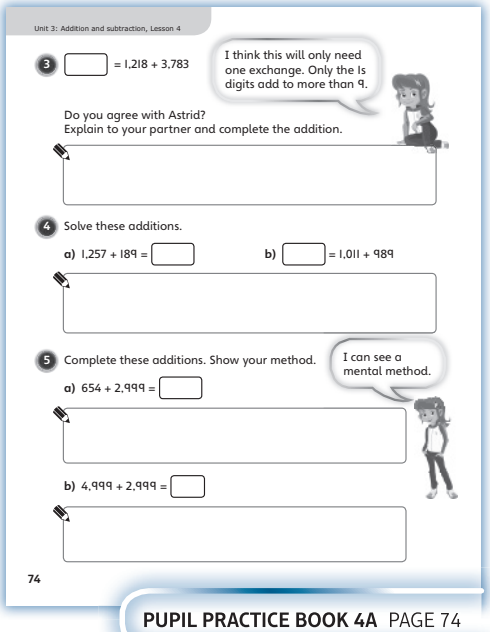
Ask children to give you an example of an addition where one exchange causes there to be an exchange in the next column (where the carry digit means that the column total will now be 10 or more). Can they explain why this happens? Encourage them to refer to bonds to 10 in their explanation.

ASSESSMENT CHECKPOINT Question 3 will allow you to assess whether children can check and correct answers, which will demonstrate a deeper understanding of the lesson.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 73



PUPIL PRACTICE BOOK 4A PAGE 74

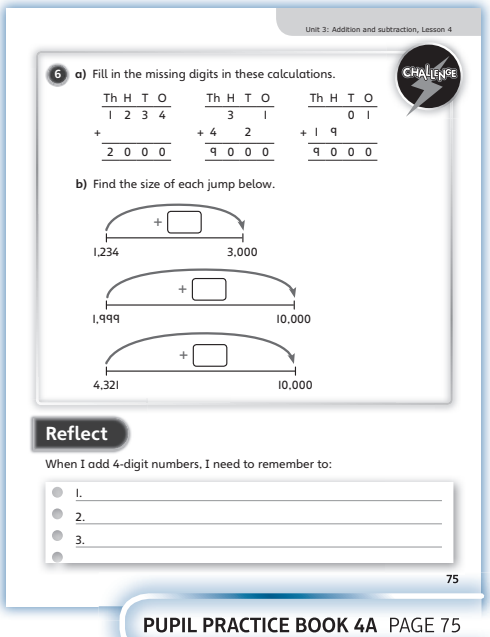
Reflect

WAYS OF WORKING Independent thinking

IN FOCUS This section requires children to explain their written workings in three steps. They must be clear and concise in their answers.

ASSESSMENT CHECKPOINT Assess whether children have remembered all of the steps of column addition with exchanges. You may want to encourage children to provide an example alongside their answers.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 75

After the lesson

- Can children identify exchanges without having to do the workings?
- Can children represent an exchange with place value counters?
- Which children will need intervention following this lesson?

Subtracting two 4-digit numbers 1

Learning focus

In this lesson children will subtract 4-digit numbers using the column method where there are no exchanges.

Small steps

- Previous step: Adding two 4-digit numbers (3)
- **This step: Subtracting two 4-digit numbers (1)**
- Next step: Subtracting two 4-digit numbers (2)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

ASSESSING MASTERY

Children can use the column method to subtract. They can explain their method clearly and demonstrate a clear understanding of place value, i.e. they know that they are not just subtracting separate digits, but recognise the ones, tens, hundreds and thousands.

COMMON MISCONCEPTIONS

Children may not correctly align the columns to show 1s, 10s, 100s and 1,000s. Ask:

- *What happens if the columns are not lined up neatly?*

Some children may just subtract the digits without showing an understanding of the place value of each column. Ask:

- *Does that column show 3 – 1 or 30 – 10?*

STRENGTHENING UNDERSTANDING

As well as using place value counters to make learning more concrete, model for children how to work with bar models to represent subtractions.

GOING DEEPER

Give children a column subtraction with some digits missing and discuss what strategies they can use to complete it. Explore how to check a subtraction by finding the inverse, i.e. doing an addition.

KEY LANGUAGE

In lesson: bar model, subtraction, fewer, more than, column, digits, odd, even, story problem

Other language to be used by the teacher: place value, thousands (1,000s), hundreds (100s), tens (10s), ones (1s).

STRUCTURES AND REPRESENTATIONS

place value grid, bar model, number line

RESOURCES

Mandatory: base 10 equipment, place value counters

Optional: strips of paper to make bar models

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How will you explain the key vocabulary?
- Which children are likely to struggle with the concept of place value?

Discover

WAYS OF WORKING Pair work

ASK

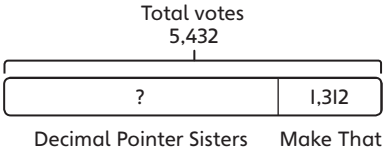
- Question 1 a): *How can you draw the bar model?*
- Question 1 b): *How can you use the bar model to help you work out the answer?*

IN FOCUS The bar model is a powerful tool for representing subtraction. Children can clearly see the largest amount and the amount that is taken away to leave the answer. It also helps them relate subtraction to addition.

PRACTICAL TIPS Provide children with strips of paper to create their bar models.

ANSWERS

Question 1 a):



Question 1 b): 5,432 – 1,312 = 4,120

The Decimal Pointers got 4,120 votes.

Unit 3: Addition and subtraction, Lesson 5

Subtracting two 4-digit numbers 1

Discover

1 a) Decimal Pointers want to know how many votes they got.
Show how they could work this out using a bar model.

b) How many votes did Decimal Pointers get?

104

PUPIL TEXTBOOK 4A PAGE 104

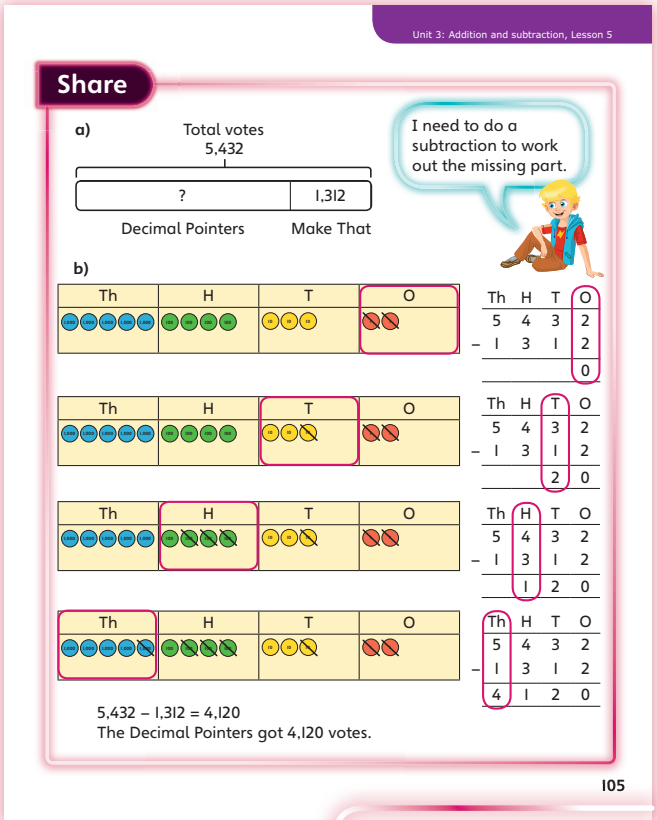
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 b): *How does the column method of subtraction work?*
- Question 1 b): *What do the place value counters tell you about the digits in the calculation?*

IN FOCUS In question 1 b), it is worth discussing that when we use equipment to show a subtraction, we don't need to make both numbers. We can just represent the whole, and then remove the parts that are being taken away.



Unit 3: Addition and subtraction, Lesson 5

Share

a)

b)

	Th	H	T	O
	5	4	3	2
–	1	3	1	2
				0

	Th	H	T	O
	5	4	3	2
–	1	3	1	2
			2	0

	Th	H	T	O
	5	4	3	2
–	1	3	1	2
		1	2	0

	Th	H	T	O
	5	4	3	2
–	1	3	1	2
	4	1	2	0

5,432 – 1,312 = 4,120
The Decimal Pointers got 4,120 votes.

105

PUPIL TEXTBOOK 4A PAGE 105

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 1: *What is the question asking you to do?*
- Question 3: *How do you work out a subtraction with a missing number?*
- Question 4 b): *How do the models you have drawn help you to understand the subtraction?*

IN FOCUS Some children may need support with interpreting the word problems in questions 1 and 2. Use bar models to support your explanations.

STRENGTHEN The language 'more than' is usually associated with addition. Explain that in question 2 it is actually a subtraction. You could represent it on a bar model for clarity.

DEEPEN Look closely at question 3 and discuss how to solve missing number subtractions. Draw out that a calculation like 9 – ? = 5 is solved with a subtraction, i.e. 9 – 5 = 4, and a calculation like ? – 4 = 5 is solved with an addition, i.e. 4 + 5 = 9.

ASSESSMENT CHECKPOINT Use question 4 to see if children can recognise and use different representations of subtractions, which shows a deeper understanding of what a subtraction actually means.

ANSWERS

Question 1: 4,324 – 2,120 = 2,204

Scissor Squares got 2,204 votes.

Question 2: 4,436 – 3,425 = 1,011

Division Express got 1,011 more votes than Measure Minds.

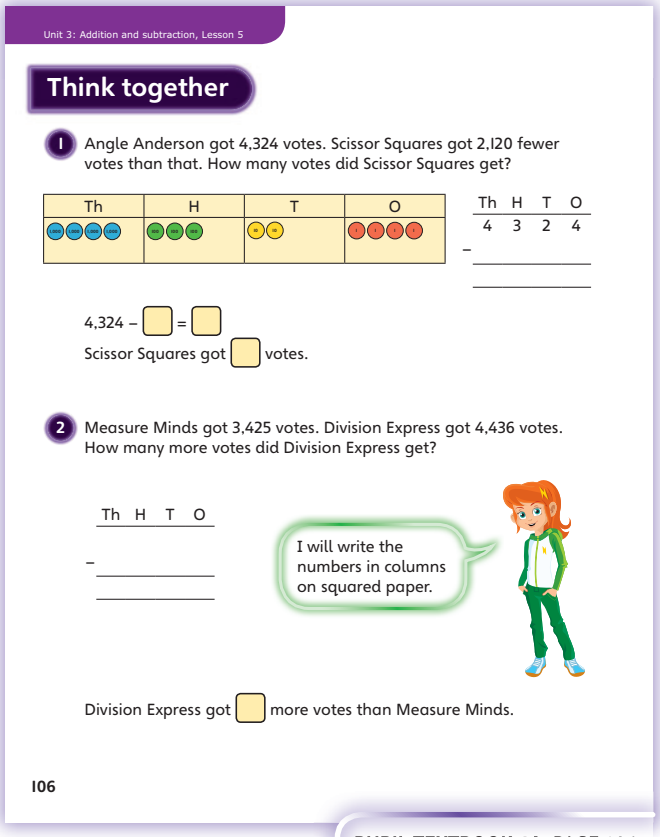
Question 3: 5,465 – 264 = 5,201

Question 4 a): 9,876 – 5,432 = 4,444

9,999 – 7,654 = 2,345

7,890 – 450 = 7,440

Question 4 b): Expect children to show 7,654 – 4,321 = 3,333 using a bar model, number line and comparison bar model.



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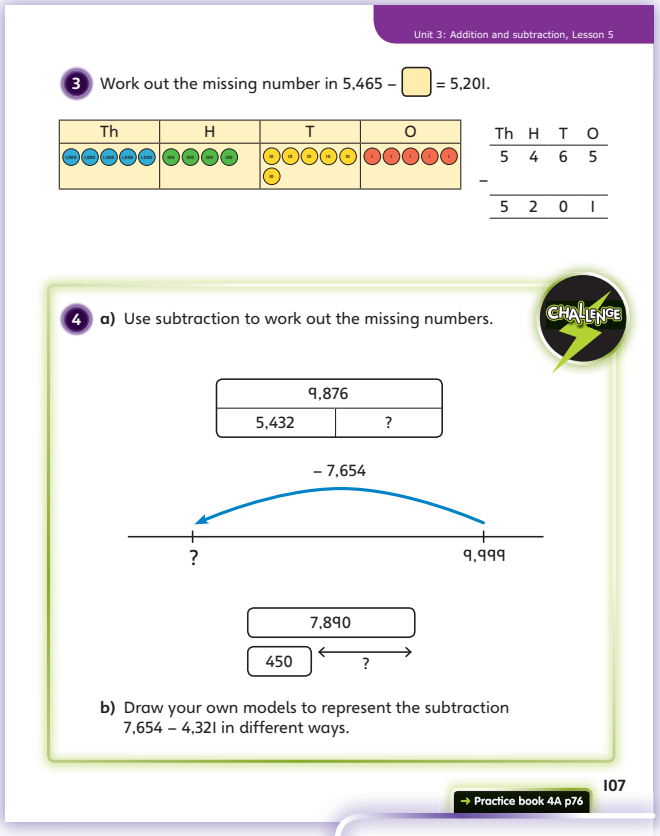


PUPIL TEXTBOOK 4A PAGE 107

Practice

WAYS OF WORKING Independent thinking

IN FOCUS The reasoning in question 5 will give you a good insight into which children are thinking in a deeper manner. Look for children who spot the pattern, i.e. odd – odd = even. Ask them to show you why this is.

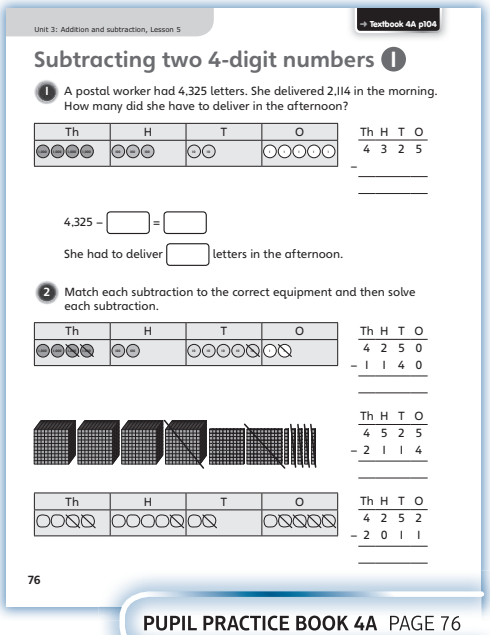
STRENGTHEN Children may need help forming the odd and even numbers in question 5. Make sure they understand the place value of each digit in their numbers and can see which digit is significant in making the whole number odd or even. Support them in laying their numbers out correctly for column subtraction.

DEEPEN Deepen learning in this section by giving children the answer to an unspecified subtraction. Challenge them to write down as many subtractions as they can to make that answer.

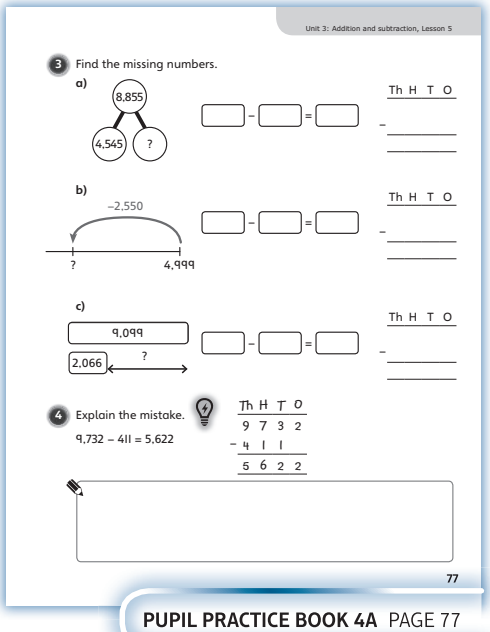
THINK DIFFERENTLY In question 4, children have to explain why a child has made a mistake. Listen carefully to their reasoning, and prompt them to think about layout if they are finding it hard to spot the error.

ASSESSMENT CHECKPOINT Question 2 gives children the opportunity to demonstrate their application of learning in a number of different ways. Children who show that they can match subtractions to different equipment and representations have likely mastered the lesson.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 76



PUPIL PRACTICE BOOK 4A PAGE 77

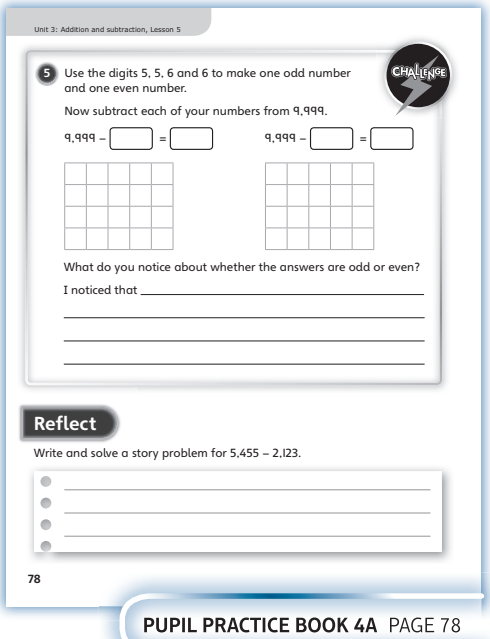
Reflect

WAYS OF WORKING Independent thinking

IN FOCUS This activity requires children to write a story problem for a subtraction. If necessary, guide them to stay within the context of the lesson (talent show votes).

ASSESSMENT CHECKPOINT Children are likely to have mastered the lesson if they can create a problem independently and then solve it. Ask them to explain their question and solution to you.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 78

After the lesson

- Which children have mastered the lesson?
- Are all children ready to go on to subtractions with exchanges?
- In the next lesson what support will you provide for those children whose understanding still needs strengthening?

Subtracting two 4-digit numbers 2

Learning focus

In this lesson children will subtract 4-digit numbers using the column method where an exchange is required.

Small steps

- Previous step: Subtracting two 4-digit numbers (1)
- **This step: Subtracting two 4-digit numbers (2)**
- Next step: Subtracting two 4-digit numbers (3)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

ASSESSING MASTERY

Children can use the column method to subtract. They can explain the method that they have used and can describe what happens when an exchange takes place (using a firm knowledge of place value).

COMMON MISCONCEPTIONS

Children may not understand how to exchange and so may say, for example, that 4 – 5 = 0 or may subtract the smaller digit from the larger.

$$\begin{array}{r} 3\ 4 \\ -\ 2\ 5 \\ \hline 1\ 0 \end{array} \qquad \begin{array}{r} 3\ 4 \\ -\ 2\ 5 \\ \hline 1\ 1 \end{array}$$

Ask:

- *Can you show the subtraction using equipment?*

STRENGTHENING UNDERSTANDING

Use place value counters and equipment to model every exchange. Make the learning visual so that the process of exchanging is clear to understand. Run some more intervention enabling children to practise subtractions with exchanges.

GOING DEEPER

Deepen learning in this lesson by giving children a range of subtractions and asking them to work the subtractions out using more than one method. Ask them to reason which method is more effective.

KEY LANGUAGE

In lesson: tens (10s), hundreds (100s), thousands (1,000s), whole, part, exchange, more, difference, method, column subtraction, number line

Other language to be used by the teacher: place value, digits, ones

STRUCTURES AND REPRESENTATIONS

place value grid, bar model

RESOURCES

Mandatory: base 10 equipment, place value counters

Optional: string

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How will you explain what an exchange is?
- How will you visually represent an exchange?
- Could you put something on your working wall to support children with exchanging when subtracting?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *Look carefully at the hundreds column. Can you see the mistake now?*
- Question 1 b): *How should you lay out the subtraction?*

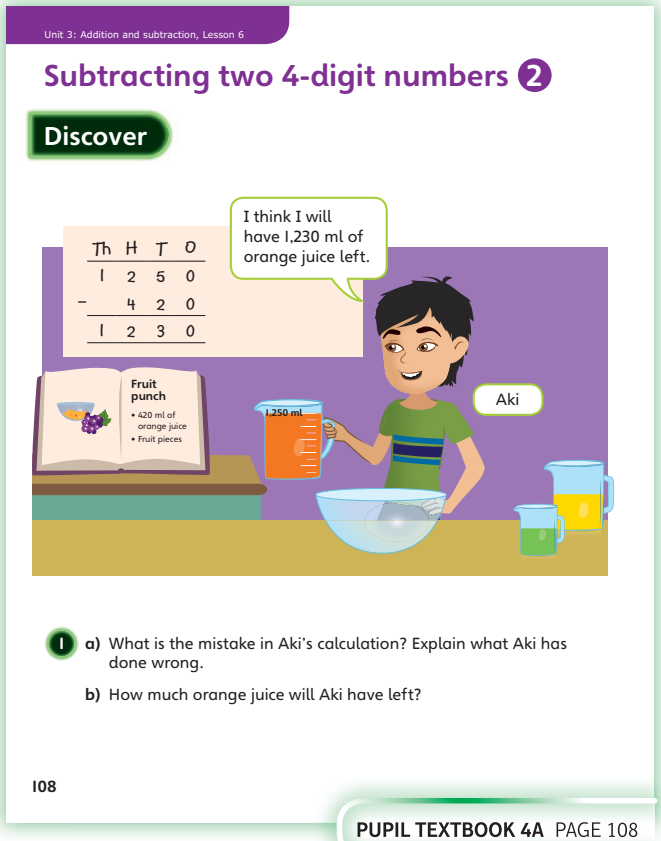
IN FOCUS Children are required to work out a 4-digit number minus a 3-digit number. Draw attention to the H column. Why has Aki ended up with a 2 in his answer? (He has subtracted the wrong digit.)

PRACTICAL TIPS Make a visual display in your classroom to support learning. A subtraction with an accompanying place value grid (with place value counters) is a good example to use.

ANSWERS

Question 1 a): In the hundreds column, Aki has subtracted the whole from the part, but he needed to exchange from the thousands column.

Question 1 b): 1,250 – 420 = 830. Aki has 830 ml of orange juice left.



Unit 3: Addition and subtraction, Lesson 6

Subtracting two 4-digit numbers 2

Discover

Th	H	T	O
1	2	5	0
–	4	2	0
1	2	3	0

1 a) What is the mistake in Aki's calculation? Explain what Aki has done wrong.

b) How much orange juice will Aki have left?

108

PUPIL TEXTBOOK 4A PAGE 108

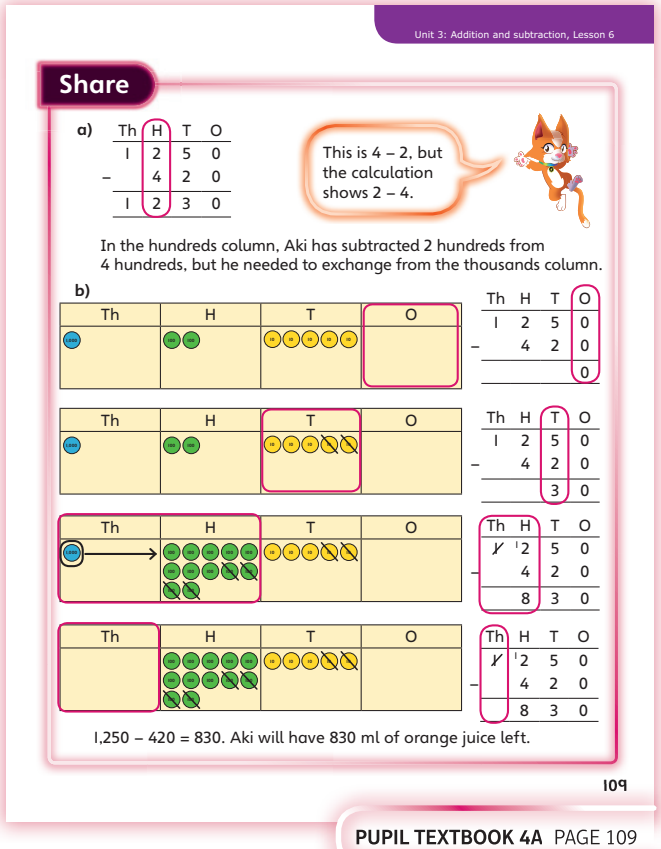
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 a): *How can you tell when an exchange is needed?*
- Question 1 b): *Can you explain the method in steps?*

IN FOCUS As a class, talk through the steps of the method. In particular, highlight the importance of place value. Ensure children understand that 1 thousand is being exchanged for 10 hundreds, so that you can do the subtraction in the H column.



Unit 3: Addition and subtraction, Lesson 6

Share

a)

Th	H	T	O
1	2	5	0
–	4	2	0
1	2	3	0

In the hundreds column, Aki has subtracted 2 hundreds from 4 hundreds, but he needed to exchange from the thousands column.

b)

1,250 – 420 = 830. Aki will have 830 ml of orange juice left.

109

PUPIL TEXTBOOK 4A PAGE 109

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 1: *Can you tell me what the number sentence is?*
- Question 3: *Why is the column method not the best method for these questions?*
- Question 3: *Can you draw a representation to help you picture your mental strategies?*

IN FOCUS Questions 1 and 2 are word problems. Use a bar model to represent them, in order to help children see that they are subtractions.

STRENGTHEN For question 3, children may need some support with mental strategies. Give suggestions such as: *9 is close to 10* and *999 is how many away from 1,001?* Practise laying out subtractions without column headings for those children who need help with that.

DEEPEN Deepen learning in this section by asking children to solve a subtraction using two different strategies. They must then reason which is the more efficient.

ASSESSMENT CHECKPOINT Use question 3 to assess whether children have a strong understanding of the column method of subtraction. Do they realise that it is not always the most efficient method?

ANSWERS

Question 1: 1,750 – 625 = 1,125

Aki spilled 1,125 ml of mango juice.

Question 2: 1,725 – 1,175 = 550

Aki has 550 more ml of pineapple juice.

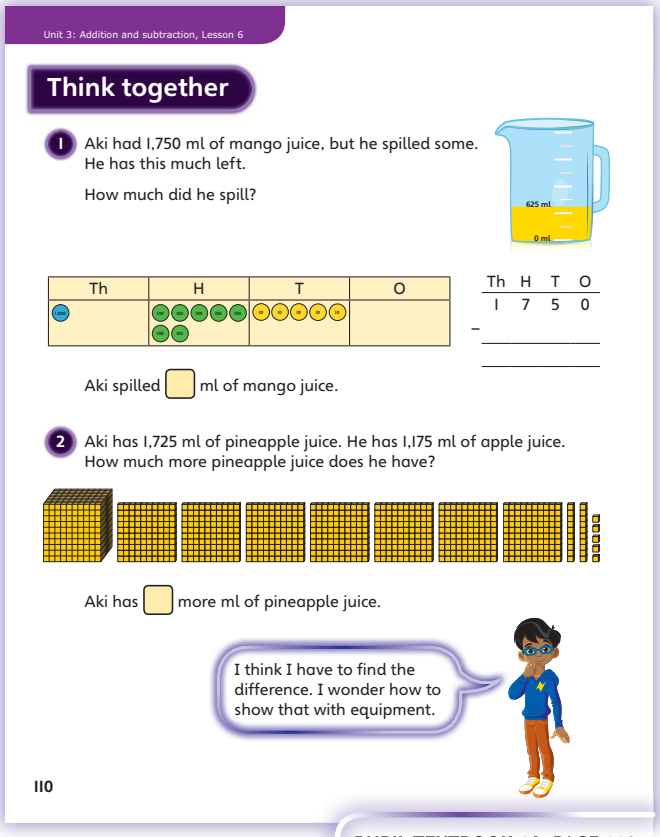
Question 3 a): 3,455 – 9 = 3,446

Strategies may include taking 10, then adding 1; taking 5, then taking 4; counting back 9. There's only one digit to subtract, so a method like a number line or using number bonds to 10 is quite easy to do mentally.

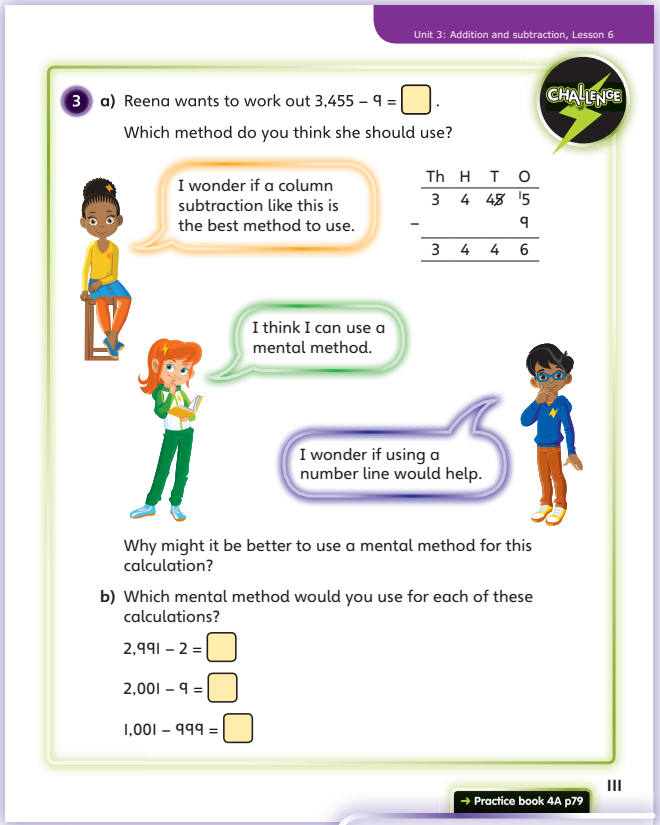
Question 3 b): 2,991 – 2 = 2,989; strategies may include taking 1, then taking 1; or counting back 2.

2,001 – 9 = 1,992; strategies may include taking 1, then taking 8; or counting back 9; or taking 10, then adding 1.

1,001 – 999 = 2; strategies may include counting on from 999 to 1,001; or counting back from 1,001 to 999; or taking 1,000, then adding 1.



PUPIL TEXTBOOK 4A PAGE 110



PUPIL TEXTBOOK 4A PAGE 111

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Question 1 provides a lot of structured support in the first subtraction but less and less in the following subtractions, to scaffold learning. Encourage children to look back to the first example when tackling later questions.

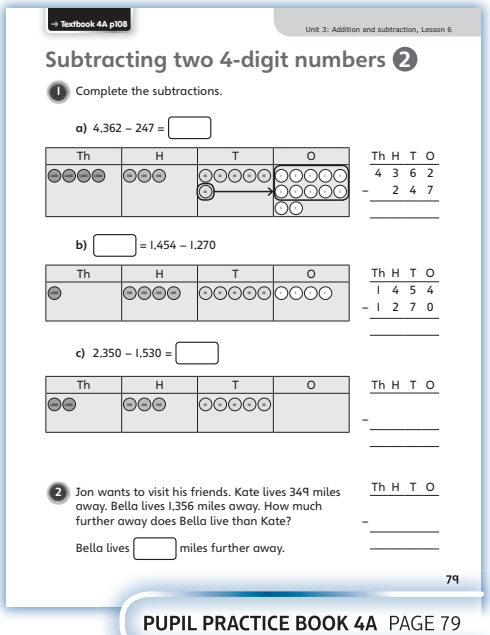
STRENGTHEN Children may need some support in question 5. Provide 'big' number lines (for example, string) and place value counters, so that they can physically represent the problems.

DEEPEN Deepen learning by asking children to reason about how they could spot where there will be an exchange without doing a calculation. They could write a rule for this.

THINK DIFFERENTLY Question 4 promotes mastery of the lesson. Children will need to find the missing numbers, which is particularly challenging when there is an exchange needed. Encourage children to reason what each number must be (use place value apparatus for those who require it).

ASSESSMENT CHECKPOINT Question 4 will give you an indication of which children have mastered the lesson. To assess further, ask children to talk you through their answers.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



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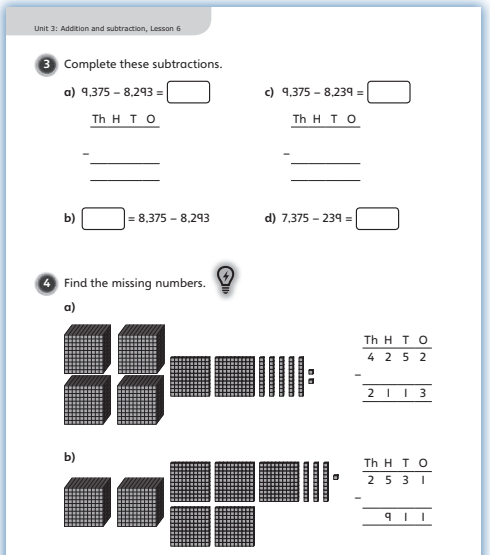


PUPIL PRACTICE BOOK 4A PAGE 80

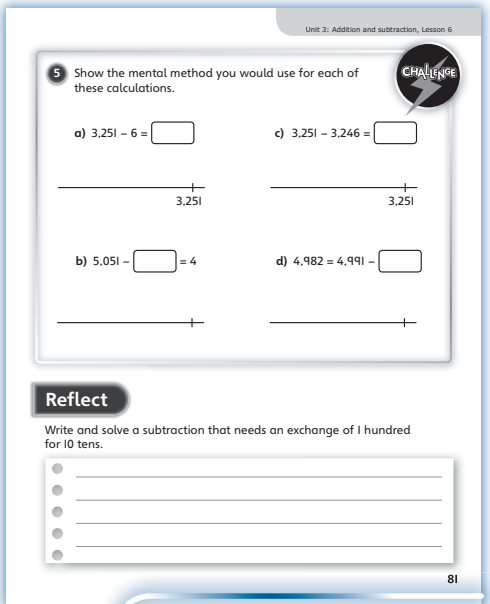
Reflect

WAYS OF WORKING Independent thinking

IN FOCUS For this exercise, put some key vocabulary on the board to support reasoning: subtraction, subtract, exchange, tens, hundreds.

ASSESSMENT CHECKPOINT Listen carefully to children's explanations. Have they identified the correct columns where the exchange is needed? Are they using correct vocabulary? Can they explain why an exchange is needed?

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 81

After the lesson

- Are any children still making the same mistakes that they were at the start of the lesson?
- How will you tackle these misconceptions?
- Which children mastered the lesson?

Subtracting two 4-digit numbers 3

Learning focus

In this lesson children will subtract 4-digit numbers using the column method where more than one exchange is required.

Small steps

- Previous step: Subtracting two 4-digit numbers (2)
- **This step: Subtracting two 4-digit numbers (3)**
- Next step: Subtracting two 4-digit numbers (4)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

ASSESSING MASTERY

Children can use the column method for subtraction calculations where more than one exchange is required and can explain their answers and also check them (either with another strategy or by doing the inverse operation). Children can identify subtractions in which a mental method would be more efficient than the column method.

COMMON MISCONCEPTIONS

Children may forget to do one of the exchanges or may subtract the whole from the part. Ask:

- *How many exchanges were in that calculation?*

STRENGTHENING UNDERSTANDING

Keep reinforcing the place value involved in an exchange so that children learn the method and also the reasoning behind it. Continue to run quick interventions where children practice subtractions with exchanges.

GOING DEEPER

Deepen learning in this lesson by providing children with more opportunities to solve word problems that involve subtractions with more than one exchange.

KEY LANGUAGE

In lesson: difference, more, fewer, subtraction, exchange

Other language to be used by the teacher: place value, digits, thousands (1,000s), hundreds (100s), tens (10s), ones (1s), whole, part

STRUCTURES AND REPRESENTATIONS

place value grid, bar model

RESOURCES

Mandatory: base 10 equipment, place value counters

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How can you use the bar model to represent subtractions in this lesson?
- Would some children benefit from having place value counters that they can physically move to represent an exchange?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *Can you tell me the number sentence you have to work out?*
- Question 1 a): *Could you explain your method to a friend?*

IN FOCUS In question 1 a), children are asked to work out a 4-digit number minus a 3-digit number with two exchanges. Focus their learning by asking them how many exchanges there are, and how they know this. Some children will rely on jotting down the column method; others will be able to spot the exchanges from their knowledge of number bonds.

PRACTICAL TIPS Ask children to make place value counters from paper or cardboard that they can physically move to represent multiple exchanges.

ANSWERS

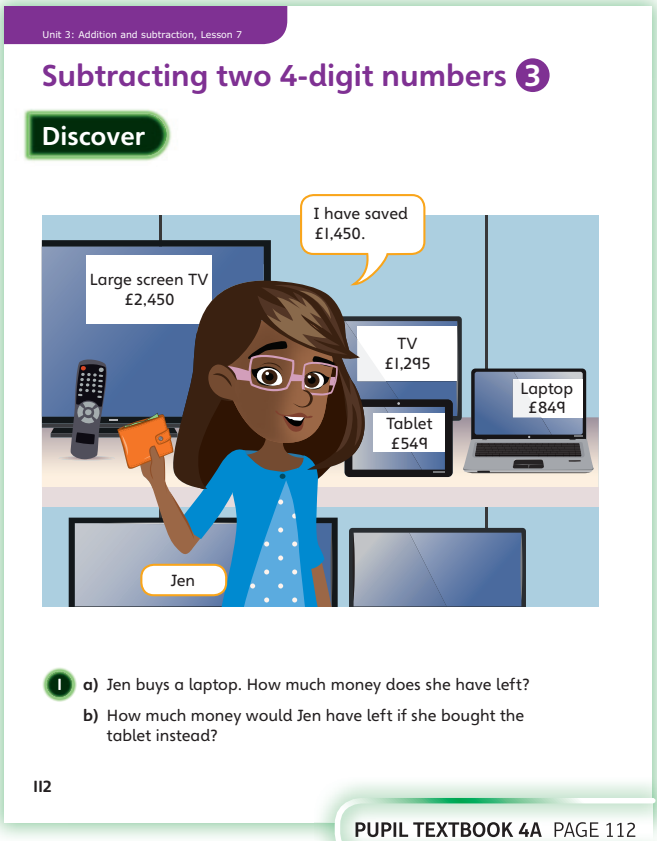
Question 1 a): 1,450 – 849 = 601

Jen has £601 left.

Question 1 b): 849 – 549 = 300; 601 + 300 = 901

Alternatively, children may work out 1,450 – 549 = 901

Jen would have £901 left.



PUPIL TEXTBOOK 4A PAGE 112

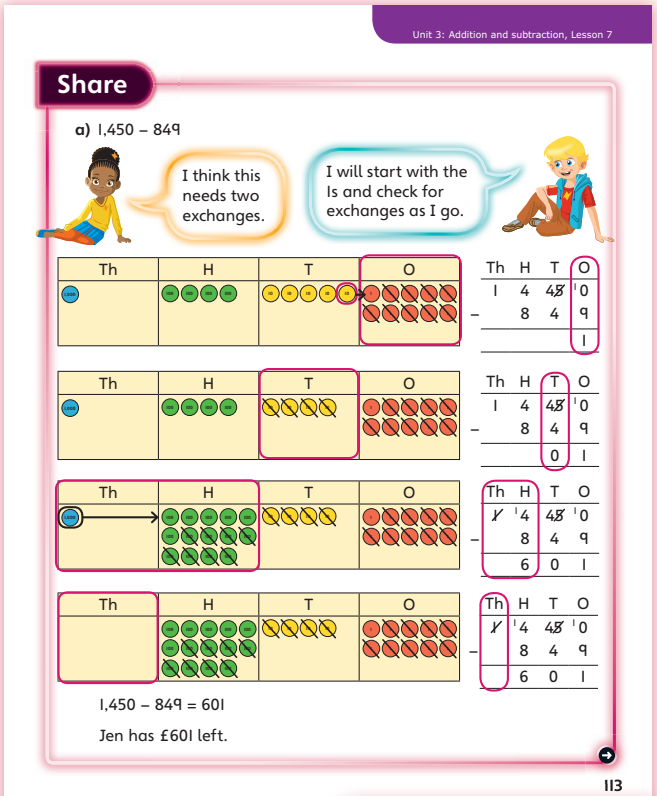
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 b): *How can part a) help you with this?*
- Question 1 b): *What does the bar model show you?*

IN FOCUS For question 1 b), focus on the bar model. Show children how they can use the information from question 1 a) to help work it out. Consider highlighting the fact that the difference between 849 and 549 is 300.



PUPIL TEXTBOOK 4A PAGE 113

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 1: *What does 'difference' mean?*
- Question 1: *How can you represent a difference?*
- Question 2: *How are subtraction and addition linked?*

IN FOCUS In question 1 the word 'difference' is in the word problem. Draw out what this term means. Stand next to a child and ask what the difference in heights is. Establish that we will need a subtraction to work it out. In question 3 children may agree that only one exchange is needed as the digits in the hundreds and the tens columns of the part are not greater than the digits of the whole. Support them in seeing that once an exchange has been done from the tens to the ones, the tens whole digit will now be smaller than the tens part digit, and so a second exchange, from hundreds to tens, will be needed.

STRENGTHEN Question 2 links subtraction and addition. Provide children with more subtractions to represent using a bar model. After this, challenge them to tell you the associated addition.

DEEPEN Deepen learning by asking children to think of mental strategies for the subtractions in this section. For example, in question 2, children may suggest finding the difference by counting on in jumps from 1,880 to 2,450.

ASSESSMENT CHECKPOINT Assess children's learning by looking at their answers to question 3. Children are likely to have mastered the lesson if they can solve the calculation and reason that one exchange caused another exchange to occur.

ANSWERS

Question 1: 2,450 – 1,295 = 1,155

The difference in price between the two televisions is £1,155.

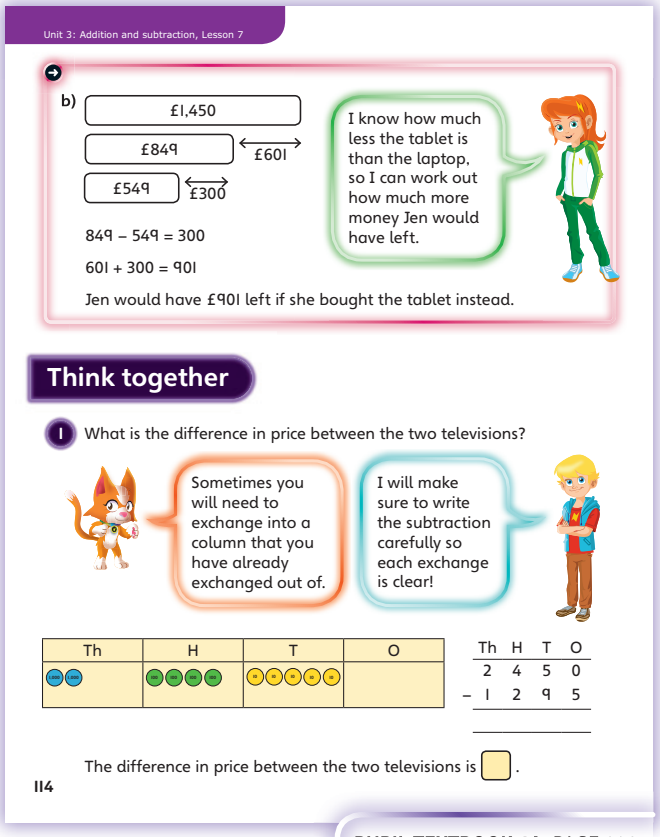
Question 2: 2,450 – 1,880 = 570

Luke needs to save £570 more.

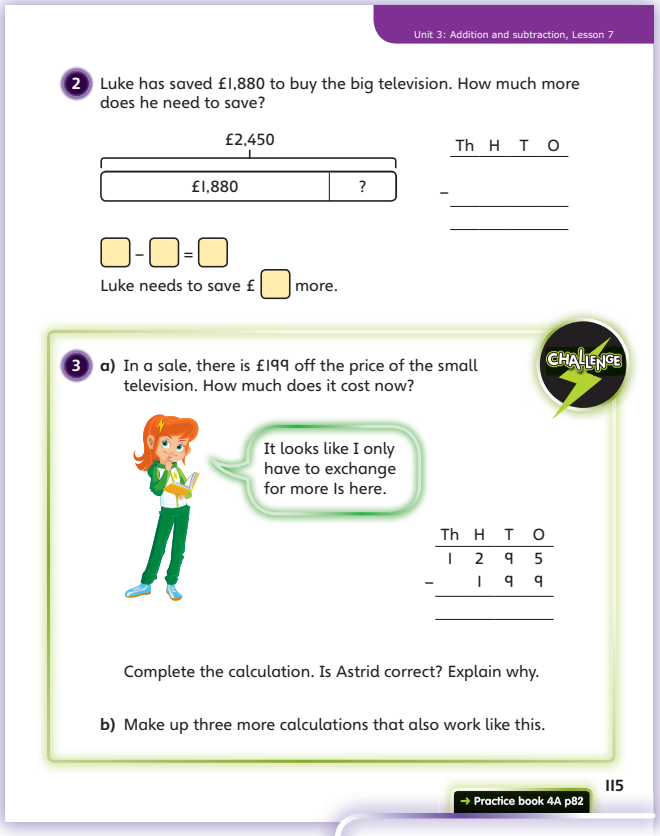
Question 3 a): 1,295 – 199 = 1,096

Astrid is not correct. The first exchange caused another exchange to occur.

Question 3 b): Answers will vary. Calculations should involve an exchange of a 10 for 1s that causes another exchange, of a 100 for 10s, to occur.



PUPIL TEXTBOOK 4A PAGE 114



PUPIL TEXTBOOK 4A PAGE 115

Practice

WAYS OF WORKING Independent thinking

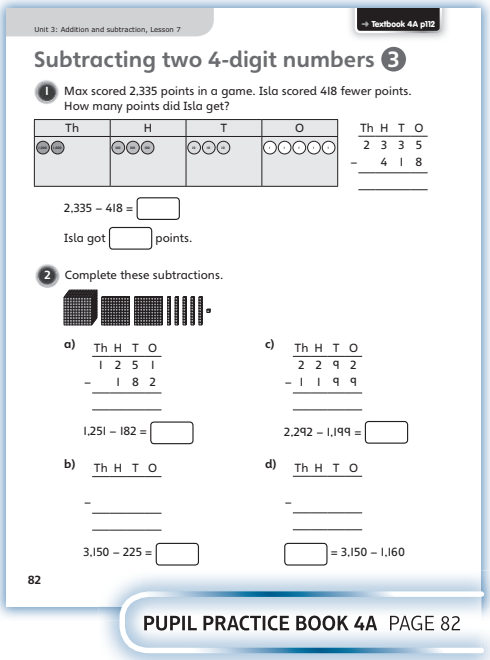
IN FOCUS Question 4 provides a real challenge and will consolidate learning. Look at the third subtraction, in which some of the digits are missing. If children are struggling to get started, ask them what numbers could not go in, to focus their thinking.

STRENGTHEN Question 3 involves using an understanding of place value and prior knowledge of another calculation to work out a calculation. Run some quick intervention with similar problems; for example:
If 6,785 – 238 = 6,547, what is 7,785 – 238, 5,785 – 238, 6,885 – 238, 6,685 – 238, 785 – 238? Linking facts like this creates deep connections that strengthen learning.

DEEPEN Ask children to make up some of their own word problems that involve multiple exchanges.

ASSESSMENT CHECKPOINT Question 6 will allow you to assess which children have mastered the lesson. Look carefully at their reasoning. Have they linked the solution to subtraction?

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Unit 3: Addition and subtraction, Lesson 7

→ Textbook 4A p112

Subtracting two 4-digit numbers 3

1 Max scored 2,335 points in a game. Isla scored 418 fewer points. How many points did Isla get?

Th | H | T | O

Th H T O
2 3 3 5
– 4 1 8

2,335 – 418 = ☐

Isla got ☐ points.

2 Complete these subtractions.

a) Th H T O
1 2 5 1
– 1 8 2

1,251 – 182 = ☐

c) Th H T O
2 2 9 2
– 1 1 9 9

2,292 – 1,199 = ☐

b) Th H T O

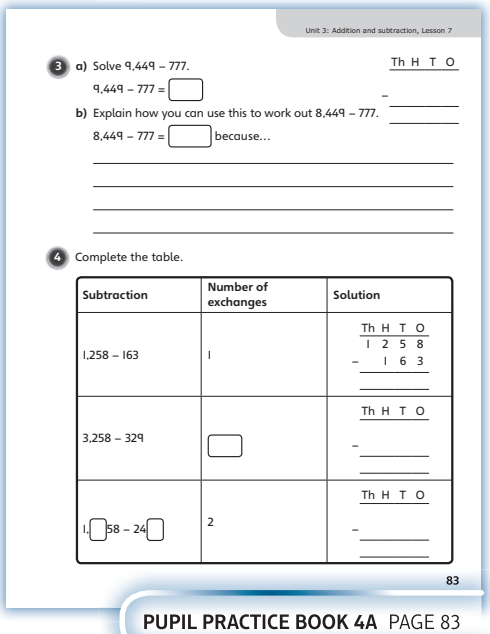
3,150 – 225 = ☐

d) Th H T O

☐ = 3,150 – 1,160

82

PUPIL PRACTICE BOOK 4A PAGE 82


Unit 3: Addition and subtraction, Lesson 7

3 a) Solve 9,449 – 777.

9,449 – 777 = ☐

Th H T O
–

b) Explain how you can use this to work out 8,449 – 777.

8,449 – 777 = ☐ because...

4 Complete the table.

Subtraction	Number of exchanges	Solution
1,258 – 163	1	Th H T O 1 2 5 8 – 1 6 3
3,258 – 329	☐	Th H T O –
1☐58 – 24☐	2	Th H T O –

83

PUPIL PRACTICE BOOK 4A PAGE 83

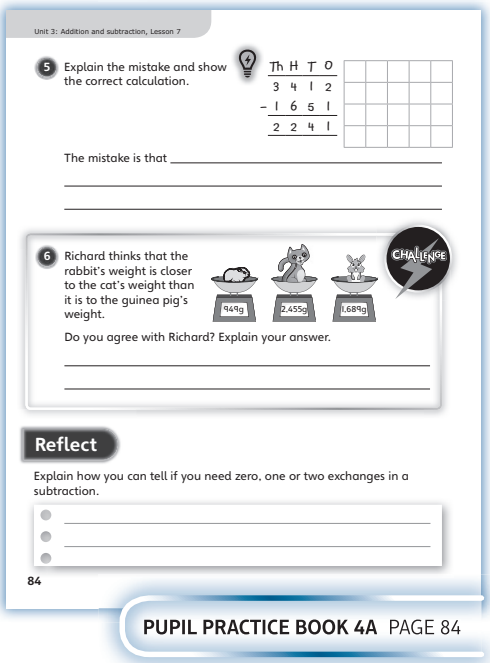
Reflect

WAYS OF WORKING Independent thinking

IN FOCUS This will help you to check children's understanding of the lesson. Some may mention earlier learning from question 3 of the **Think together** section, reasoning that one exchange can sometimes cause another exchange to occur.

ASSESSMENT CHECKPOINT Assess children on the vocabulary they use and the conciseness and clarity of their explanation.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Unit 3: Addition and subtraction, Lesson 7

5 Explain the mistake and show the correct calculation.

Th H T O
3 4 1 2
– 1 6 5 1
2 2 4 1

The mistake is that ☐

6 Richard thinks that the rabbit's weight is closer to the cat's weight than it is to the guinea pig's weight.

CHALLENGE

Do you agree with Richard? Explain your answer.

Reflect

Explain how you can tell if you need zero, one or two exchanges in a subtraction.

84

PUPIL PRACTICE BOOK 4A PAGE 84

After the lesson

- Can all children now use the column method?
- Can all children now exchange?
- Are children reasoning well?

Subtracting two 4-digit numbers 4

Learning focus

In this lesson children will subtract 4-digit numbers using the column method with exchanges, when there is a zero in the column to be exchanged from.

Small steps

- Previous step: Subtracting two 4-digit numbers (3)
- **This step: Subtracting two 4-digit numbers (4)**
- Next step: Equivalent difference

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.

ASSESSING MASTERY

Children can understand what to do when there is a zero is in the column in which an exchange is required; they can talk through their methods, demonstrating a clear understanding of place value. Children can also show their subtractions on a part-whole model.

COMMON MISCONCEPTIONS

When children see that there is a 0 in the next column, they may not change the 0 but still exchange '1' from it anyway. Ask:

- *What should you do if there is a 0 in the column you need for an exchange?*

Children may think that 0 minus a number is either 0 or the number itself, for example, 0 – 2 = 0 or 0 – 2 = 2. Ask:

- *Can you draw 0 – 2? Is the answer 2?*

STRENGTHENING UNDERSTANDING

Run a quick intervention in which children practise doing subtractions with a 0 in the column that is required for an exchange, for example 1,001 – 342. Encourage children to work through each step methodically.

GOING DEEPER

Deepen learning in this lesson by providing children with subtractions that have exchange mistakes in them. Can children spot the mistakes and reason why they may have been made?

KEY LANGUAGE

In lesson: subtraction, exchange, ones (1s), tens (10s), hundreds (100s), column, zero, place value, partition

Other language to be used by the teacher: thousands (1,000s), whole, part

STRUCTURES AND REPRESENTATIONS

place value grid, bar model, part-whole model

RESOURCES

Mandatory: base 10 equipment, place value counters

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How will you explain what to do if there is a 0 in a column required for an exchange?
- Are all children ready for this lesson? Did they master the previous lesson?
- How will you support those children who did not?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *Could Bella look at the next column?*
- Question 1 a): *How could the hundreds column help with the exchange?*

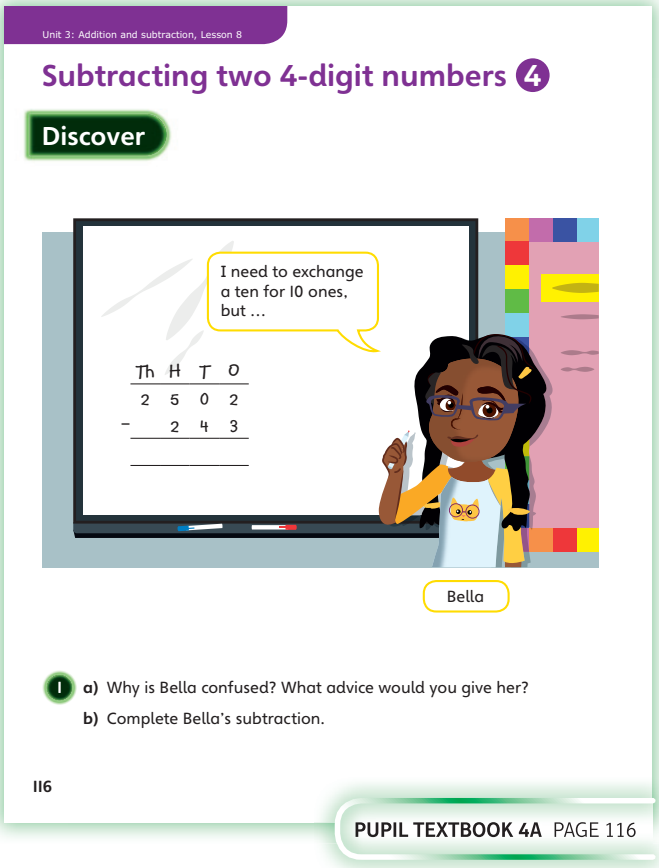
IN FOCUS Children are exploring what happens when an exchange is needed but there is a 0 in the next column. Listen carefully to what they think they should do, prompting them to look at the next column if necessary.

PRACTICAL TIPS Use place value counters to make numbers with 0 in some columns. Discuss what will happen if we try to subtract from a column where there are no counters, and model exchanging from the next column.

ANSWERS

Question 1 a): Bella wants to exchange a ten for 10 ones, but she cannot because there is a zero in the tens column. First, Bella should exchange 1 hundred for 10 tens. Then she can exchange 1 ten for 10 ones.

Question 1 b): 2,502 – 243 = 2,259



PUPIL TEXTBOOK 4A PAGE 116

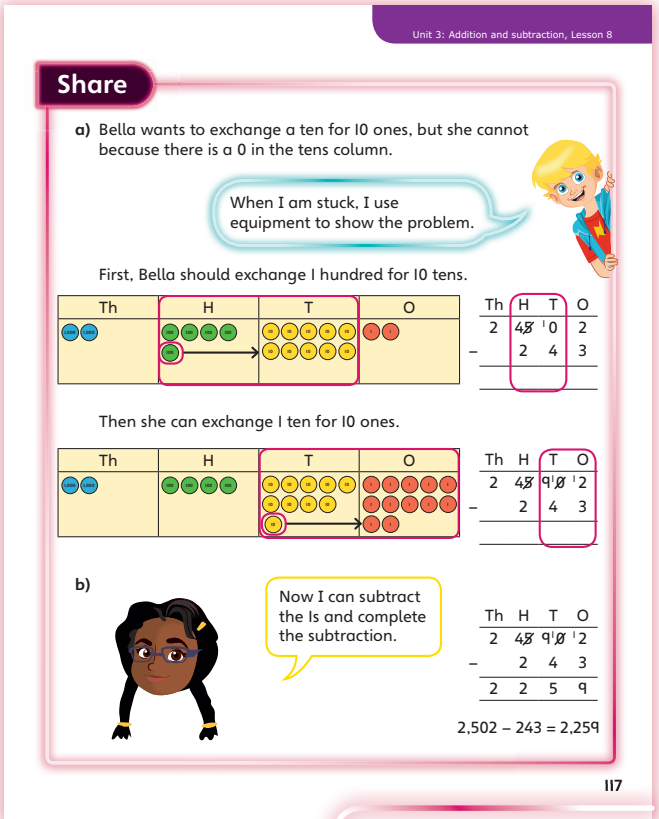
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 b): *Do you understand how the exchange can be made with the hundreds?*
- Question 1 b): *What steps do you need to take when there is a 0 in the column you need for an exchange?*

IN FOCUS For question 1 b), model the subtraction in the column method format. Show children the importance of the layout, how to strike through the numbers being exchanged, and how to put a small 1 for the exchanged number.



PUPIL TEXTBOOK 4A PAGE 117

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 3: *Can you use the words 'exchange', 'hundreds' and 'ones' in your explanation?*
- Question 4: *What do you do when there is a 0 in the tens column and the hundreds column?*
- Question 4: *How can you predict the exchange?*

IN FOCUS In question 4, children are faced with 5,005 – 2,929. They will see that there is a 0 in the tens column and in the hundreds column. Explain that children should follow the same method they previously learnt, working back from the thousands column. Model an example on the board.

STRENGTHEN Question 2 requires children to exchange from the hundreds and the tens in order to subtract in the ones column. Ask them to carefully describe each step aloud as they do it, to clarify what is needed. For example, *I need to exchange 1 ten but there are none. I can take 1 hundred from the hundreds column, that is 10 tens.*

DEEPEN Question 4 links to previous work on subtracting by using knowledge of place value. Children should be able to spot the links between the calculations: for example, the hundreds and tens digits are switched in 5,055 – 2,929 and 5,505 – 2,929.

ASSESSMENT CHECKPOINT Question 3 will show you which children are confident with subtracting when there are zeros in columns that require exchanges. Listen carefully to their explanations of where Zac went wrong, and then assess their corrected answer.

ANSWERS

Question 1: 2,032 – 512 = 1,520

Question 2: 5,403 – 505 = 4,898

Question 3: Zac forgot to exchange 1 hundred for 10 tens, and 1 ten for 10 ones.

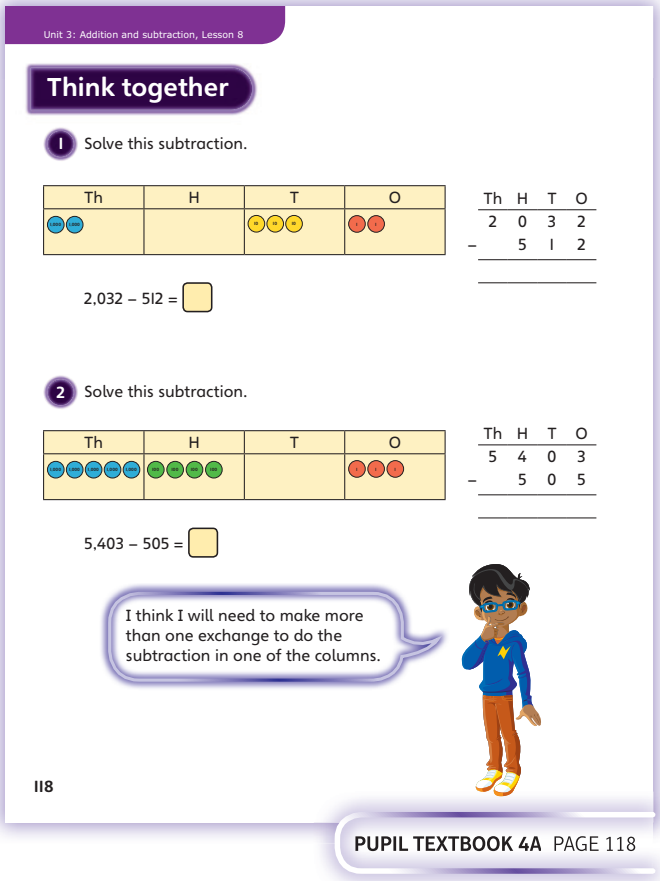
3,304 – 1,269 = 2,035

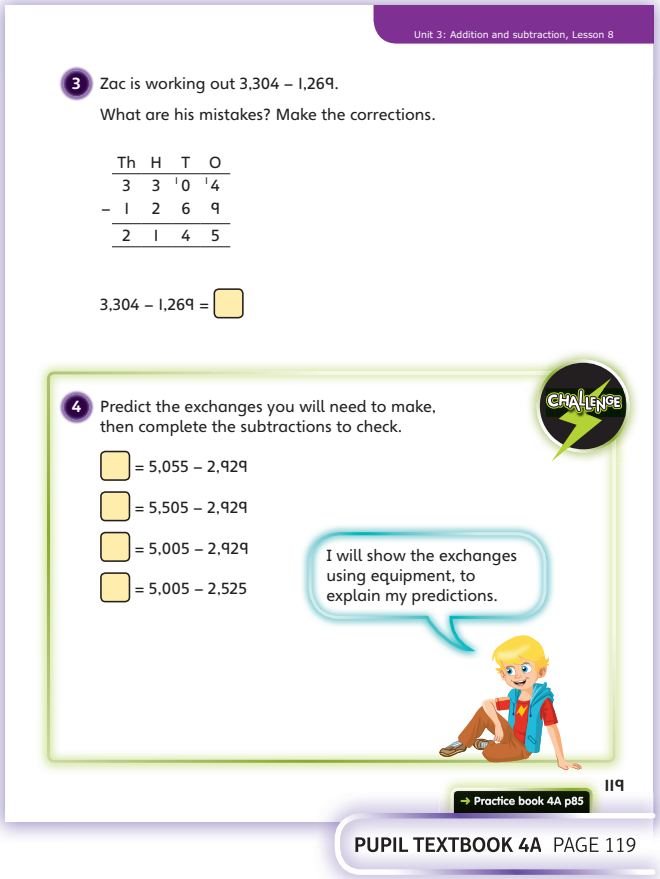
Question 4: 1 thousand for 10 hundreds:
2,126 = 5,055 – 2,929

1 hundred for 10 tens: 2,576 = 5,505 – 2,929

1 thousand for 10 hundreds; 1 hundred for 10 tens: 2,076 = 5,005 – 2,929

1 thousand for 10 hundreds; 1 hundred for 10 tens: 2,480 = 5,005 – 2,525





Practice

WAYS OF WORKING Pair work

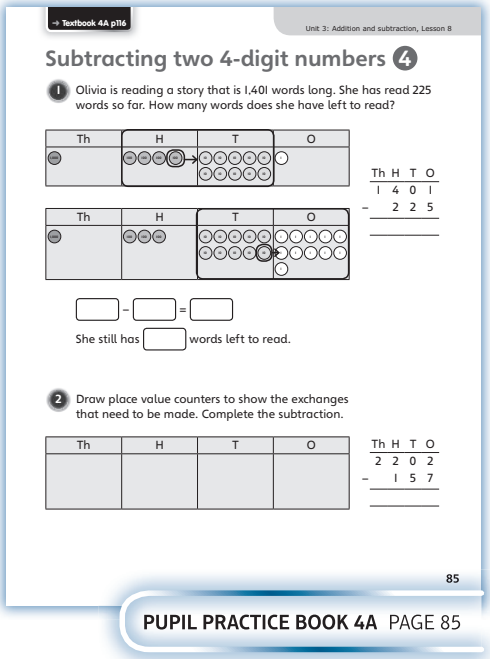
IN FOCUS Question 4 a) has the numbers missing from the column subtraction. This will focus children's thinking and help them to make the link between place value, partitioning and exchanging.

STRENGTHEN Question 2 requires children to show workings using place value counters. As children draw counters into the grids, encourage them to also use and move place value counters in real life, to model each step and consolidate what happens each time you make an exchange, particularly where there is a 0 in one or more columns.

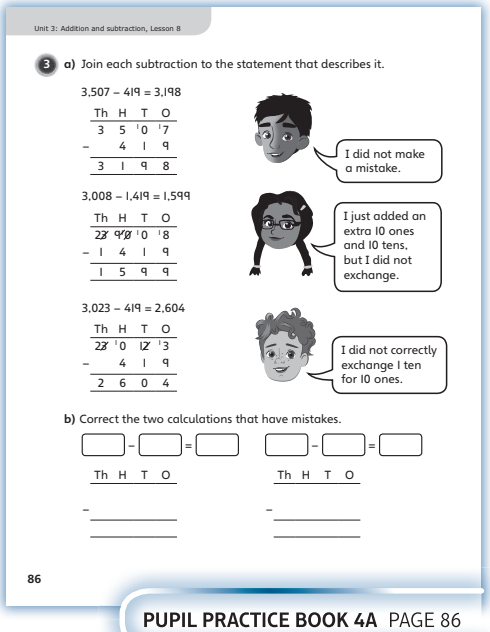
DEEPEN Question 1 provides a subtraction in the context of words and reading. Provide more examples of story problems with real-life contexts like this, in particular problems with multiple steps which will deepen learning even further.

ASSESSMENT CHECKPOINT Question 4 b) will allow you to assess which children can solve a subtraction in which there is a 0 in one of the columns required for an exchange. It will also let you see which children can represent their workings on a part-whole model, which will show you that they have a strong knowledge of place value.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 85



PUPIL PRACTICE BOOK 4A PAGE 86

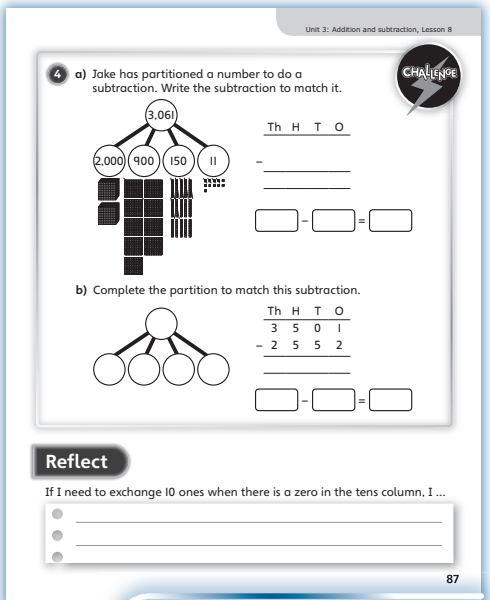
Reflect

WAYS OF WORKING Pair work

IN FOCUS Consider having a list of key vocabulary on the board or learning wall to support children's explanations.

ASSESSMENT CHECKPOINT Assess children on whether they can correctly explain their methodology, for example: *If I need to exchange 10 ones, when there is a 0 in the tens column, I must first exchange 1 hundred for 10 tens, then exchange 1 ten for 10 ones.*

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 87

After the lesson

- Can all children explain how to exchange when there is a zero in a column required for the exchange?
- Are children ready to start exploring efficient methods of subtraction?
- Should you run some intervention sessions?

Equivalent difference

Learning focus

In this lesson children will learn the equivalent difference method of subtraction.

Small steps

- Previous step: Subtracting two 4-digit numbers (4)
- **This step: Equivalent difference**
- Next step: Estimating answers to additions and subtractions

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Estimate and use inverse operations to check answers to a calculation.

Year 4 Number – Number and place value

Round any number to the nearest 10, 100 or 1,000.

ASSESSING MASTERY

Children understand the equivalent difference strategy and can apply it when solving problems. Children can explain the method correctly and suggest why it is more efficient than the column method (or a mental method).

COMMON MISCONCEPTIONS

Children often do not understand the reasoning behind equivalent difference, that you can adjust the two numbers in a subtraction so that the difference remains the same. With the subtraction 232 – 98, they may know that it is easier to subtract 100 and that they will need to adjust 232 accordingly, but they are not sure whether it should be 230 – 100 or 234 – 100. Ask:

- *Can you show the equivalent difference on a bar model?*

STRENGTHENING UNDERSTANDING

For children who need more support, use a bar model to represent subtractions, drawing attention to equivalent differences. Ask children to draw their own bar models to represent each problem.

GOING DEEPER

Deepen learning in this lesson by asking children to think of more than one strategy that they can use to solve a subtraction, for example equivalent difference, column method and counting on to find the difference. Ask them to reason which method is the most efficient.

KEY LANGUAGE

In lesson: difference, subtraction, exchange, bar model, method, **efficient**, column, equivalent

Other language to be used by the teacher: place value, digits, thousands (1,000s), hundreds (100s), tens (10s), ones (1s), fewer

STRUCTURES AND REPRESENTATIONS

bar model

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- Do children know what 'equivalent' means?
- How will you explain it?
- Are children comfortable with using the bar model to represent differences?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 b): *How can you work out the difference?*
- Question 1 b): *Can you spot the related calculations that do not require an exchange?*

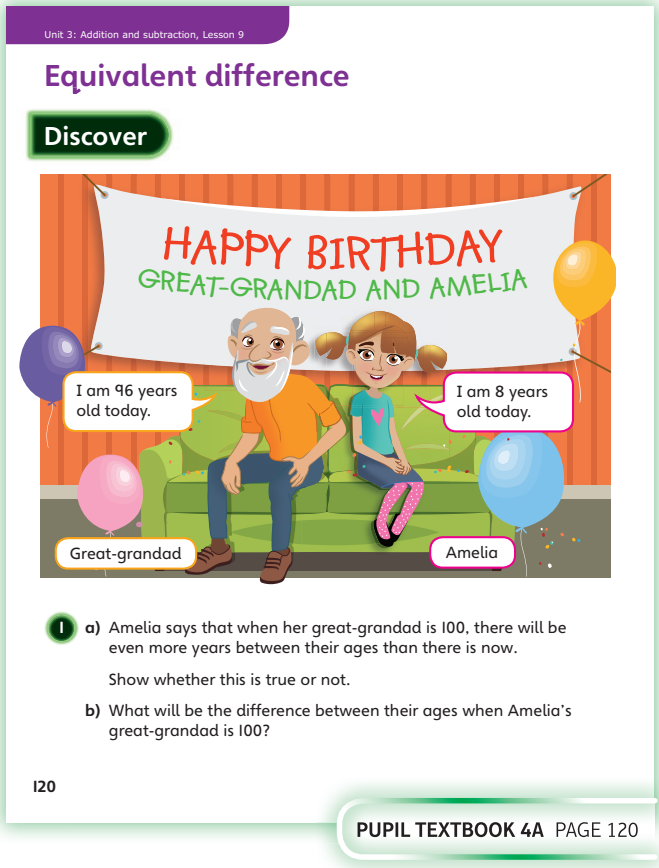
IN FOCUS In question 1 b), children should explore an efficient method to work out the subtraction. If necessary, draw their attention to the calculations that do not require an exchange.

PRACTICAL TIPS Discuss the context of the question and consider comparing the age of a real person, perhaps a singer or celebrity, with children's ages. This will make the learning more real, and will spark enthusiasm for real-life applications of the topic.

ANSWERS

Question 1 a): Amelia's statement is not true. The difference between Amelia's age and her great-grandad's age will always be the same. Children may use a variety of methods to show this. Accept any that show that the difference will not change.

Question 1 b): The difference between their ages will be 88 years.



PUPIL TEXTBOOK 4A PAGE 120

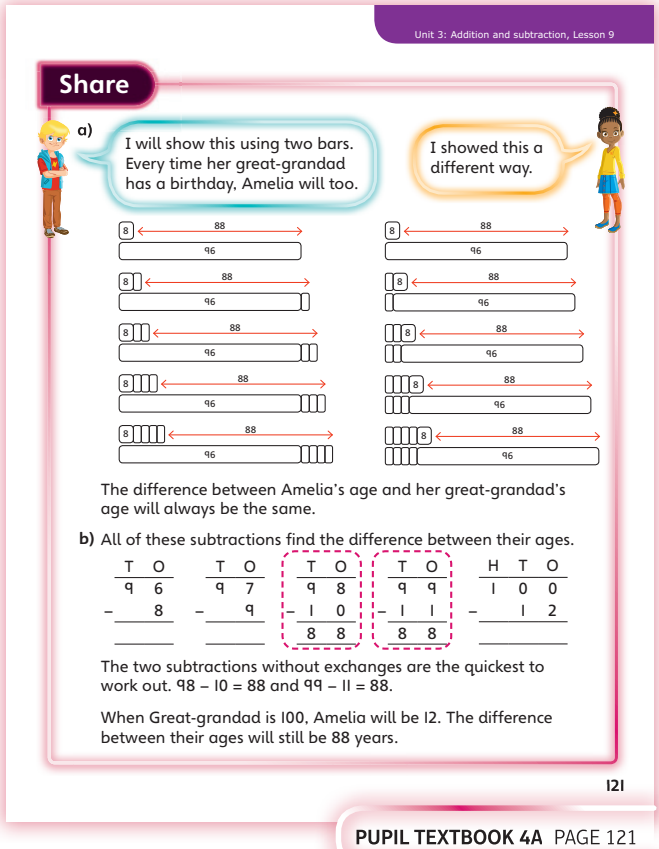
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 a): *What do you notice about the difference when both of the ages increase?*
- Question 1 b): *Which subtractions are the easiest to calculate mentally?*

IN FOCUS For question 1 a), make it clear that if we increase each number by the same amount, the difference will not change.



PUPIL TEXTBOOK 4A PAGE 121

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 2: *Why did you choose that calculation to find the difference?*
- Question 3 b): *Which methods can you remember from things you have learnt before?*
- Question 3 b): *Which methods were the most efficient?*

IN FOCUS In question 2, children should realise that two subtractions do not involve an exchange (128 – 100 and 129 –101). Then they should reason that 128 – 100 is easier to work out as they are simply subtracting 100.

STRENGTHEN Run a quick intervention for children to practise solving more subtractions where they can use equivalent difference to get to a multiple of 100 or 10, which will be more efficient, for example 154 – 97, 222 – 198, 100 – 58.

DEEPEN Children can use question 3 to explore different strategies for working out subtractions. Encourage them to evaluate each subtraction and consider which would be the most efficient method each time.

ASSESSMENT CHECKPOINT Question 3 b) will give you an insight into which children have mastered the equivalent difference method. It will also tell you if children can apply other learnt strategies to subtractions, based on which method is more efficient.

ANSWERS

Question 1: 198 – 79 = 119

199 – 80 = 119

200 – 81 = 119

The difference is 119 years.

Question 2: 125 – 97 = 28

126 – 98 = 28

127 – 99 = 28

128 – 100 = 28

129 – 101 = 28

The whale is 28 years younger than the giant tortoise.

Question 3 a): 1,000 – 245 = 755

Astrid's method is more efficient because no exchanges are needed.

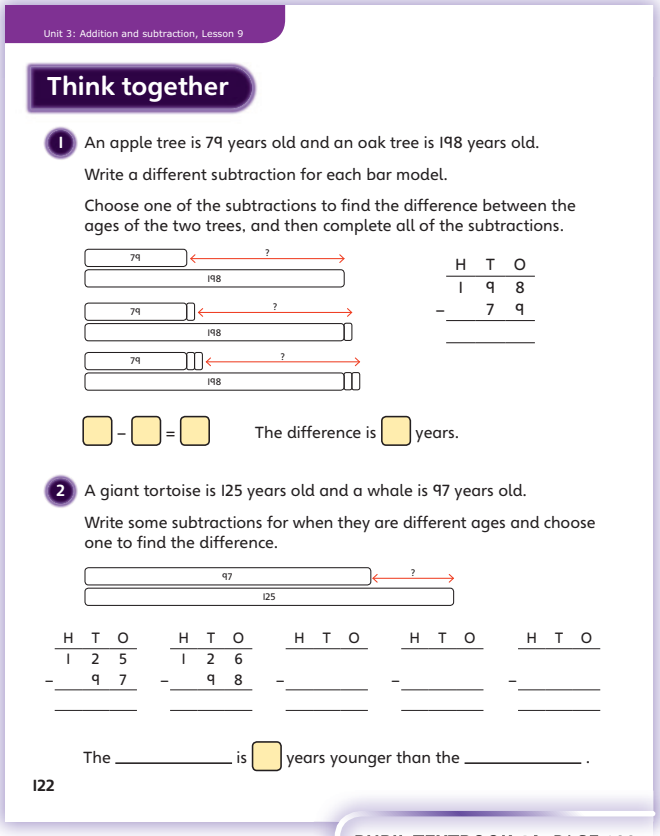
Question 3 b): 1,000 – 542 = 458

2,692 – 836 = 1,856

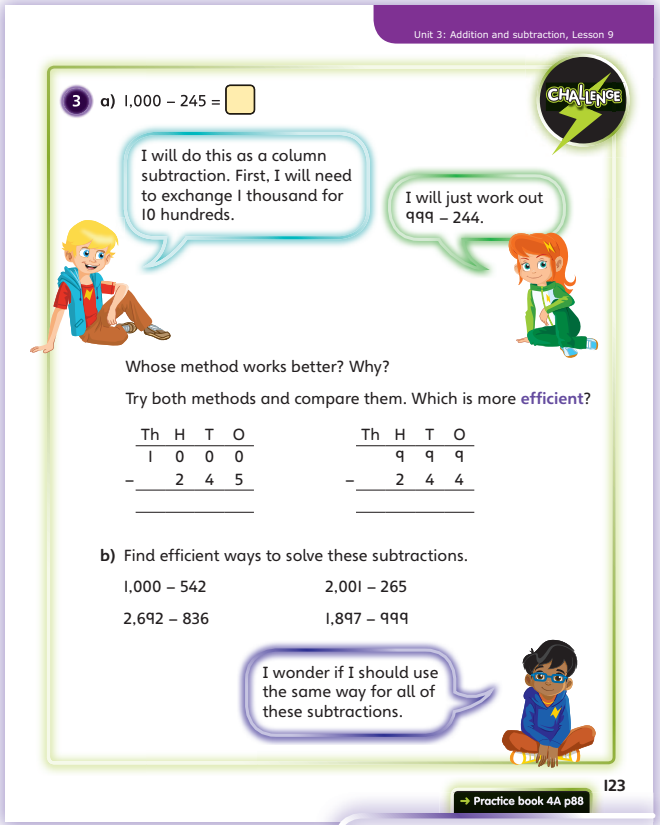
2,001 – 265 = 1,736

1,897 – 999 = 898

Check for a range of strategies being used, for example, equivalent difference, column method, counting on to find the difference (number line), counting back (number line), expanded method.



PUPIL TEXTBOOK 4A PAGE 122



PUPIL TEXTBOOK 4A PAGE 123

Practice

WAYS OF WORKING Independent thinking

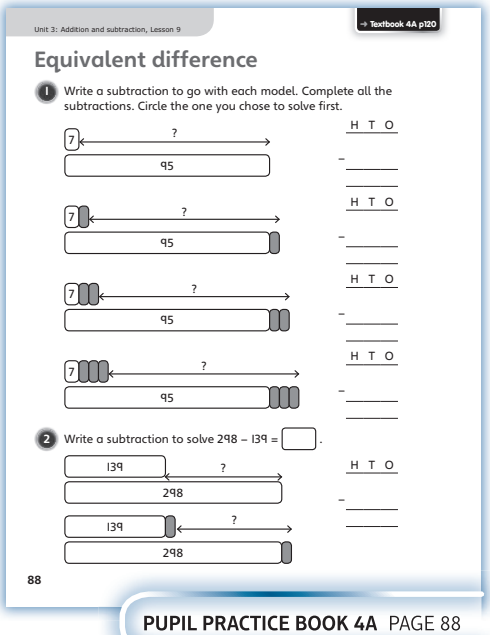
IN FOCUS Question 5 is an open question in which children can choose from a range of methods that they know, identifying the most efficient. When they have finished, ask them to compare their chosen strategies with a partner. Encourage them to use correct vocabulary in their discussion.

STRENGTHEN Encourage children to show each of their methods using a representation such as a bar model or a number line.

DEEPEN Focus on question 1. Ask children if they can think of a subtraction for which it would not be a good idea to use equivalent difference.

ASSESSMENT CHECKPOINT Question 1 will allow you to assess which children can find equivalent subtractions and select the most efficient one. Question 4 b) will allow you to assess children's reasoning skills around this method. If they are correct, then it is likely that they have achieved mastery of this lesson.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



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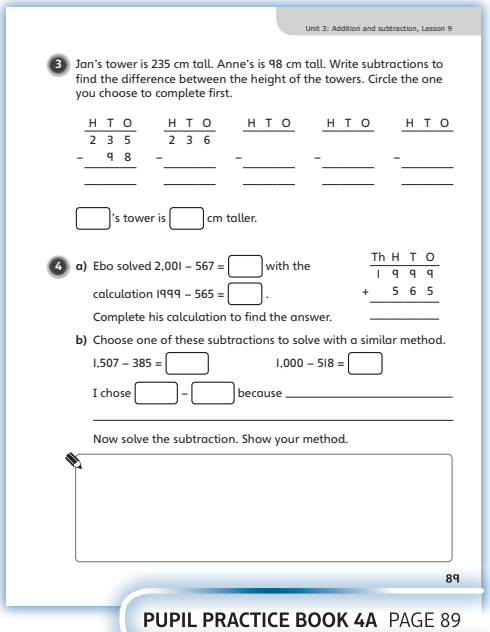


PUPIL PRACTICE BOOK 4A PAGE 89

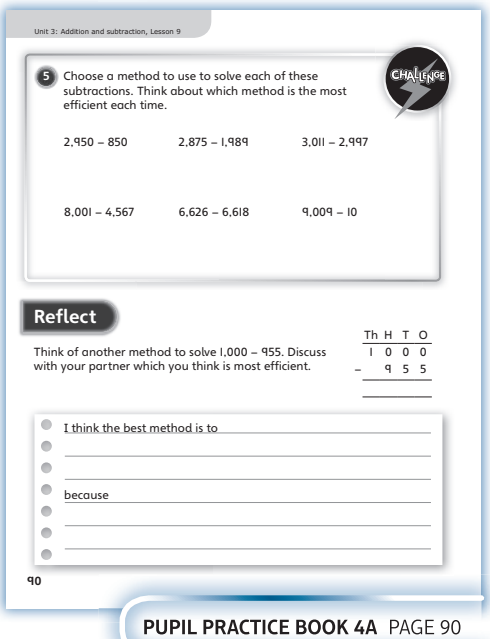
Reflect

WAYS OF WORKING Pair work

IN FOCUS For this question, children should reason that the column method would require three exchanges, so it is not a very efficient strategy for this subtraction. Children may instead opt to use equivalent difference or counting on from 955 to 1,000 to find the difference.

ASSESSMENT CHECKPOINT This exercise will allow you to assess whether children understand that different methods are more suitable for different subtractions. Their reasoning will let you know if they understand why this is the case.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 90

After the lesson

- Do all children understand equivalent difference?
- Can children visually represent equivalent difference?
- Do you need to run intervention sessions for any children?

Estimating answers to additions and subtractions

Learning focus

In this lesson children will learn to make choices about whether to round to the nearest 10, 100 or 1,000 and how to use that to decide if a calculation is accurate.

Small steps

- Previous step: Equivalent difference
- **This step: Estimating answers to additions and subtractions**
- Next step: Checking strategies

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Estimate and use inverse operations to check answers to a calculation.

Year 4 Number – Number and place value

Round any number to the nearest 10, 100 or 1,000.

ASSESSING MASTERY

Children can round the numbers in additions and subtractions up or down to the nearest 10, 100 or 1,000 as appropriate and can use this to make estimates and find rough answers. They can compare their estimates to the exact answers and use this to check answers.

COMMON MISCONCEPTIONS

Children may not know whether to round a number to the nearest 10, 100 or 1,000. Ask:

- *How accurate do you need to be? Can you work that out mentally?*

STRENGTHENING UNDERSTANDING

If children are finding rounding difficult, you may need to run some intervention for them to practise this important skill.

GOING DEEPER

This lesson shows children that sometimes it is more accurate to round only one number, to retain better accuracy. Generate discussion around this and ask children to come up with examples that demonstrate it.

KEY LANGUAGE

In lesson: **accurate,** estimate, round, roughly, **exact**, nearest, thousand, hundred, ten, one, column, subtraction, addition, check, efficient

Other language to be used by the teacher: approximately

STRUCTURES AND REPRESENTATIONS

number line

RESOURCES

Printed number lines from 1,000 to 2,000 and from 3,000 to 4,000

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- Can all children round to the nearest 10, 100, 1,000?
- Could you do a mini-assessment prior to the lesson?
- Would displaying the key vocabulary support children in this lesson?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *How can you tell the ringmistress has not made a good estimate?*
- Question 1 b): *What strategy could you use to check?*

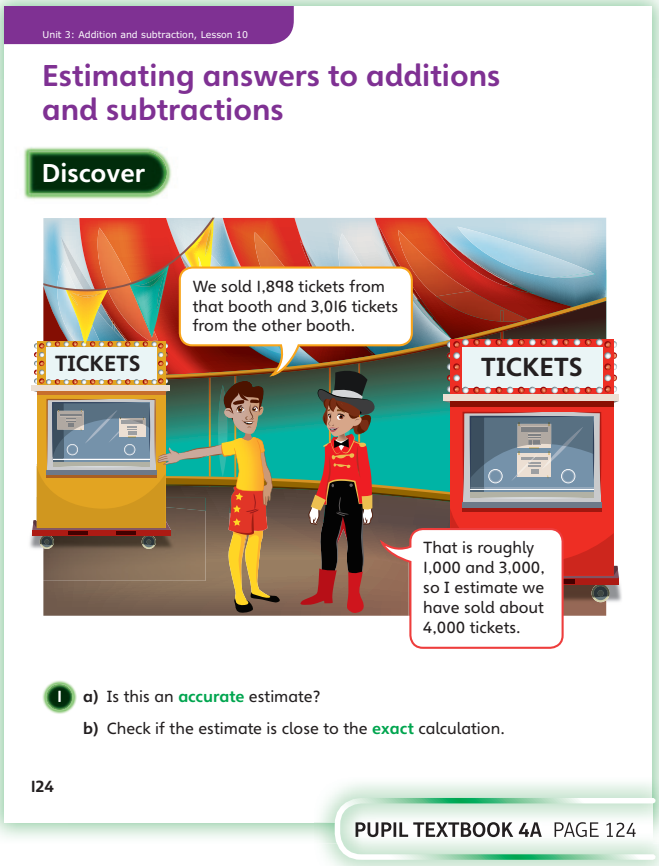
IN FOCUS The ringmistress gives an incorrect statement because she has rounded one of the amounts incorrectly. Question 1 a) provides a good learning opportunity for children to spot this. This is a good point in the lesson at which to remind children of the rules involved in rounding.

PRACTICAL TIPS Provide printed number lines from 1,000 to 2,000 and from 3,000 to 4,000 for children who need visual support with the questions.

ANSWERS

Question 1 a): This is not an accurate estimate. 1,898 is closer to 2,000 than 1,000. A better estimate would be 2,000 + 3,000 = 5,000. They have sold roughly 5,000 tickets.

Question 1 b): The exact answer is 4,914 tickets. 4,914 rounds to 5,000. 5,000 is close to the exact calculation. 4,000 is not. 5,000 is a good estimate.



PUPIL TEXTBOOK 4A PAGE 124

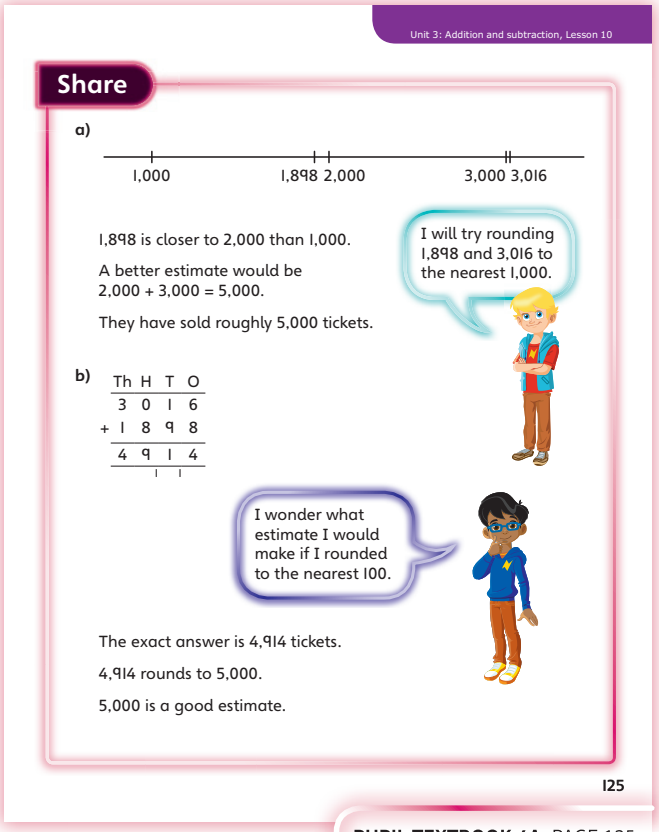
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 a): *How do the number lines help you round?*
- Question 1 b): *What would the estimate be if the ringmaster had rounded to the nearest hundred?*

IN FOCUS Question 1 a) gives a good opportunity to ask children what happens if the amount is exactly in the middle of the number line, i.e. 1,500. Recap the rule that they must always round up when that is the case. Explain that the five digits that round down are 0, 1, 2, 3, 4, and the digits that round up are 5, 6, 7, 8, 9. This makes it equal.



PUPIL TEXTBOOK 4A PAGE 125

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 2: *What is the next 1,000 after 9,000?*
- Question 3: *How close is Isla's estimate to Max's answer?*

IN FOCUS In question 2, children will need to round 9,811 to the nearest 1,000. This may confuse some children who do not see that 10,000 is the answer. Model the question on a number line to provide support, if needed.

STRENGTHEN Practise counting on and back in tens, hundreds and thousands. This will be particularly useful in question 2, when the tens of thousands barrier is crossed.

DEEPEN Question 3 deepens learning by showing that although Isla has only rounded one of the numbers, hers is the best estimate. She can subtract a thousands number which is a sensible mental method. Discuss this with children and challenge them to find other subtractions in which it would be best to round only one of the numbers.

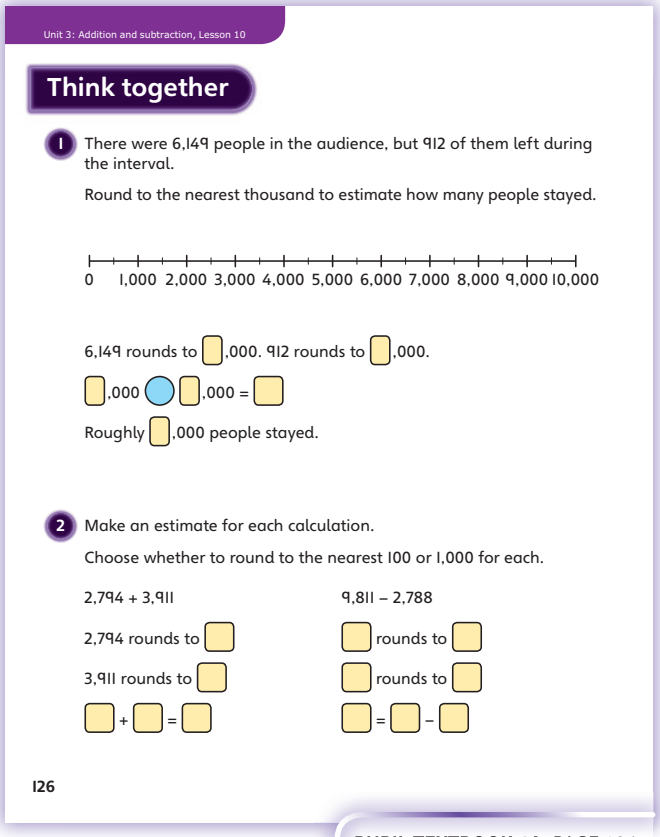
ASSESSMENT CHECKPOINT Question 2 will allow you to assess which children can round numbers and subtract them mentally to reach an estimate.

ANSWERS

Question 1: 6,149 rounds to 6,000. 912 rounds to 1,000.
6,000 – 1,000 = 5,000.
Roughly 5,000 people stayed.

Question 2: 2,794 rounds to 2,800
3,911 rounds to 3,900
2,800 + 3,900 = 6,700
9,811 rounds to 9,800
2,788 rounds to 2,800
7,000 = 9,800 - 2,800

Question 3: Children should notice that Isla's method is more accurate because it is nearer to the actual answer. Although Isla has only rounded one of the numbers, her estimate is better because when you round 5,602 to the nearest thousand, you lose quite a lot of accuracy. Doing as Isla did would have helped Max to find out whether his answer was close to the correct one.


Unit 3: Addition and subtraction, Lesson 10

Think together

1 There were 6,149 people in the audience, but 912 of them left during the interval.

Round to the nearest thousand to estimate how many people stayed.

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000

6,149 rounds to □,000. 912 rounds to □,000.

□,000 ○ □,000 = □

Roughly □,000 people stayed.

2 Make an estimate for each calculation.

Choose whether to round to the nearest 100 or 1,000 for each.

2,794 + 3,911

2,794 rounds to □

3,911 rounds to □

□ + □ = □

9,811 – 2,788

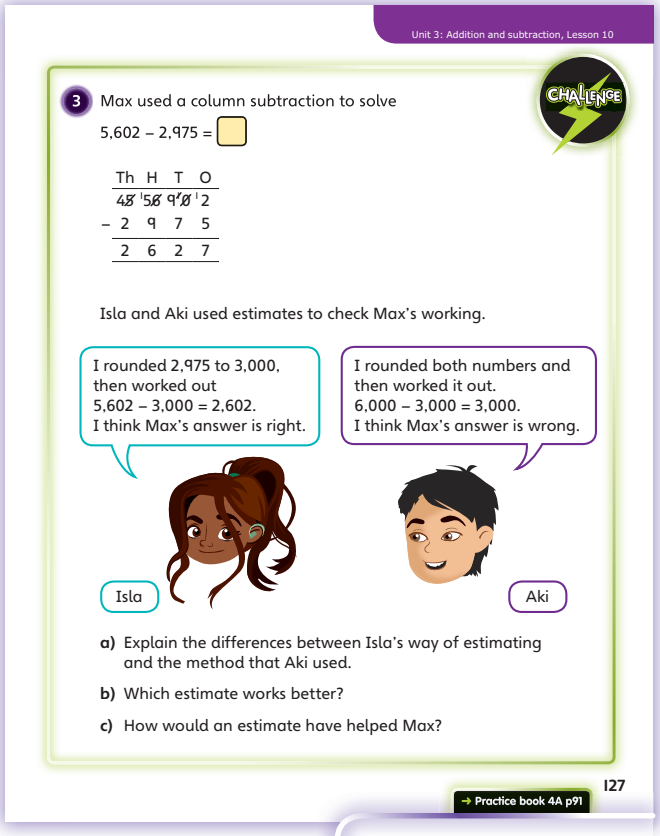
□ rounds to □

□ rounds to □

□ = □ – □

126

PUPIL TEXTBOOK 4A PAGE 126


Unit 3: Addition and subtraction, Lesson 10

CHALLENGE

3 Max used a column subtraction to solve

5,602 – 2,975 = □

	Th	H	T	O
	~~4~~	~~15~~	~~9~~	~~12~~
–	2	9	7	5
	2	6	2	7

Isla and Aki used estimates to check Max's working.

I rounded 2,975 to 3,000, then worked out 5,602 – 3,000 = 2,602. I think Max's answer is right.

I rounded both numbers and then worked it out. 6,000 – 3,000 = 3,000. I think Max's answer is wrong.

Isla

Aki

a) Explain the differences between Isla's way of estimating and the method that Aki used.

b) Which estimate works better?

c) How would an estimate have helped Max?

127

→ Practice book 4A p91

PUPIL TEXTBOOK 4A PAGE 127

Practice

WAYS OF WORKING Independent thinking

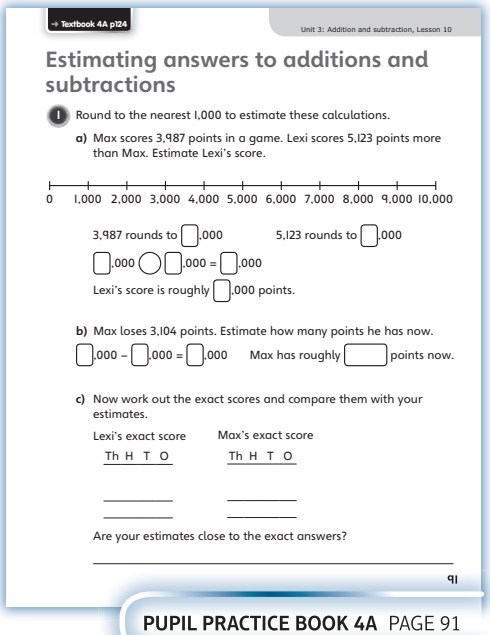
IN FOCUS In question 3, children calculate the exact answer and then use an estimate to check it. This will help them with their reasoning.

STRENGTHEN The matching exercise in question 2 will provide support for children who need it, and will allow them to focus on developing their reasoning skills.

DEEPEN Focus on question 4 and encourage discussion about rounding to different degrees of accuracy. Ask children to think of real-life situations when the degree of accuracy is important, for example estimating the rough total price of a shopping list.

ASSESSMENT CHECKPOINT Question 2 will allow you to assess which children can choose a suitable estimate. They should also be able to explain why you might sometimes round a number in the 1,000s to the nearest 100.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Textbook 4A p124

Unit 3: Addition and subtraction, Lesson 10

Estimating answers to additions and subtractions

1 Round to the nearest 1,000 to estimate these calculations.

a) Max scores 3,987 points in a game. Lexi scores 5,123 points more than Max. Estimate Lexi's score.

0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000

3,987 rounds to ☐,000 5,123 rounds to ☐,000

☐,000 ◯ ☐,000 = ☐,000

Lexi's score is roughly ☐,000 points.

b) Max loses 3,104 points. Estimate how many points he has now.

☐,000 – ☐,000 = ☐,000 Max has roughly ☐ points now.

c) Now work out the exact scores and compare them with your estimates.

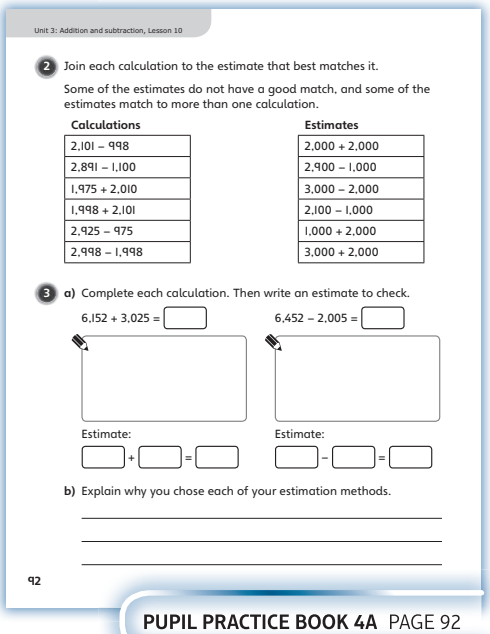
Lexi's exact score Th H T O

Max's exact score Th H T O

Are your estimates close to the exact answers?

91

PUPIL PRACTICE BOOK 4A PAGE 91


Unit 3: Addition and subtraction, Lesson 10

2 Join each calculation to the estimate that best matches it.

Some of the estimates do not have a good match, and some of the estimates match to more than one calculation.

Calculations	Estimates
2,101 – 998	2,000 + 2,000
2,891 – 1,100	2,900 – 1,000
1,975 + 2,010	3,000 – 2,000
1,998 + 2,101	2,100 – 1,000
2,925 – 975	1,000 + 2,000
2,998 – 1,998	3,000 + 2,000

3 a) Complete each calculation. Then write an estimate to check.

6,152 + 3,025 = ☐ 6,452 – 2,005 = ☐

Estimate: ☐ + ☐ = ☐ Estimate: ☐ – ☐ = ☐

b) Explain why you chose each of your estimation methods.

92

PUPIL PRACTICE BOOK 4A PAGE 92

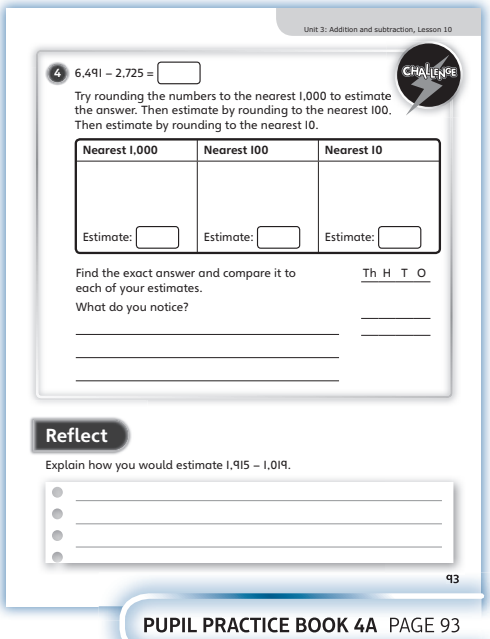
Reflect

WAYS OF WORKING Pair work

IN FOCUS For this question, some children may do 2,000 – 1,000. Others may do 1,915 – 1,000 and some others may do 2,000 – 1,019. Encourage children to share their solutions and debate which is the most useful.

ASSESSMENT CHECKPOINT This will help you to assess children's understanding of the methodology used in this lesson. Can they list the instructions in clear steps?

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Unit 3: Addition and subtraction, Lesson 10

4 6,491 – 2,725 = ☐

CHALLENGE

Try rounding the numbers to the nearest 1,000 to estimate the answer. Then estimate by rounding to the nearest 100. Then estimate by rounding to the nearest 10.

Nearest 1,000	Nearest 100	Nearest 10
Estimate: ☐	Estimate: ☐	Estimate: ☐

Find the exact answer and compare it to each of your estimates. Th H T O

What do you notice?

Reflect

Explain how you would estimate 1,915 – 1,019.

93

PUPIL PRACTICE BOOK 4A PAGE 93

After the lesson

- Can all children estimate using rounding?
- How many children achieved mastery of this lesson?
- Do children understand why we estimate answers?

Checking strategies

Learning focus

In this lesson children will learn strategies for checking answers, using the inverse operation and estimating by rounding.

Small steps

- Previous step: Estimating answers to additions and subtractions
- **This step: Checking strategies**
- Next step: Problem solving – addition and subtraction (1)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Estimate and use inverse operations to check answers to a calculation.

ASSESSING MASTERY

Children can complete a calculation and then use the inverse operation to check their answer. They can spot mistakes and understand the importance of checking answers, and can understand that there is more than one way to check an answer (inverse, rounding, repetition).

COMMON MISCONCEPTIONS

Children may work out the inverse, but if it is not the same as their answer, they may not know what to do. Ask:

- *Could you work out the calculation in a different way?*

STRENGTHENING UNDERSTANDING

Some children may not be secure with inverse operations. Scaffold learning by showing simple fact families and explaining the relationship between them, for example 3 + 2 = 5, 2 + 3 = 5, 5 – 2 = 3, 5 – 3 = 2.

GOING DEEPER

Deepen learning in this lesson by exploring different ways to check answers. Children may find the inverse, or they may use rounding or repetition. Ask them to discuss the differences between the strategies.

KEY LANGUAGE

In lesson: check, estimate, addition, subtraction, inverse, accurately, fact family, **diagram**

Other language to be used by the teacher: round, nearest, thousand, hundred, ten, one

STRUCTURES AND REPRESENTATIONS

bar model, part-whole model

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- Do all children know what 'inverse' means?
- How will you link this lesson to the previous one?
- Do children understand the importance of checking an answer?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *How many different ways can you think of to check an answer?*
- Question 1 a): *What would you do if you got a different answer when checking?*

IN FOCUS Question 1 a) focuses on the importance of checking answers. If the checked answer is different, we know there is a problem but is it the original or the checked answer that is incorrect? Discuss this with children.

PRACTICAL TIPS Create a display in the classroom which models different ways to check answers.

ANSWERS

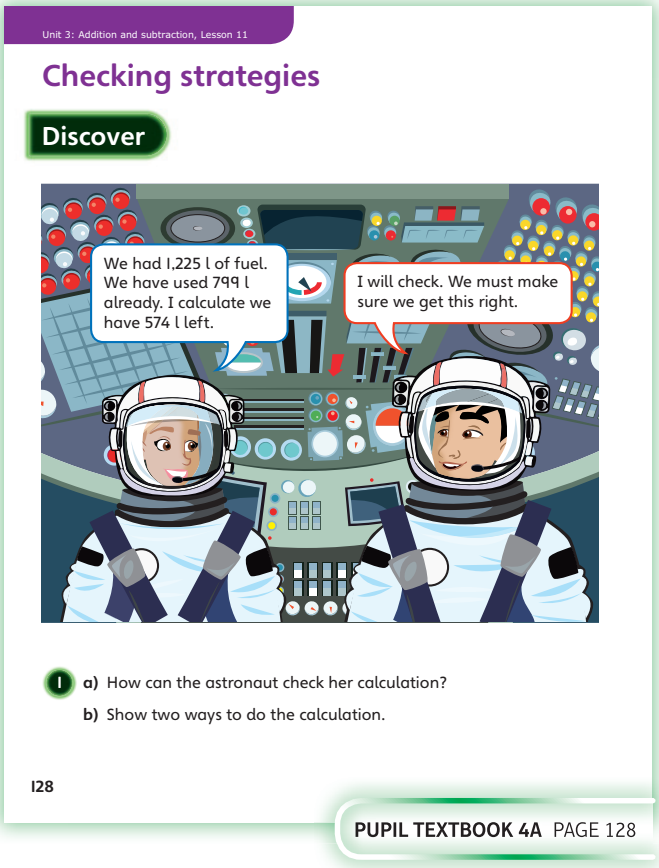
Question 1 a): A subtraction can be checked by using the inverse operation, which is addition.

799 + 574 = 1,373

The parts do not match the whole. The calculation should be done again.

Question 1 b): 1225 – 799 = 426; 1226 – 800 = 426

There are 426 l of fuel left.



PUPIL TEXTBOOK 4A PAGE 128

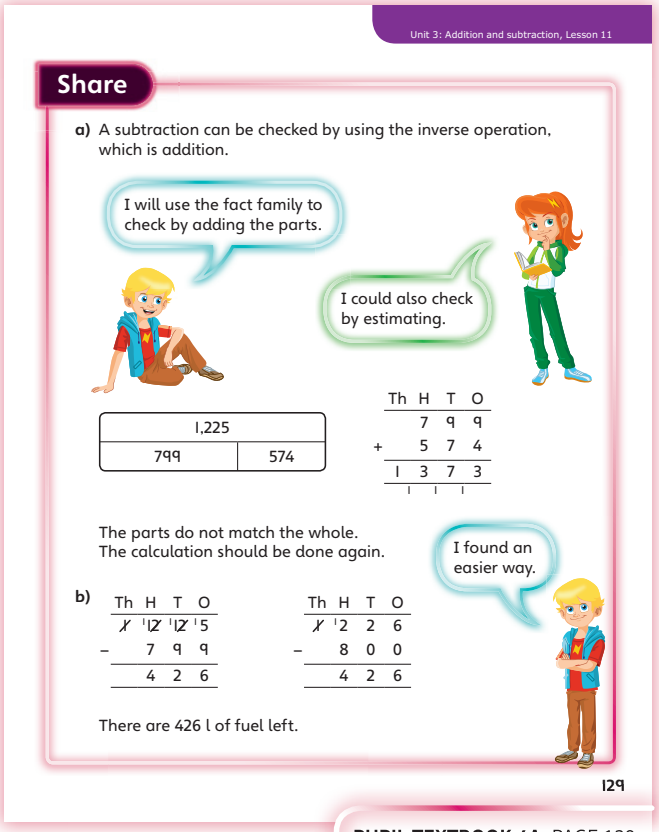
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 b): *Could you use equivalent difference to work out the answer?*
- Question 1 b): *Why is it important to check answers?*

IN FOCUS For question 1 b), it is a good idea to remind children of the earlier lesson in this unit about equivalent difference. Explain that there are different ways to check answers, and sometimes you may even need to use more than one to be sure. Link this to real-life examples, for example a shopkeeper totalling their takings for a day.



PUPIL TEXTBOOK 4A PAGE 129

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 2: *What sort of calculation could you do to check the answers accurately? How could you estimate first what the answers should be?*

IN FOCUS Question 3 is a good way to make mathematical connections, which is an important skill for mastery. Discuss with children how fact families can help with checking answers.

STRENGTHEN Following on from question 2, give children more opportunities to check answers by using the inverse operation.

DEEPEN Ask children to complete the calculations in question 2, then challenge them to explain where each one went wrong. For the first one, children should be able to do 5,391 – 3,401 = 1,990 to show that a 0 was missing from the original calculation. Children should find that the second one is already correct.

ASSESSMENT CHECKPOINT Question 1 gives a simple way to assess children on whether they can check answers using the inverse operation. Question 4 will allow you to assess which children can check answers using visual representations such as bar models or part-whole models.

ANSWERS

Question 1: 3,288 + 3,707 = 6,995

The parts do match the whole. The calculation is correct.

Question 2 a): 5,391 – 3,401 = 1,990 (Correction: either

199 + 3,401 = 3,600

or 1,990 + 3,401 = 5,391)

Question 2 b): 8,569 + 440 = 9,009

Question 3: Model completed: 1,149.

1,999 – 850 = 1,149

1,999 – 1,149 = 850

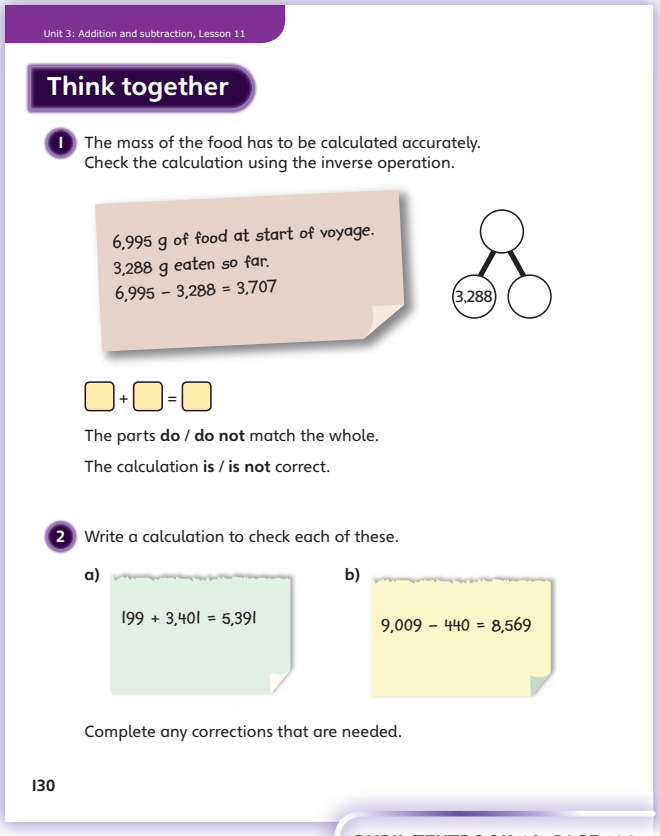
1,149 + 850 = 1,999

850 + 1,149 = 1,999

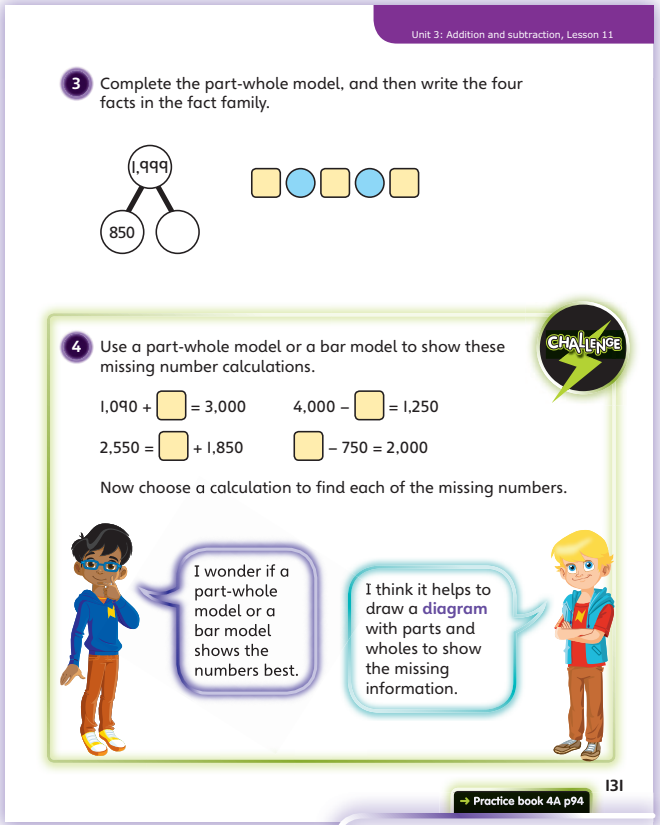
Question 4: Look for accurately drawn part-whole models or bar models showing:

1,090 + 1,910 = 3,000 4,000 – 2,750 = 1,250

2,550 = 700 + 1,850 2,750 – 750 = 2,000



PUPIL TEXTBOOK 4A PAGE 130



PUPIL TEXTBOOK 4A PAGE 131

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Checking answers, such as in question 1, can empower and motivate children as they enjoy becoming like the teacher.

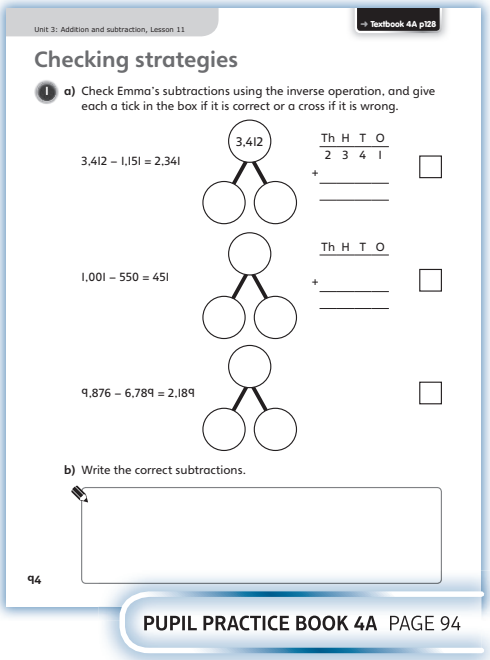
STRENGTHEN Question 3 features missing numbers in calculations. Some children's knowledge may need strengthening here. Ask them when they must do the inverse operation to find out the answer, and when they do not need to.

DEEPEN Deepen learning in question 1 by asking children to discuss and explain where Emma went wrong each time.

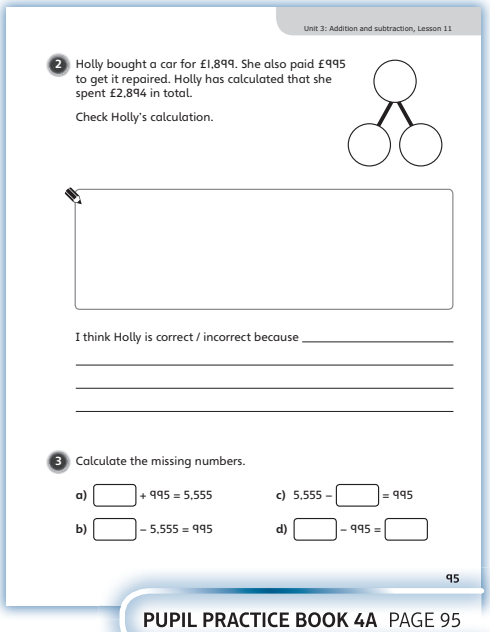
THINK DIFFERENTLY Question 4 shows how rounding can sometimes be flawed. First, encourage children to look at the correct answer (7,998). Then see if they can think why the rounding method used was not accurate. Children should reason that Dexter would have been more accurate if he had rounded to the nearest hundred instead of thousand.

ASSESSMENT CHECKPOINT Question 5 will allow you to assess whether children can solve a problem and then check their answer.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 94



PUPIL PRACTICE BOOK 4A PAGE 95

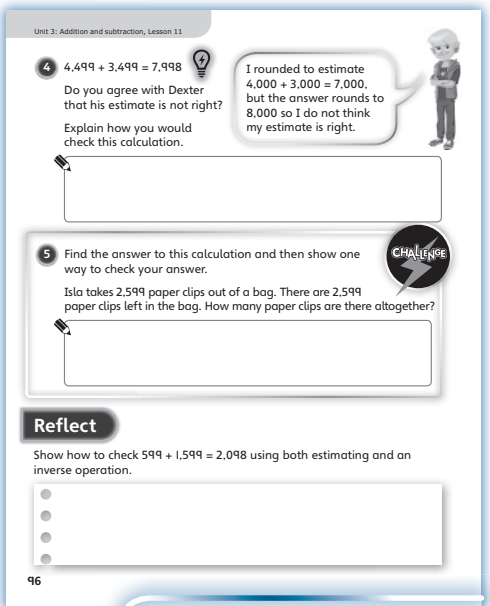
Reflect

WAYS OF WORKING Pair work

IN FOCUS This is a good opportunity for discussion using maths language. Ask children to work with a partner for this activity, and to work together to discuss their methods for checking.

ASSESSMENT CHECKPOINT This activity will let you see which children can use more than one strategy to check an answer.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 96

After the lesson

- Can children use more than one method to check answers?
- Can children reason why it is important to check answers?
- Are children ready to apply their knowledge to lessons about problem solving?

Problem solving – addition and subtraction (1)

Learning focus

In this lesson children will apply addition and subtraction strategies they have learnt previously to solve one-step problems.

Small steps

- Previous step: Checking strategies
- **This step: Problem solving – addition and subtraction (1)**
- Next step: Problem solving – addition and subtraction (2)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

ASSESSING MASTERY

Children can choose an efficient method of addition or subtraction to solve a problem. They can represent the problem on a bar model, and explain their method.

COMMON MISCONCEPTIONS

Children may struggle to interpret the word problems and not know whether to add or subtract. Ask:

- *Can you highlight the key words that might help you?*

STRENGTHENING UNDERSTANDING

Some children may need practice in interpreting word problems. Talk through the questions and provide bar models to visually represent them.

GOING DEEPER

Provide more examples of problems where numbers are represented by symbols (early algebra). Discuss the best way for children to show what information they have and what they need to find out.

KEY LANGUAGE

In lesson: problem solving, strategy, part, whole, bar model, story problem, altogether, left

STRUCTURES AND REPRESENTATIONS

part-whole model, bar model

RESOURCES

Strips of paper to make bar models

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- Are children ready to move on to problem solving?
- How will you draw out the key vocabulary in the lesson?
- How will you promote discussion of methods in this lesson?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *Which model will you use?*
- Question 1 a): *Would a bar model represent the problem well?*

IN FOCUS In question 1 a) children have to represent a word problem visually. If children are not sure which diagram to choose, suggest the bar model or part-whole model.

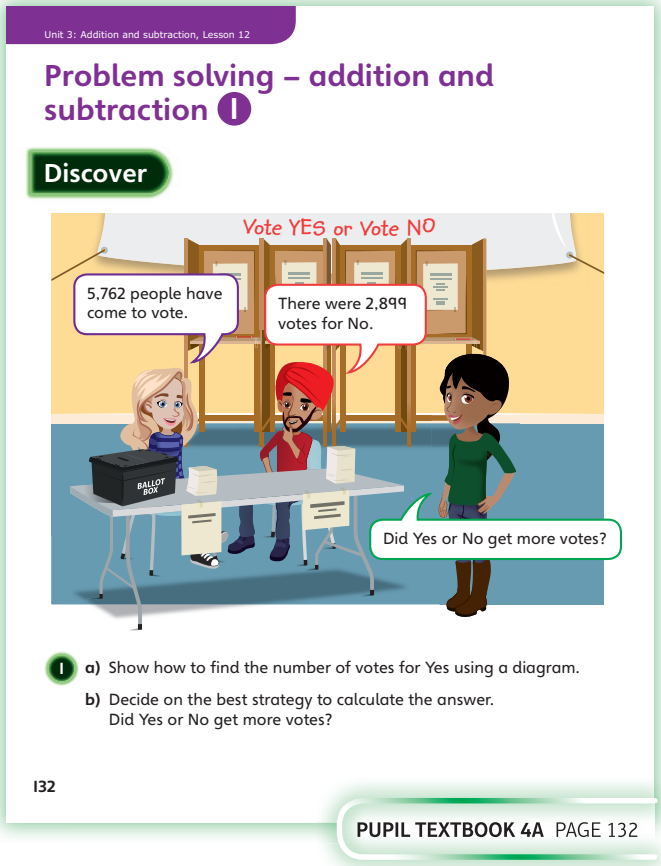
PRACTICAL TIPS Instead of drawing bar models, children could cut strips of paper to make physical bar models.

ANSWERS

Question 1 a): Look for a bar model or part-whole model showing that the whole (total votes) is 5,762, that one part (No votes) is 2,899 and that the other part (Yes votes) is not known.

Question 1 b): You need to subtract to find the missing part and calculate the answer:
5,762 – 2,899 = 2,863.

There were 2,863 Yes votes. No got more votes because 2,899 > 2,863.



Unit 3: Addition and subtraction, Lesson 12

Problem solving – addition and subtraction 1

Discover

1 a) Show how to find the number of votes for Yes using a diagram.

b) Decide on the best strategy to calculate the answer.
Did Yes or No get more votes?

132

PUPIL TEXTBOOK 4A PAGE 132

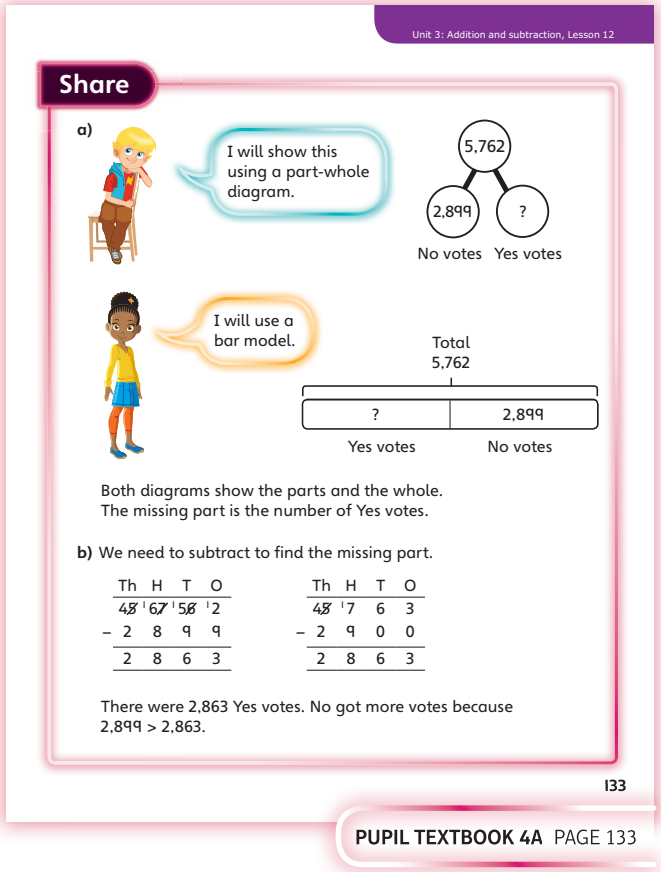
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 a): *What does 'part' mean?*
- Question 1 a): *What does 'whole' mean?*

IN FOCUS For question 1 a), the bar model and the part-whole model have been used to represent the problem. Be aware that children may have used other representations, for example number lines.



Unit 3: Addition and subtraction, Lesson 12

Share

a)

I will show this using a part-whole diagram.

I will use a bar model.

Both diagrams show the parts and the whole.
The missing part is the number of Yes votes.

b) We need to subtract to find the missing part.

Th	H	T	O
4	16	15	12
– 2	8	9	9
2	8	6	3

Th	H	T	O
4	16	7	6 3
– 2	9	0	0
2	8	6	3

There were 2,863 Yes votes. No got more votes because 2,899 > 2,863.

133

PUPIL TEXTBOOK 4A PAGE 133

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 1: *How do you know that this is an addition problem?*
- Question 2: *What does the bar model need to show?*
- Question 4: *What do you need to remember when drawing a bar model?*

IN FOCUS Question 3 will draw out associated addition and subtraction facts. Explain to children that making connections like this is very important in maths mastery.

STRENGTHEN After completing question 2, children could strengthen their learning by drawing the correct bar model once they have identified what is wrong with the two that are given.

DEEPEN Use question 4 to deepen learning. Children will need to represent a range of calculations using bar models, including some with missing numbers. Challenge children to find links between the calculations. They should be able to use vocabulary such as 'inverse', and explain the strategies they used to work out the correct answers. Finally, they should realise that they do not need four different bar models since the calculations are linked, and so only two models are needed. Extend learning by providing an answer, such as 3,232, and asking children to draw bar models to match it.

ASSESSMENT CHECKPOINT Question 2 will allow you to assess which children can accurately represent a word problem with a bar model. Look for effective reasoning and the correct use of mathematical vocabulary.

ANSWERS

Question 1: 1,775 (Yes); 3,007 (No).

3,007 + 1,775 = 4,782. 4,782 people voted.

Question 2: Jamilla has put 9,923 as a part when it should be the whole.

Max has drawn the correct bar model, but the parts should not be equally sized.

Question 3: 6,000 – 2,999 = 3,001

6,000 – 3,001 = 2,999

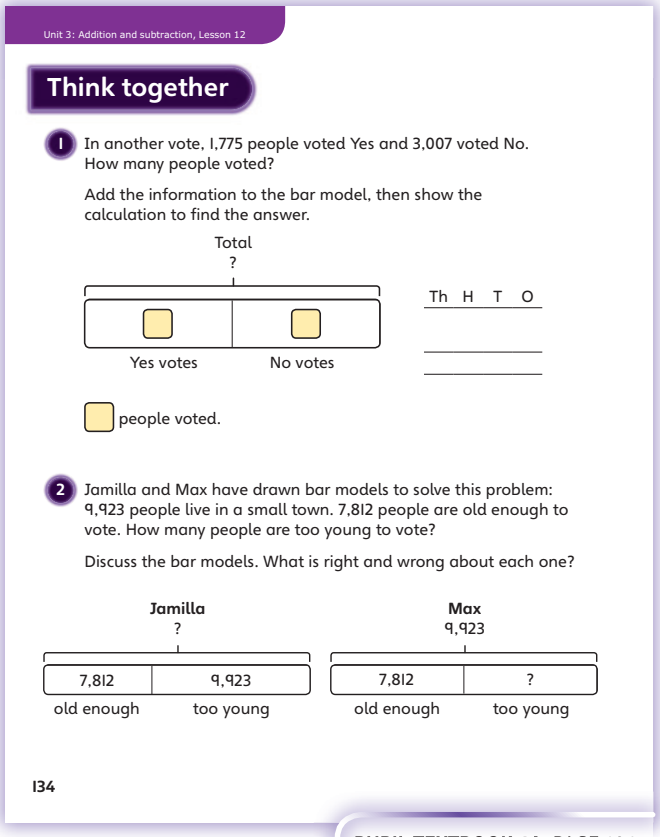
2,999 + 3,001 = 6,000

3,001 + 2,999 = 6,000

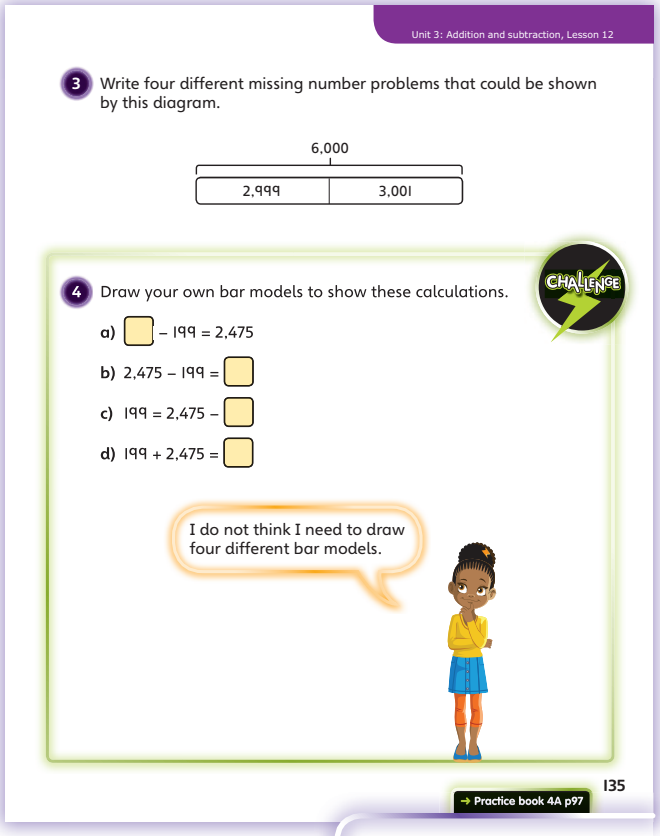
Question 4: Look for accurately drawn bar models, with parts and whole of appropriate sizes. Children should notice that only two models are needed, showing:

2,674 – 199 = 2,475 and 199 + 2,475 = 2,674

2,475 – 199 = 2,276 and 199 = 2,475 – 2,276



PUPIL TEXTBOOK 4A PAGE 134



PUPIL TEXTBOOK 4A PAGE 135

Practice

WAYS OF WORKING Independent thinking

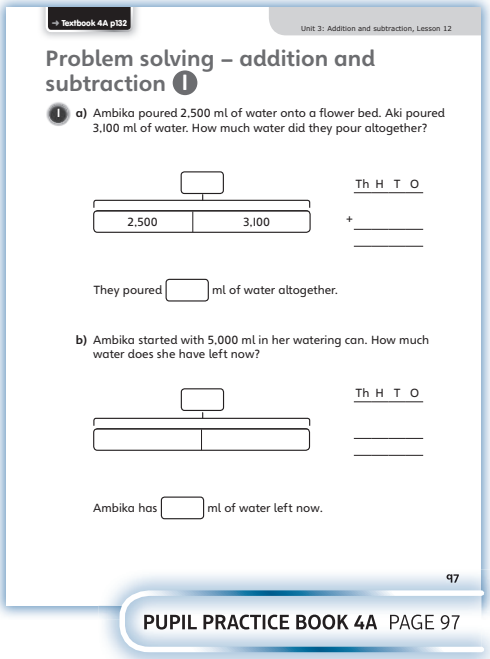
IN FOCUS Question 2 promotes reasoning. Ask children how they will go about solving each problem. Also ask them what their bar model will tell them, and what the size of each part should be.

STRENGTHEN For question 4, talk to children about how they could begin to find a solution. They may realise that starting with the triangle would be a good strategy. From the second bar model: if you add the triangle to the star you get the cloud. But also, we know that if you add 2,000 to the star you get the cloud. So the triangle must be worth 2,000. From the first model, that means that the star and the heart sum to 2,000. As the heart is worth 1,000 more than the star, the heart must be 1,500 and the star 500. This means that the cloud is 500 + 2,000 = 2,500.

DEEPEN In question 4, tell children that you think two hearts total less than one triangle. Challenge children to reason why this is incorrect (heart > star; star + heart = triangle).

ASSESSMENT CHECKPOINT Assess children's progress by looking at question 2. See if they have achieved mastery, and can interpret the question correctly and use the appropriate operation.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Textbook 4A p132

Unit 3: Addition and subtraction, Lesson 12

Problem solving – addition and subtraction I

1 a) Ambika poured 2,500 ml of water onto a flower bed. Aki poured 3,100 ml of water. How much water did they pour altogether?

2,500 | 3,100

Th H T O

+

They poured ☐ ml of water altogether.

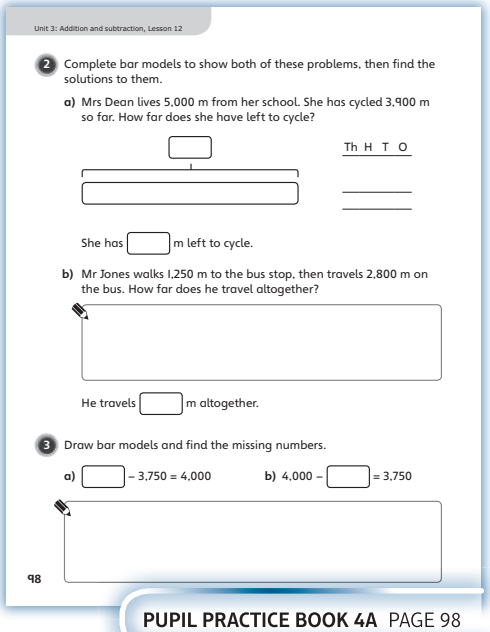
b) Ambika started with 5,000 ml in her watering can. How much water does she have left now?

Th H T O

Ambika has ☐ ml of water left now.

97

PUPIL PRACTICE BOOK 4A PAGE 97


Unit 3: Addition and subtraction, Lesson 12

2 Complete bar models to show both of these problems, then find the solutions to them.

a) Mrs Dean lives 5,000 m from her school. She has cycled 3,900 m so far. How far does she have left to cycle?

Th H T O

She has ☐ m left to cycle.

b) Mr Jones walks 1,250 m to the bus stop, then travels 2,800 m on the bus. How far does he travel altogether?

He travels ☐ m altogether.

3 Draw bar models and find the missing numbers.

a) ☐ – 3,750 = 4,000 b) 4,000 – ☐ = 3,750

98

PUPIL PRACTICE BOOK 4A PAGE 98

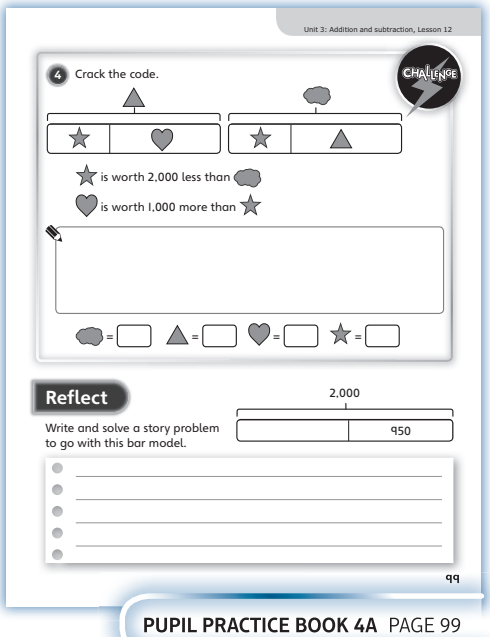
Reflect

WAYS OF WORKING Pair work

IN FOCUS Some children may need support with thinking of a suitable context for their problem. If needed, provide some ideas like measuring in centimetres, or counting marbles in a jar.

ASSESSMENT CHECKPOINT This activity will let you see which children are likely to have mastered the lesson. They will be able to create a relevant story problem and explain how it relates to the bar model.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Unit 3: Addition and subtraction, Lesson 12

4 Crack the code.

CHALLENGE

is worth 2,000 less than

is worth 1,000 more than

= ☐ = ☐ = ☐ = ☐

Reflect

Write and solve a story problem to go with this bar model.

2,000

950

99

PUPIL PRACTICE BOOK 4A PAGE 99

After the lesson

- Can all children represent addition and subtraction problems using a bar model?
- Can they explain the bar model using the words 'part' and 'whole'?
- Are children ready to move on to more complex problem solving?

Problem solving – addition and subtraction 2

Learning focus

In this lesson, children will explore single bar models and comparison bar models to interpret and solve one-step problems.

Small steps

- Previous step: Problem solving – addition and subtraction (1)
- **This step: Problem solving – addition and subtraction (2)**
- Next step: Problem solving – addition and subtraction (3)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

ASSESSING MASTERY

Children can understand when to draw single bar models and when to draw comparison bar models to help them solve problems. They can explain the representations clearly using the correct vocabulary.

COMMON MISCONCEPTIONS

Children may not understand when to draw single bar models and when to draw comparison bar models. Ask:

- *Can you draw both models and explain which is more useful?*

STRENGTHENING UNDERSTANDING

If children do not know when to draw a single bar model and when to draw a comparison bar model, give them some word problems with corresponding single bar models and comparison bar models. Ask them to discuss as a group which one represents the problem more clearly.

GOING DEEPER

Deepen learning by giving children some single bar models and comparison bar models, and ask them to write some word problems to match them.

KEY LANGUAGE

In lesson: problem solving, addition, subtraction, single bar model, comparison bar model, part, whole, story problem, how much, more, fewer, left, difference

Other language to be used by the teacher: strategy

STRUCTURES AND REPRESENTATIONS

single bar model, comparison bar model

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How will you explain the difference between a single bar model and a comparison bar model?
- Will you have a challenge activity for any quick finishers?
- Could you make a classroom display to support this lesson?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *How will you show that Luis has more?*
- Question 1 b): *Will you use column subtraction or is there another way of calculating the answer?*

IN FOCUS Questions 1 a) and 1 b) explore the difference between single bar models and comparison bar models. If necessary, suggest that the bar models may look different for each question.

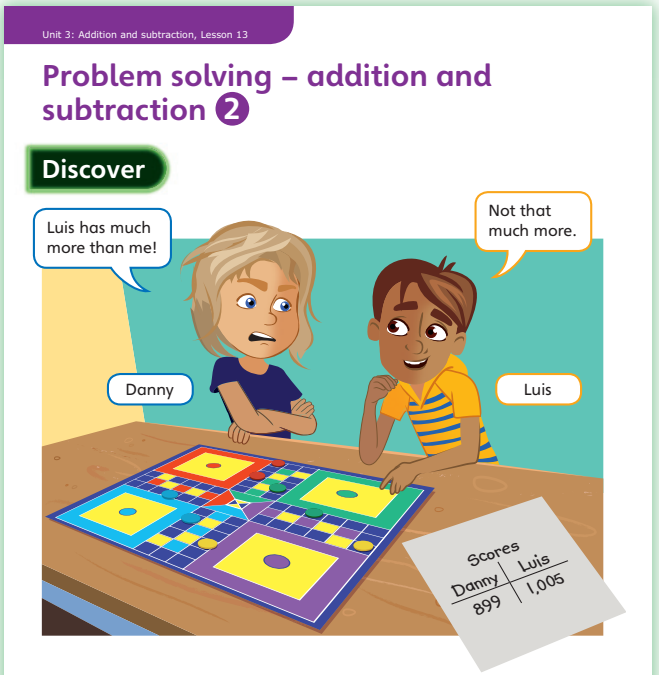
PRACTICAL TIPS Give children visual support, by creating a classroom display featuring some word problems with single bar models and comparison bar models, to support their interpretation of them.

ANSWERS

Question 1 a): A single bar model or comparison bar model where the part representing 1,005 (Luis) is noticeably longer than the part representing 899 (Danny).

Look for children who identify that the comparison bar model is a better way to represent this problem.

Question 1 b): 1,005 – 899 = 106. Luis has 106 more points than Danny.



PUPIL TEXTBOOK 4A PAGE 136

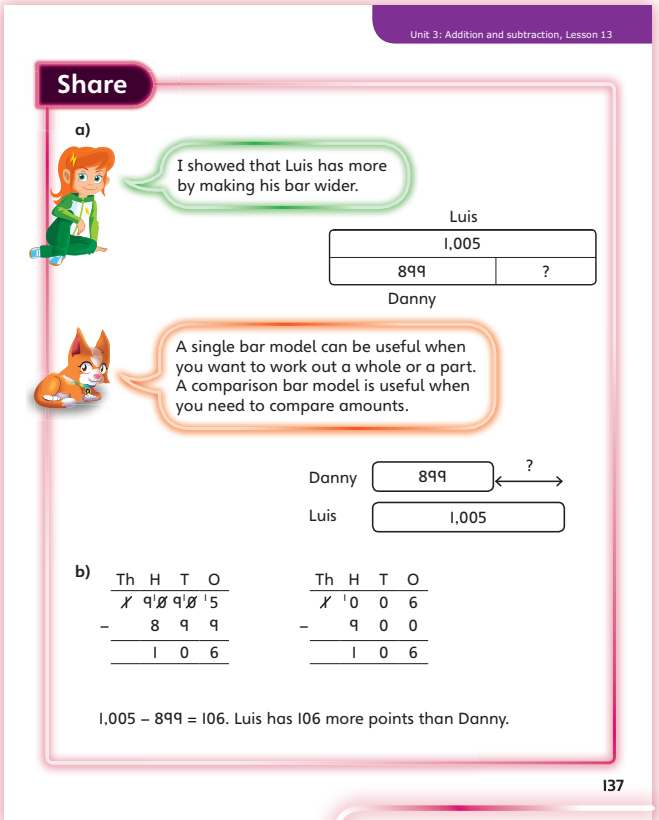
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 a): *How does the comparison bar model show who has more?*
- Question 1 b): *Did you use the column method to calculate the answer, or a different strategy?*

IN FOCUS For question 1 b), children may have used a different strategy, for example equivalent difference. Share all the strategies that children used.



PUPIL TEXTBOOK 4A PAGE 137

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 2: *Is this problem an addition or a subtraction?*
- Question 2: *What can you fill in first on the model?*
- Question 3: *Can you think of more than one solution for part d)?*

IN FOCUS Question 2 breaks the word problem down for children. Ask them to fill in the information that they know first, then to explain what calculation they must do to find the answer.

STRENGTHEN Strengthen learning by talking through question 3. Help children to identify that a comparison bar model is needed when finding a difference, and a single bar model is more useful when completing an addition.

DEEPEN Ask children to actually draw the different bar models for question 3 and to reason which is more suitable for each question. For the final question, challenge children to find more than one answer.

ASSESSMENT CHECKPOINT Question 3 will let you see which children have mastered the lesson and can identify the correct bar model and calculate the answers effectively.

ANSWERS

Question 1: 1,050 – 678 = 372. Jack has 372 fewer points than Amelia.

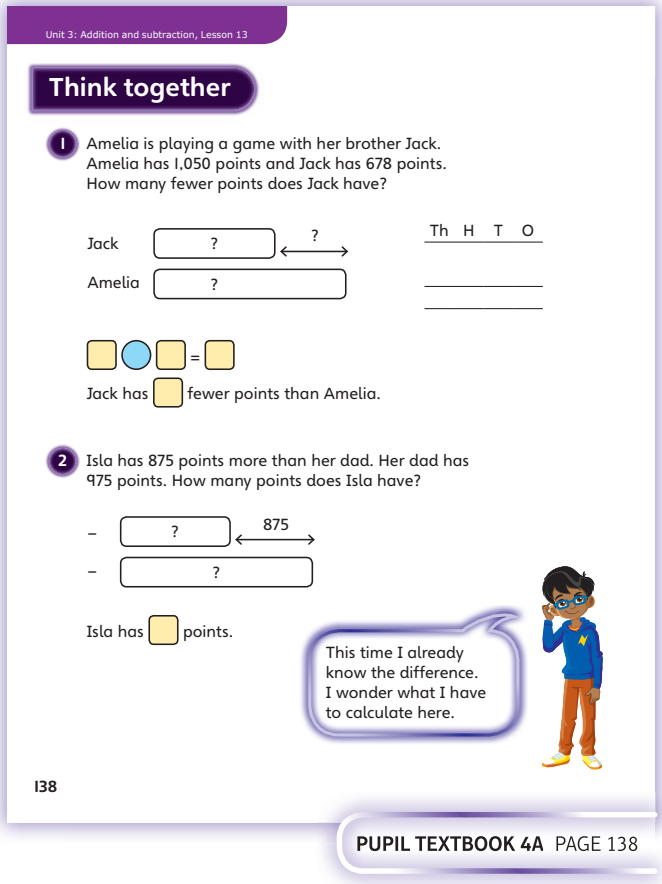
Question 2: 975 + 875 = 1,850. Isla has 1,850 points.

Question 3 a): Single bar model showing 5,250 + 100 = 5,350

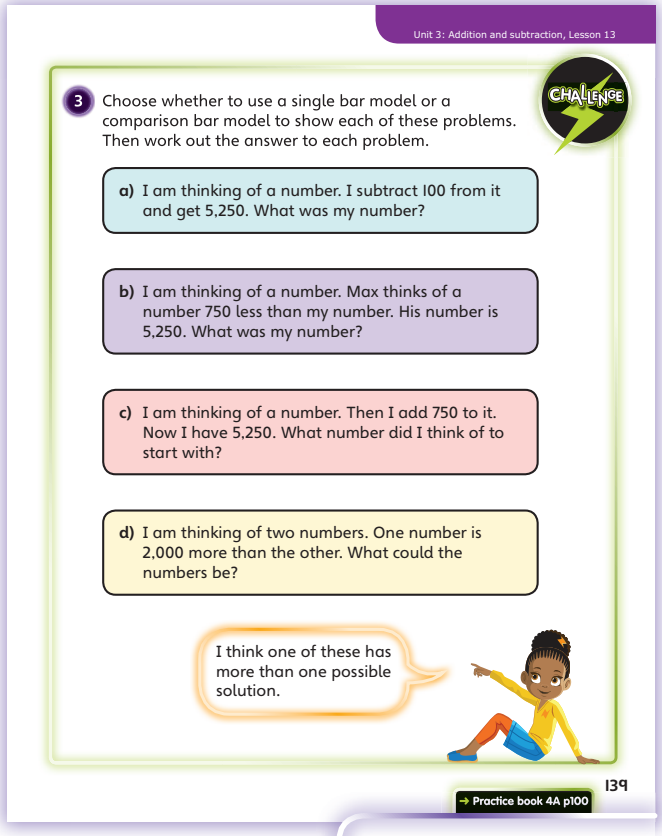
Question 3 b): Single bar model showing 5,250 + 750 = 6,000

Question 3 c): Comparison bar model showing 5,250 – 750 = 4,500

Question 3 d): Comparison bar model showing any two numbers with a difference of 2000.



PUPIL TEXTBOOK 4A PAGE 138



PUPIL TEXTBOOK 4A PAGE 139

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Questions 1 a), 1 b) and 1 c) draw out the different ways that additions and subtractions can be represented using bar models.

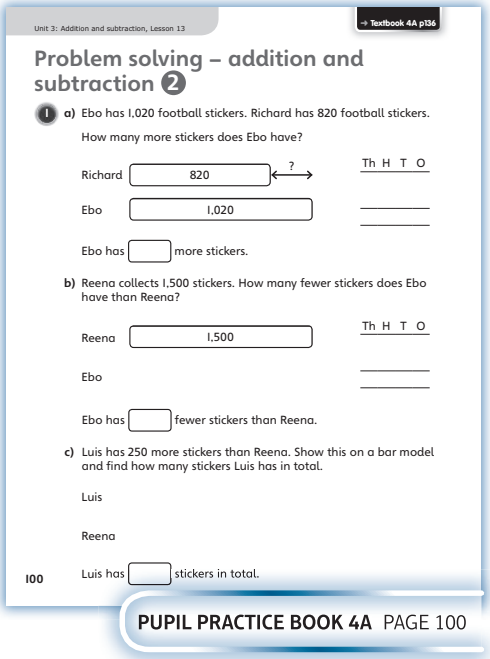
STRENGTHEN Some children will need scaffolding for question 4. Work alongside them, or as a group, and talk through the problem. You could provide some of the bars for them.

DEEPEN In question 3, challenge children to find more than one way to work out the correct answer.

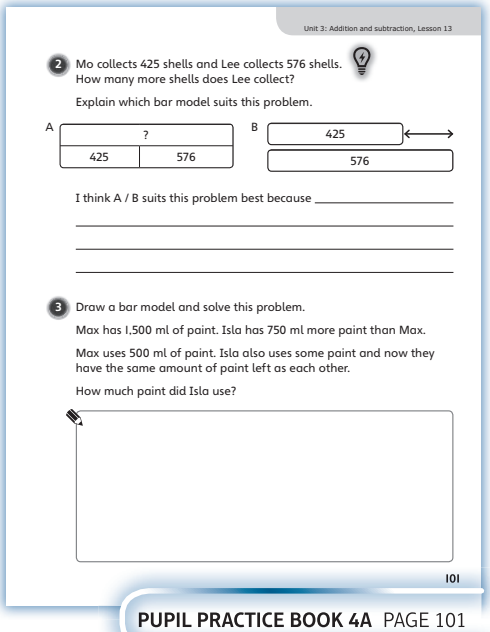
THINK DIFFERENTLY This question 2 may prove challenging for some children. Usually the word 'more' is associated with addition. However, in this question you have to find how many 'more than'. Explain the difference to children to help them identify that this is a subtraction. Use a bar model to support this.

ASSESSMENT CHECKPOINT Question 4 will tell you which children have mastered the lesson. Check that they can break down the problem and represent it using bar models. Ask them to explain their workings to make sure they are confident with their learning.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 100



PUPIL PRACTICE BOOK 4A PAGE 101

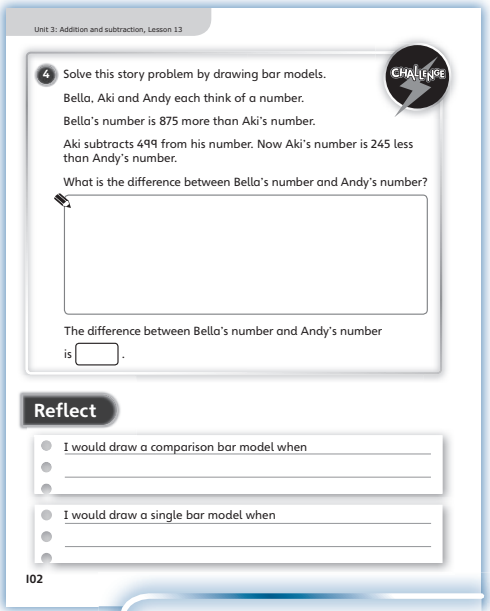
Reflect

WAYS OF WORKING Pair work

IN FOCUS Display the words 'compare', 'comparison', 'addition', 'subtraction' and 'difference' to help children explain their answers. Encourage children to use examples of number sentences and bar models in their explanations.

ASSESSMENT CHECKPOINT Assess children on the accuracy of their explanations, and the vocabulary they use.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 102

After the lesson

- Do all children know the difference between a single bar model and a comparison bar model?
- Which children struggled with **Practice** question 4?
- Could you do some more problems like this to strengthen learning?

Problem solving – addition and subtraction 3

Learning focus

In this lesson children will apply addition and subtraction strategies that they have learnt previously, to solve multi-step problems.

Small steps

- Previous step: Problem solving – addition and subtraction (2)
- **This step: Problem solving – addition and subtraction (3)**
- Next step: Problem solving – addition and subtraction (4)

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

ASSESSING MASTERY

Children can understand how to solve a problem, and which operations they must use. They can confidently represent a word problem using a model or representation and explain this clearly.

COMMON MISCONCEPTIONS

Children may not realise that a question is a multi-step problem, and so may only complete one of the steps. Ask:

- *Is that your final answer?*

STRENGTHENING UNDERSTANDING

Encourage children to break each problem down into simple steps. Each step should be supported with a model or representation, helping children to interpret the mathematics.

GOING DEEPER

Give children two completed bar models and challenge them to think of a multi-step word problem to match.

KEY LANGUAGE

In lesson: problem solving, addition, subtraction, step, check, part, whole, bar model, story problem, total, difference, how much

Other language to be used by the teacher: multi-step, strategy

STRUCTURES AND REPRESENTATIONS

bar model

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- How will you scaffold learning in this lesson?
- Could you pair children who struggle with reading with a more capable reader?
- How can you promote maths vocabulary in this lesson?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *Is there only one way to work this out?*
- Question 1 a): *What number sentences will help you work out the correct answer?*

IN FOCUS Question 1 a) involves children working out a multi-step problem. Focus children's learning by asking them to break the question down into two steps. They should write two number sentences and then do the calculations. There is more than one way to work out the answer. Encourage children to explore all of the options.

PRACTICAL TIPS Promote lots of discussion in this section, using appropriate maths vocabulary. Talking through questions in pairs can help to ensure that children gain a secure understanding of the problem.

ANSWERS

Question 1 a): 2,500 – 1,200 – 750 = 550

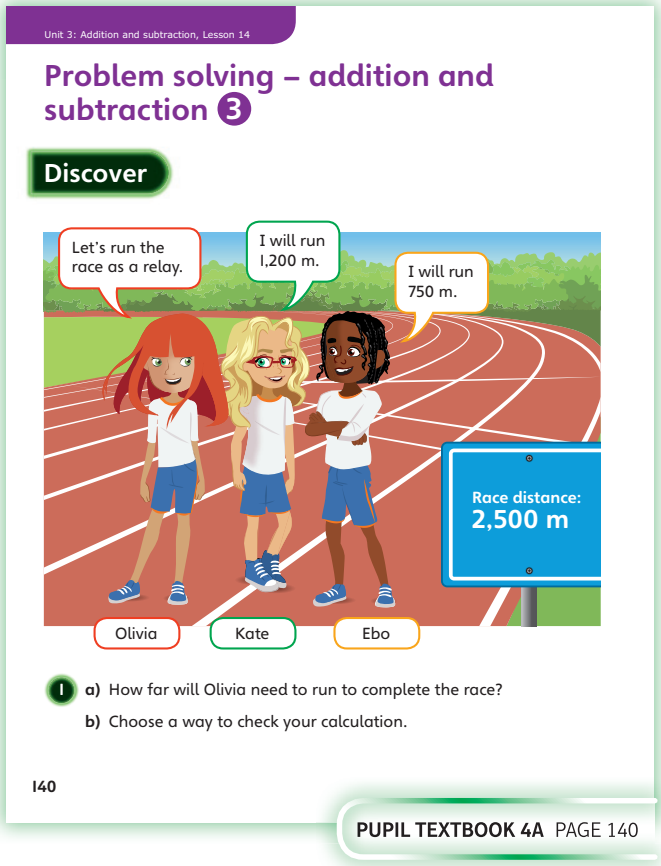
or 1,200 + 750 = 1,950 and 2,500 – 1,950 = 550

Olivia will need to run 550 m to complete the race.

Question 1 b): Check by adding.

1,200 + 750 = 1950 and 1,950 + 550 = 2,500

or 1,200 + 750 + 550 = 2,500



Unit 3: Addition and subtraction, Lesson 14

Problem solving – addition and subtraction 3

Discover

1 a) How far will Olivia need to run to complete the race?

b) Choose a way to check your calculation.

140

PUPIL TEXTBOOK 4A PAGE 140

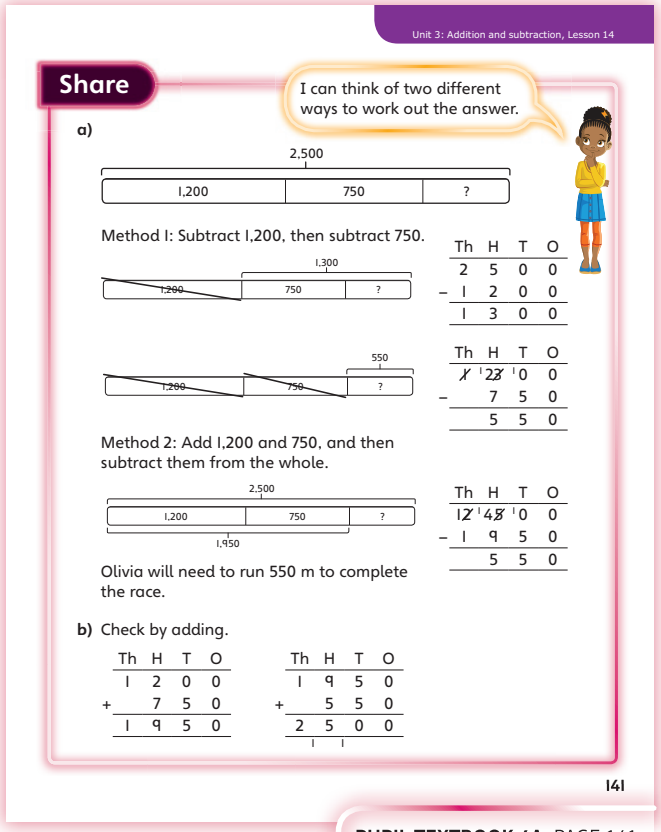
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 b): *How can you check your answer?*
- Question 1 b): *Can you think of more than one way to check?*

IN FOCUS For question 1 b), children should check by using the inverse operation (addition). However, some children may choose to check by using a different strategy, for example a number line or rounding.



Unit 3: Addition and subtraction, Lesson 14

Share

I can think of two different ways to work out the answer.

a)

Method 1: Subtract 1,200, then subtract 750.

Th	H	T	O
2	5	0	0
– 1	2	0	0
1	3	0	0

Th	H	T	O
~~2~~	~~1~~2~~3~~	~~1~~0	0
–	7	5	0
	5	5	0

Method 2: Add 1,200 and 750, and then subtract them from the whole.

Th	H	T	O
~~1~~2~~1~~	~~1~~4~~3~~	~~1~~0	0
– 1	9	5	0
	5	5	0

Olivia will need to run 550 m to complete the race.

b) Check by adding.

Th	H	T	O
1	2	0	0
+	7	5	0
1	9	5	0

Th	H	T	O
1	9	5	0
+	5	5	0
2	5	0	0
	1	1	

141

PUPIL TEXTBOOK 4A PAGE 141

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 1: *Have you seen a similar question before?*
- Question 2: *What is different about the bar model here?*
- Question 4: *How can you show two numbers with a total of 1,500 but a difference of 1,000?*

IN FOCUS In question 2, children will see that the whole is at the side of the bars, which is new. Explain that this is just a different way of looking at a bar model. Ask children to draw what this would usually look like, i.e. a single bar model with the whole as 2,475 and three parts of 475, 800 and 1,200.

STRENGTHEN Question 1 is similar to the **Discover** section. This will support children, so prompt them to think back to this if necessary. Ask children to find both ways of working out the problem.

DEEPEN Question 2 is a good chance to show children that you do not always have to use a written method when calculating. Some children will realise that a good strategy would be to add 1,200 and 800 to reach 2,000, then add on the 475.

ASSESSMENT CHECKPOINT Question 3 will allow you to assess which children can use a comparison bar model to represent a multi-step problem. Children may break it down into a number of steps, first adding 1,250 and 300 to get 1,550, then adding 1,250 and 1,550 to get 2,800, and finally subtracting 2,800 from 3,000 to get 200.

ANSWERS

Question 1: 5,000 – 1,250 – 1,750 = 2,000. Toshi ran 2,000 m.

Question 2: 475 + 800 + 1,200 = 2,475. Bella, Lexi and Mo ran 2,475 m in total.

Question 3: For example:

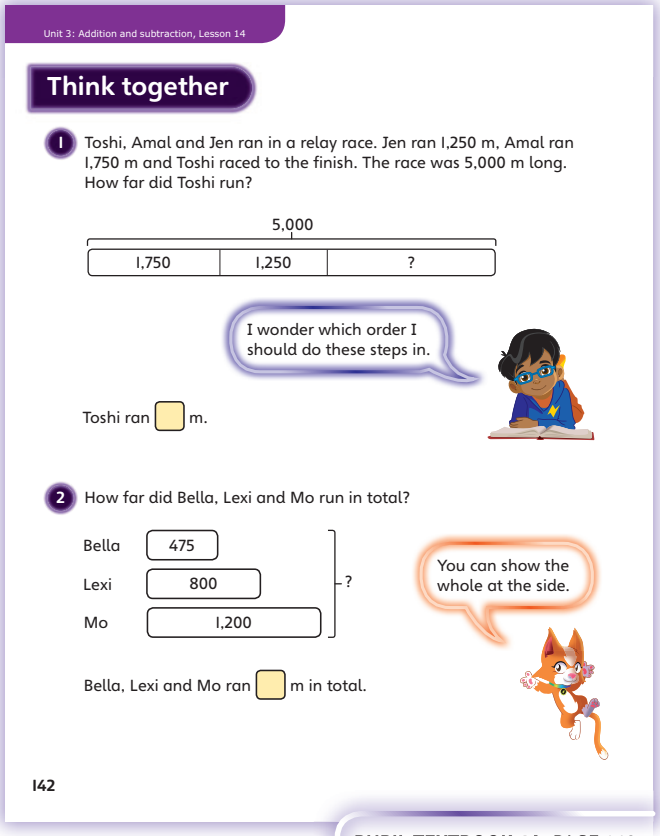
1,250 + 300 = 1,550

1,550 + 1,250 = 2,800

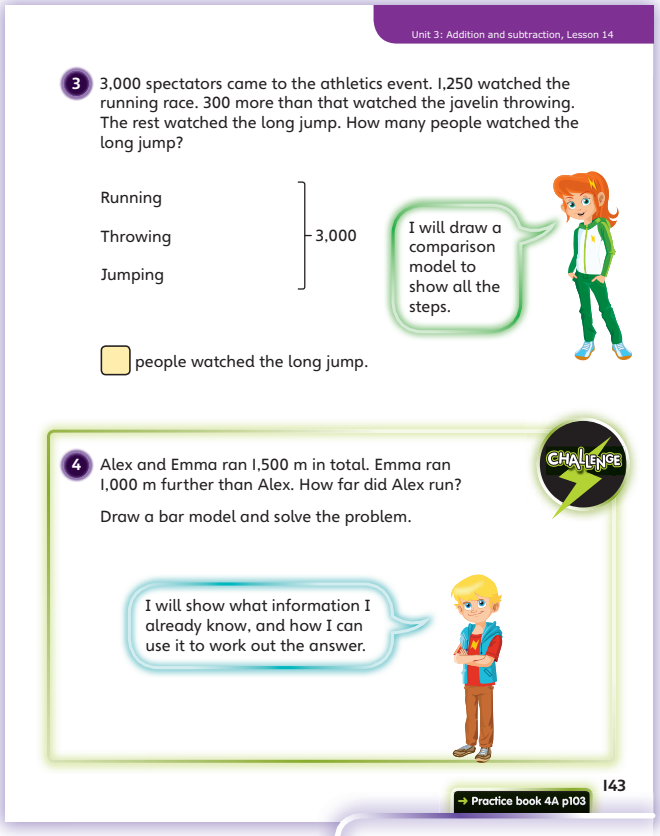
3,000 – 2,800 = 200

200 people watched the long jump.

Question 4: Look for comparison bar models showing the first bar as 1,500 and the second bar as 1,000 plus two equal blank boxes; then a deduction that the blanks are half of 500, or 250. So Emma ran 1,250 m and Alex ran 250 m.



PUPIL TEXTBOOK 4A PAGE 142



PUPIL TEXTBOOK 4A PAGE 143

Practice

WAYS OF WORKING Independent thinking

IN FOCUS Question 4 a) is tricky because we are not told how much money Amy or Ben actually have. Scaffold learning by asking children to draw a bar model, or to write down the number sentences. You could start to introduce some simple algebra by representing Amy and Ben with the letters A and B. For example:

A has £1,275 less than B.

B spends £550.

£1,275 – £550 = £725

A now has £725 less than B.

A gets £750.

£750 – £725 = £25

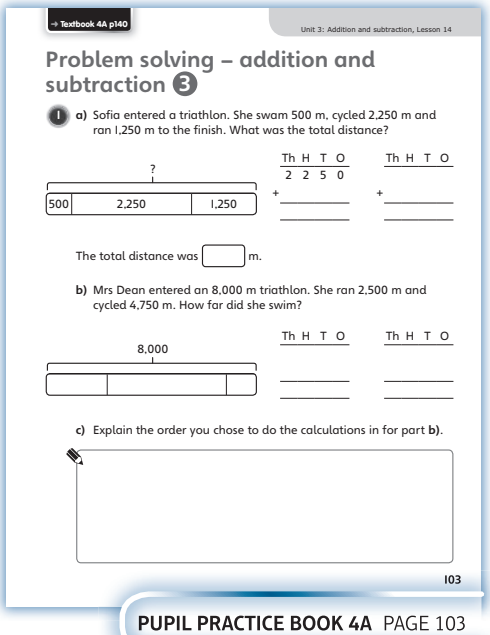
A now has £25 more than B.

STRENGTHEN For question 1 b), it may be necessary to explain what a triathlon is (a race with three parts: a swim, a cycle and a run). Question 4 b) can be linked to knowledge of number bonds. Support learning by asking: *What is left if you take 800 from 2,800? Could you partition this number to help you?* They could represent this with bar models.

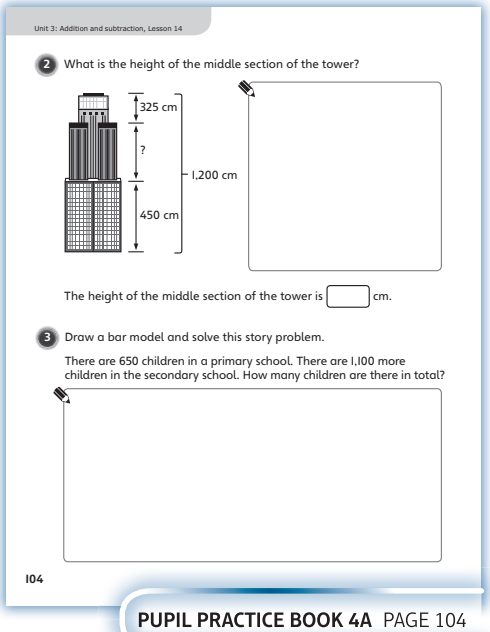
DEEPEN Question 2 displays a use of the bar model in a real-life context. Discuss this and see if children can think of other similar applications, for instance, perimeter.

ASSESSMENT CHECKPOINT Question 4 will allow you to assess which children have a firm understanding of interpreting multi-step word problems. Look in particular at how they have shown their workings.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 103



PUPIL PRACTICE BOOK 4A PAGE 104

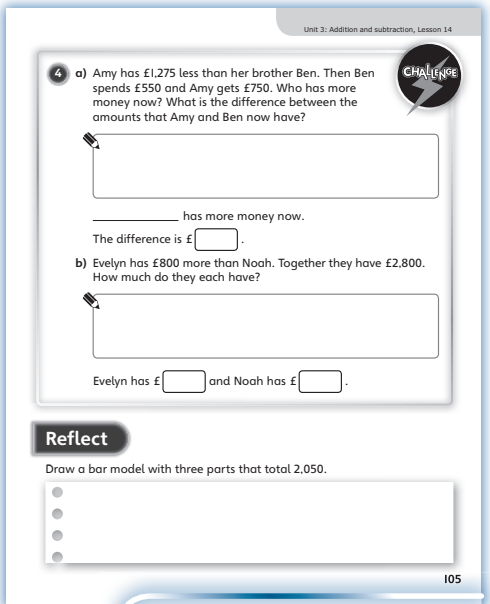
Reflect

WAYS OF WORKING Pair work

IN FOCUS Challenge children to think of as many solutions as they can. You could extend learning by asking them to think of a subtraction with three numbers that equal 2,050, or even an addition and subtraction with three numbers, such as 1,000 + 2,000 – 950.

ASSESSMENT CHECKPOINT Assess children on using the correct sizes for the bars in their models and for demonstrating depth of thinking, for example not choosing a very simple example like 2,048 + 1 + 1.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.



PUPIL PRACTICE BOOK 4A PAGE 105

After the lesson

- How did children approach **Practice** question 4?
- Do some children need more support with visualising problems like this?
- Are children ready to move on to the final lesson of the unit?

Problem solving – addition and subtraction 4

Learning focus

In this lesson children will continue to apply the addition and subtraction strategies that they have previously learnt to solve multi-step problems.

Small steps

- Previous step: Problem solving – addition and subtraction (3)
- **This step: Problem solving – addition and subtraction (4)**
- Next step: Kilometres

NATIONAL CURRICULUM LINKS

Year 4 Number – Addition and Subtraction

Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

ASSESSING MASTERY

Children can understand how to solve a problem, and can identify which operations they must use. They can confidently represent a multi-step problem using models or representations and can explain them clearly.

COMMON MISCONCEPTIONS

Children may not correctly interpret the questions. Ask:

- *Did you use the correct operations? How can you check?*

STRENGTHENING UNDERSTANDING

To strengthen learning in this lesson, run a quick intervention in which you talk through and explain some word problems. Support the discussion with representations to make the problems visual.

GOING DEEPER

Deepen learning by providing some more bar models with numbers but no labels, and asking children to write a story problem to go with them. Encourage children to use real-life contexts.

KEY LANGUAGE

In lesson: problem solving, addition, subtraction, diagram, bar model, greater than, less than, step, total, part, whole, story problem, how much, left

Other language to be used by the teacher: multi-step, strategy

STRUCTURES AND REPRESENTATIONS

part-whole model, bar model, number line

In the eTextbook of this lesson, you will find interactive links to a selection of teaching tools.

Before you teach

- Will you provide any practical resources in this lesson?
- How did the previous lesson go?
- Are children ready for more complex problems?

Discover

WAYS OF WORKING Pair work

ASK

- Question 1 a): *Can you spot any information that is not needed?*
- Question 1 a): *Is there more than one way to work this out?*

IN FOCUS In this question, some 'useless' information is also provided. Ask children if they need to know about Camp 4. They should be able to reason that the information about Camp 4 does not help to answer the question.

PRACTICAL TIPS Encourage children to draw the problem. Having an image of the mountain with the bases and the mountaineer in front of them will allow children to interpret the question more easily.

ANSWERS

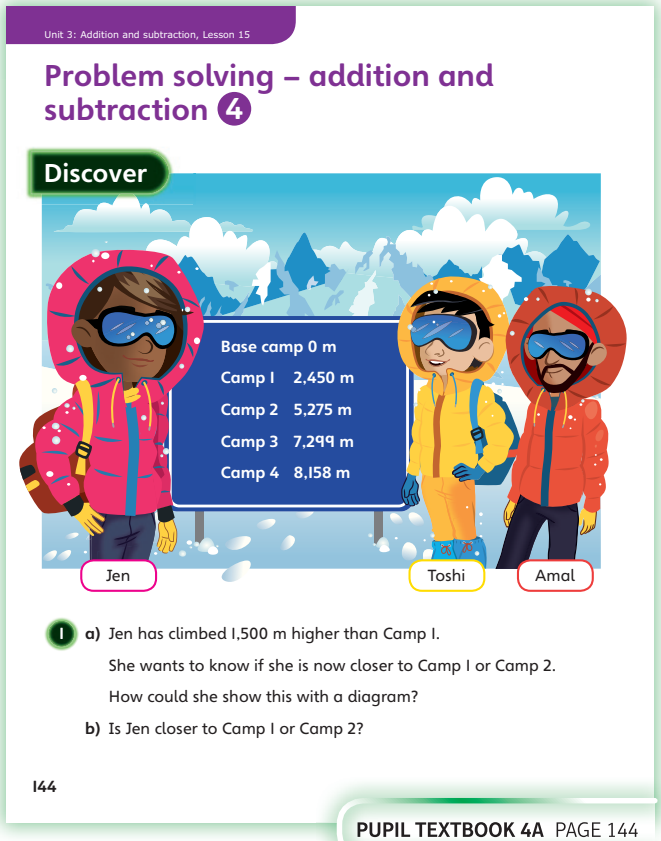
Question 1 a): Children may use a variety of diagrams to show this. Look for diagrams that show a total of 5,275 and three parts of 2,450, 1,500 and ?

Question 1 b): To solve this, find out if the distance from Jen to Camp 2 is greater than or less than 1,500 m.

2,450 + 1,500 = 3,950

5,275 – 3,950 = 1,325

1,500 > 1,325, so Jen is closer to Camp 2.


Unit 3: Addition and subtraction, Lesson 15

Problem solving – addition and subtraction 4

Discover

Base camp 0 m
Camp 1 2,450 m
Camp 2 5,275 m
Camp 3 7,299 m
Camp 4 8,158 m

Jen Toshi Amal

1 a) Jen has climbed 1,500 m higher than Camp 1.
She wants to know if she is now closer to Camp 1 or Camp 2.
How could she show this with a diagram?

b) Is Jen closer to Camp 1 or Camp 2?

144

PUPIL TEXTBOOK 4A PAGE 144

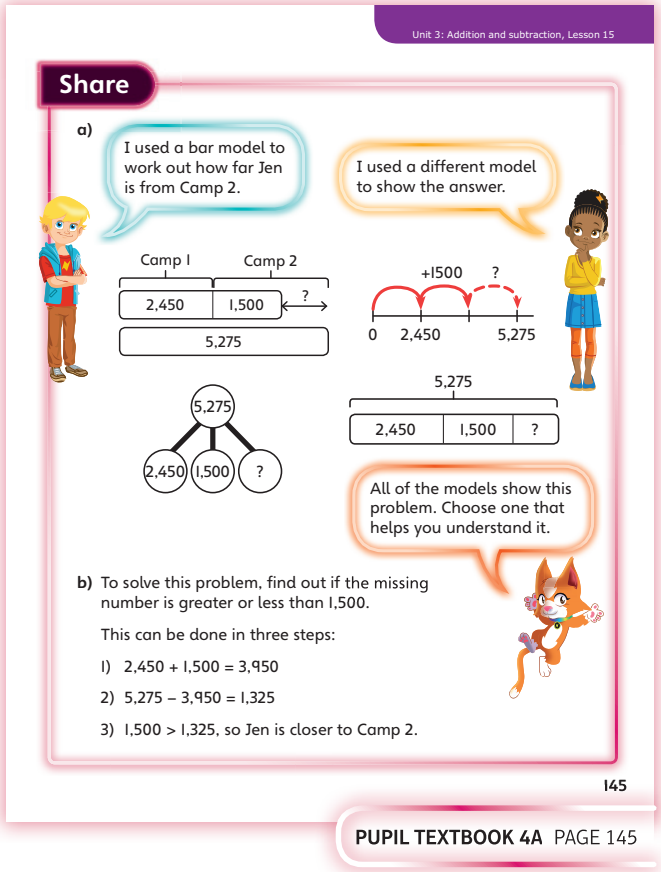
Share

WAYS OF WORKING Whole class teacher led

ASK

- Question 1 b): *What does 'closer' mean?*
- Question 1 b): *How could you use the signs < or > in your explanation?*

IN FOCUS Children may mistakenly think that Jen is closer to Camp 1 because 1,500 is greater than 1,325 and children often assume that the correct answer is the one that is higher. Explain what 'closer' means and then ask which is closer, something 1,500 m away or something 1,325 m away.


Unit 3: Addition and subtraction, Lesson 15

Share

a)

I used a bar model to work out how far Jen is from Camp 2.

I used a different model to show the answer.

Camp 1 Camp 2
2,450 1,500 ?
5,275

+1500 ?
0 2,450 5,275

5,275
2,450 1,500 ?

5,275
2,450 1,500 ?

All of the models show this problem. Choose one that helps you understand it.

b) To solve this problem, find out if the missing number is greater or less than 1,500.

This can be done in three steps:

1) 2,450 + 1,500 = 3,950
2) 5,275 – 3,950 = 1,325
3) 1,500 > 1,325, so Jen is closer to Camp 2.

145

PUPIL TEXTBOOK 4A PAGE 145

Think together

WAYS OF WORKING Whole class teacher led (I do, We do, You do)

ASK

- Question 1: *Why do the other diagrams not match the problem?*
- Question 3: *How can you solve this problem in steps?*

IN FOCUS You may need to break question 3 down to scaffold learning. Ask children to draw the mountains with the differences in heights marked to help them gain a visual understanding of the problem. Then ask children to convert this information into bar models, as it is more mathematical to work like this. Then ask them to calculate and mark the totals.

STRENGTHEN Strengthen learning in question 1 by asking children to discuss what each diagram shows, and then reason which is the correct one. Ask children why the others do not match the question. You could ask them to think of word problems that would match each diagram.

DEEPEN Ask children to make up their own multi-step problems based on the number sentence 453 + 234 – 101.

ASSESSMENT CHECKPOINT Question 3 will allow you to check which children can interpret a problem, break it down into steps, represent it with diagrams and solve it.

ANSWERS

Question 1: Bar model A shows the problem.

1,245 – 385 = 860 (shown in model B)

1,245 + 860 = 2,105

Amal has climbed 2,105 m in total.

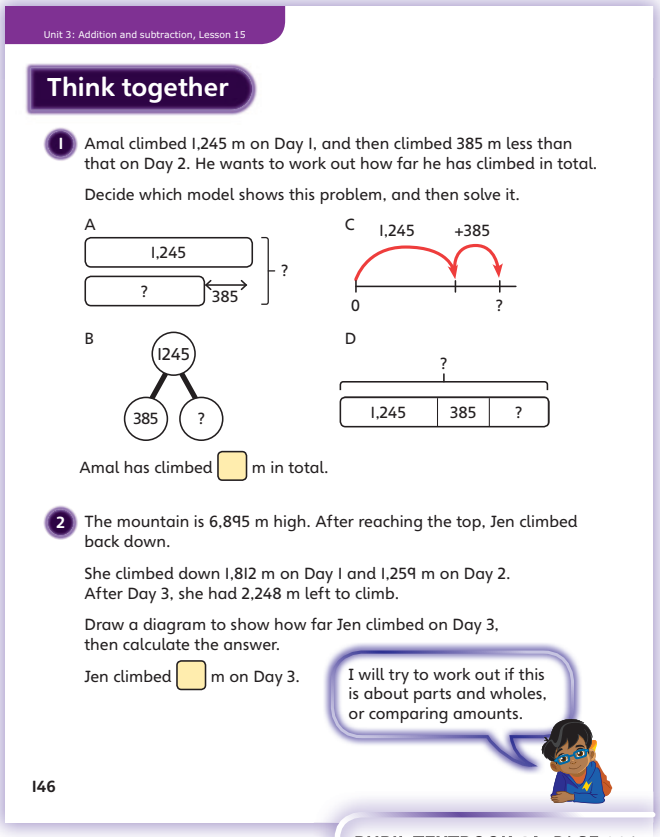
Question 2: Look for a diagram that shows:

6,895 – 1,812 – 1,259 – 2,248 = 1,576

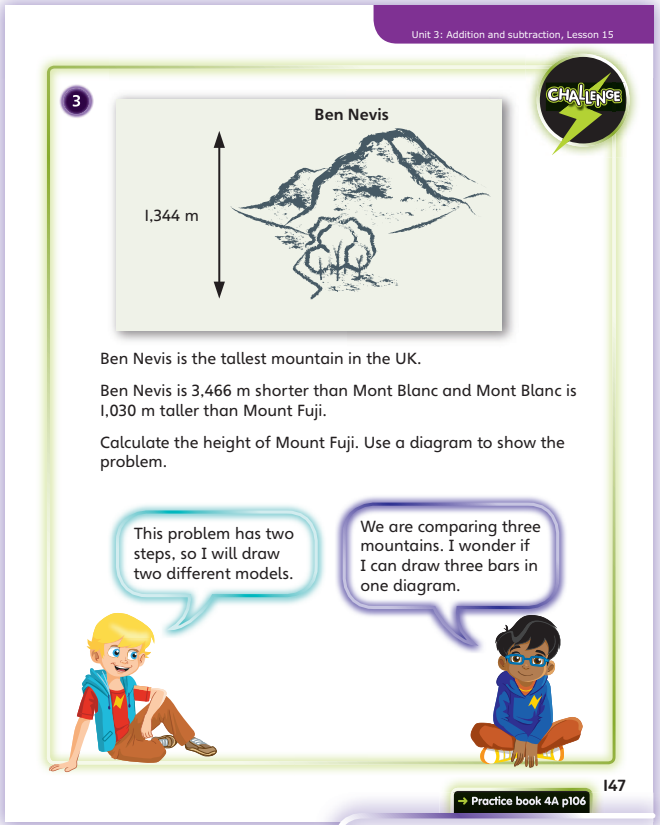
Jen climbed 1,576 m on Day 3.

Question 3: 3,466 + 1,344 = 4,810. Mont Blanc is 4,810 m high.

4,810 – 1,030 = 3,780. Mount Fuji is 3,780 m high.



PUPIL TEXTBOOK 4A PAGE 146



PUPIL TEXTBOOK 4A PAGE 147

Practice

WAYS OF WORKING Independent thinking

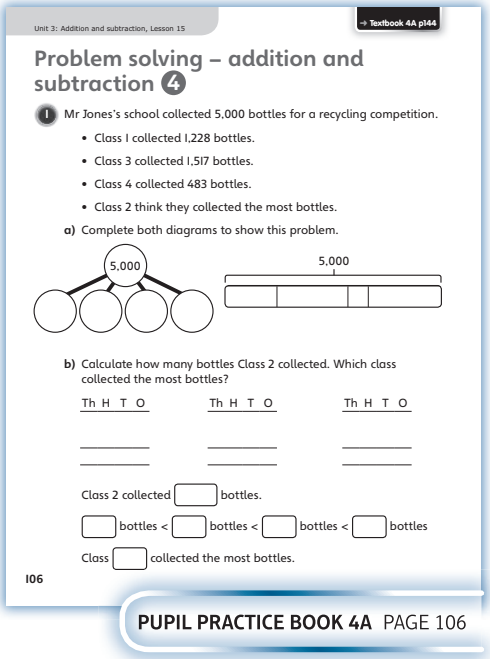
IN FOCUS In question 2, some children may just do 3,985 – 1,700 and give 2,285 as their final answer. Discuss what 'fewer' means and also what 'total' means. This should help children to realise that they then have to add 3,985 and 2,285.

STRENGTHEN In question 1, children need to add three amounts. Strengthen learning by modelling how they can do this using the column method, as they may not have come across this before. Then set other additions to practise this.

DEEPEN In question 4, children are required to interpret a diagram and think of a matching story problem. Ask them to explain the diagram to you and to fill in the missing amounts for Class 1 and Class 2. Deepen learning by then asking them to replace the Class 1, 2 and 3 labels and to think of a story problem with a completely different context, to show that one diagram could represent a variety of different problems.

ASSESSMENT CHECKPOINT Question 4 will allow you to assess which children have a firm understanding of interpreting multi-step word problems. Look in particular at how they have shown their workings.

ANSWERS Answers for the **Practice** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Unit 3: Addition and subtraction, Lesson 15

→ Textbook 4A p144

Problem solving – addition and subtraction 4

1 Mr Jones's school collected 5,000 bottles for a recycling competition.

- Class 1 collected 1,228 bottles.
- Class 3 collected 1,517 bottles.
- Class 4 collected 483 bottles.
- Class 2 think they collected the most bottles.

a) Complete both diagrams to show this problem.

5,000

5,000

b) Calculate how many bottles Class 2 collected. Which class collected the most bottles?

Th H T O Th H T O Th H T O

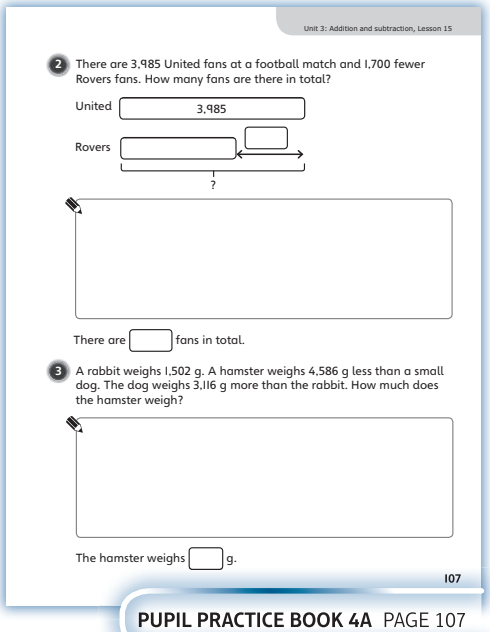
Class 2 collected ☐ bottles.

☐ bottles < ☐ bottles < ☐ bottles < ☐ bottles

Class ☐ collected the most bottles.

106

PUPIL PRACTICE BOOK 4A PAGE 106


Unit 3: Addition and subtraction, Lesson 15

2 There are 3,985 United fans at a football match and 1,700 fewer Rovers fans. How many fans are there in total?

United 3,985

Rovers ☐

?

There are ☐ fans in total.

3 A rabbit weighs 1,502 g. A hamster weighs 4,586 g less than a small dog. The dog weighs 3,116 g more than the rabbit. How much does the hamster weigh?

The hamster weighs ☐ g.

107

PUPIL PRACTICE BOOK 4A PAGE 107

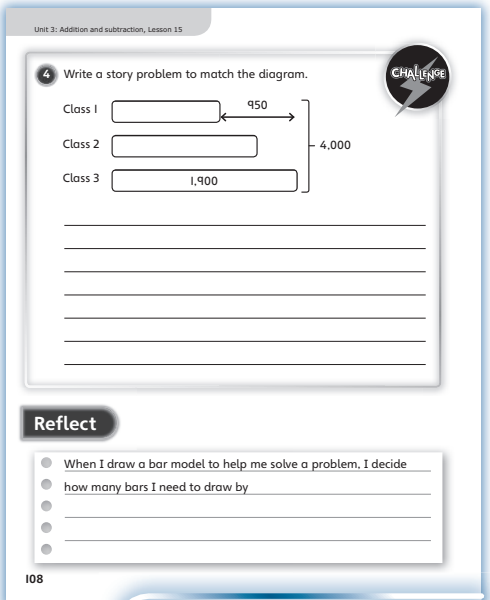
Reflect

WAYS OF WORKING Pair work

IN FOCUS This section asks children to reflect on how they decide what sort of bar diagram is needed to work out the answer to a problem. They should explain how they know how many bars the bar model needs to have to accurately reflect the problem and to show what the answer will be.

ASSESSMENT CHECKPOINT Look for children linking the pieces of information in a story problem to each bar of a bar model. It may help for children to give an example of a story problem in their explanation, and to describe how to show this on a bar model.

ANSWERS Answers for the **Reflect** part of the lesson appear in the separate **Practice and Reflect answer guide**.


Unit 3: Addition and subtraction, Lesson 15

4 Write a story problem to match the diagram.

CHALLENGE

Class 1 ☐ 950

Class 2 ☐ 4,000

Class 3 1,900

Reflect

When I draw a bar model to help me solve a problem, I decide how many bars I need to draw by

108

PUPIL PRACTICE BOOK 4A PAGE 108

After the lesson

- How did children approach **Practice** question 4?
- Could they create their own story problem?
- Will you need to run any extra intervention in which children solve more problems like these?

End of unit check

Don't forget the *Power Maths* unit assessment grid on p26.

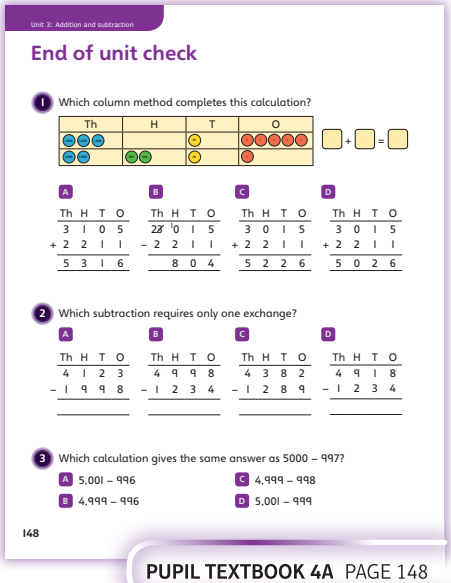
WAYS OF WORKING Group work – adult led

IN FOCUS This end of unit check will allow you to focus on children's understanding of addition and subtraction and whether they can apply their knowledge to solve problems.

- Look carefully at the answer that children give for question 5. It will tell you if they understand how to visually represent and then solve a problem.
- Encourage children to think through or discuss this section before writing their answer in **My journal**.

ANSWERS AND COMMENTARY

Children who have mastered the concepts in this unit should be secure with adding and subtracting 1s, 10s, 100s, 1,000s and adding two 4-digit numbers using the column method. They should be confident subtracting two 4-digit numbers using the column method and be able to use a range of mental addition and subtraction strategies. Children can also find equivalent difference. Children will be able to estimate answers to additions and subtractions, check their strategies and apply knowledge to solve addition and subtraction problems.



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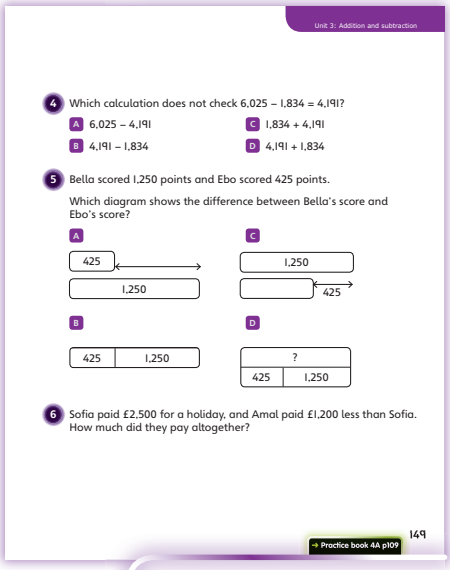


PUPIL TEXTBOOK 4A PAGE 149

Q	A	WRONG ANSWERS AND MISCONCEPTIONS	STRENGTHENING UNDERSTANDING
1	C	A suggests that children have misread the place value grid. B is a subtraction rather than an addition. D suggests that children think that 0 + 2 = 0.	Give practical support with place value to strengthen understanding. Using place value grids may help. For question 4, run an intervention in which children check answers using the inverse operation. Challenge children to match additions, subtractions and word problems with representations such as the bar model. Display the key vocabulary of the unit in your classroom.
2	D	A indicates children are insecure with identifying exchanges and B that they do not understand the term. C suggests children have not noticed that the exchange from the tens will mean an exchange from the hundreds is needed.	
3	B	Any other answer suggests that children do not understand equivalent difference.	
4	B	A suggests children have misunderstood the calculation. C or D suggest that children do not know how to check an answer using the inverse operation.	
5	A	C suggests that children do not understand how to use a comparison bar model to represent the given information. B and D suggest that children do not understand what 'difference' means.	
6	3,800	Children might have calculated £2,500 – £1,200 and then not worked out the total.	

My journal

WAYS OF WORKING Independent thinking

ANSWERS AND COMMENTARY

Question **1**

Children should be able to use their knowledge of rounding to estimate an answer and find out which number is greater than 6,800. They should be able to work this out mentally, without using the column method.

To complete the first calculation, children will need to use the inverse operation to work out the missing number. 8,634 – 1,849 = 6,785.

To complete the second calculation, children will need to calculate 9,000 – 2,026. They may realise that equivalent difference is a good method here: 8,999 – 2,025 = 6,974.

Question **2**

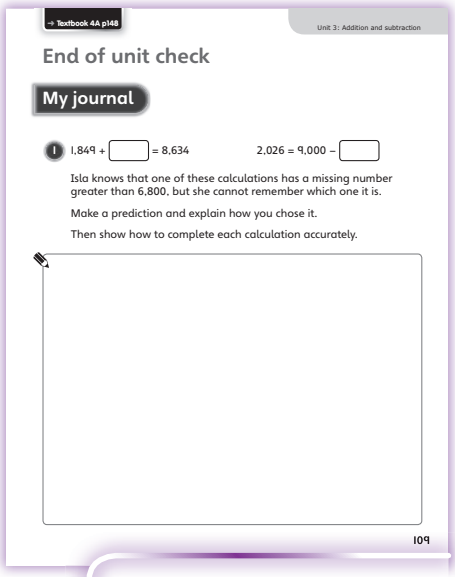
Jamilla scores 4,875 – 3,823 = 1,052.

The difference between Aki's score and Lee's score is 8,699 – 4,875 = 3,824.

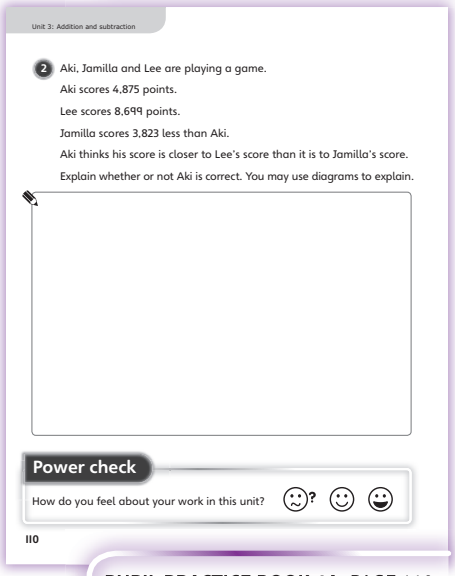
The difference between Aki's score and Jamilla's score is 4,875 – 1,052 = 3,823.

Aki's score is closer to Jamilla's score because 3,823 < 3,824.

Look for children using diagrams such as bar models to explain their answer and then using column subtraction to work out the differences.



PUPIL PRACTICE BOOK 4A PAGE 109



PUPIL PRACTICE BOOK 4A PAGE 110

Power check

WAYS OF WORKING Independent thinking

ASK

- *What visual representations and models helped you in this unit?*
- *What do you know now that you did not know at the start of the unit?*
- *What new words have you learnt and what do they mean?*

Power puzzle

WAYS OF WORKING Pair work or small groups

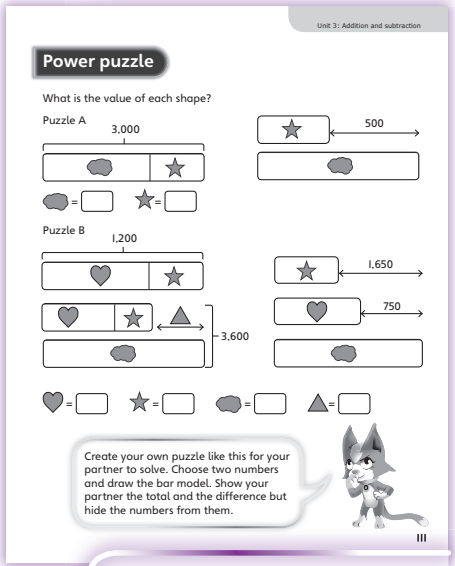
IN FOCUS Use this **Power puzzle** to assess children's problem-solving skills. Can they explain their methods or any strategies that they used?

ANSWERS AND COMMENTARY

Puzzle A: cloud = 1,750 star = 1,250

Puzzle B: heart = 1,050 star = 150 cloud = 1,800 triangle = 600

If children can solve these puzzles, it means they can interpret problems well and use learnt strategies to find a solution. Listen to the explanations of their strategies to check that they have not just guessed a number, but have used reasoning and logic. Encourage children to deepen their understanding by creating their own similar puzzle.



PUPIL PRACTICE BOOK 4A PAGE 111

After the unit

- Which children need further support and how will you provide this support?
- Are children ready for the next unit (Measure – perimeter)? How will you link this unit to finding perimeter?

Strengthen and **Deepen** activities for this unit can be found in the *Power Maths* online subscription.