White Rose Maths

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

- Add two 4-digit numbers - one exchange R
- Add two 4-digit numbers - more than one exchange R
- Add whole numbers with more than 4 digits (column method)
- Subtract two 4-digit numbers - one exchange R
- Subtract two 4-digit numbers - more than one exchange R
- Subtract whole numbers with more than 4 digits (column method)
- Round to estimate and approximate
- Inverse operations (addition and subtraction)
- Multi-step addition and subtraction problems

Notes for 2020/21

We feel it is important that children have a secure understanding of the column method for addition and subtraction, so we've suggested extra time on these key concepts.

It may be something that children have forgotten.

Add Two 4-digit Numbers (2)

Notes and Guidance

Children add two 4-digit numbers with one exchange. They use a place value grid to support understanding alongside column addition.

They explore exchanges as they occur in different place value columns and look for similarities/differences.

Mathematical Talk

How many ones do we have altogether? Can we make an exchange? Why? How many ones do we exchange for one ten? Do we have any ones remaining? (Repeat for other columns.)

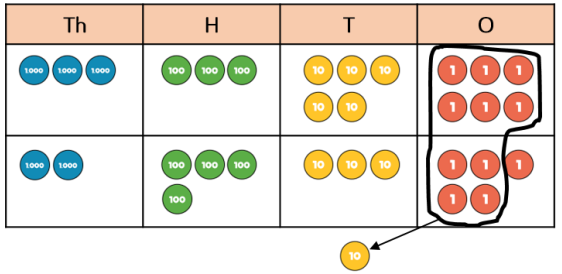
Why is it important to line up the digits in the correct column when adding numbers with different amounts of digits?

Which columns are affected if there are more than ten tens altogether?

Varied Fluency

R

- Rosie uses counters to find the total of 3,356 and 2,435



	Th	H	T	O
	3	3	5	6
+	2	4	3	5
	5	7	9	1
			1	

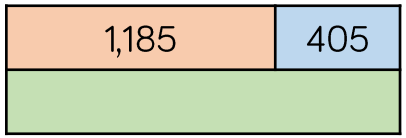
Use Rosie's method to calculate:

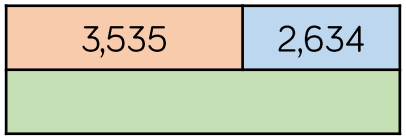
3,356 + 2,437 3,356 + 2,473 3,356 + 2,743

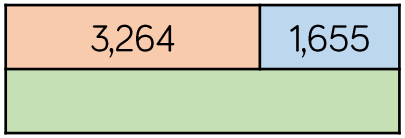
- Dexter buys a laptop costing £1,265 and a mobile phone costing £492

How much do the laptop and the mobile phone cost altogether?

- Complete the bar models.







Add Two 4-digit Numbers (2)

Reasoning and Problem Solving

R

What is the missing 4-digit number?

	Th	H	T	O
	___	___	___	___
+	6	3	9	5
	8	9	4	9

2,554

Annie, Mo and Alex are working out the solution to the calculation 6,374 + 2,823

Annie's Strategy

6,000 + 2,000 = 8,000
300 + 800 = 110
70 + 20 = 90
4 + 3 = 7
8,000 + 110 + 90 + 7 = 8,207

Mo's Strategy

	6	3	7	4
+	2	8	2	3
	8	1	9	7

Alex's Strategy

	6	3	7	4
+	2	8	2	3
				7
			9	0
	1	1	0	0
	8	0	0	0
	9	1	9	7

Who is correct?

Alex is correct with 9,197

Annie has miscalculated 300 + 800, forgetting to exchange a ten hundreds to make a thousand (showing 11 tens instead of 11 hundreds).

Mo has forgotten both to show and to add on the exchanged thousand.

Add Two 4-digit Numbers (3)

Notes and Guidance

Building on adding two 4-digit numbers with one exchange, children explore multiple exchanges within an addition.

Ensure children continue to use equipment alongside the written method to help secure understanding of why exchanges take place and how we record them.

Mathematical Talk

How many ones do we have altogether? Can we make an exchange? Why? How many ones do we exchange for one ten? How many ones are remaining? (Repeat for each column.)

Why do you have to add the digits from the right to the left, starting with the smallest place value column? Would the answer be the same if you went left to right?

What is different about the total of 4,844 and 2,156? Can you think of two other numbers where this would happen?

Varied Fluency

R

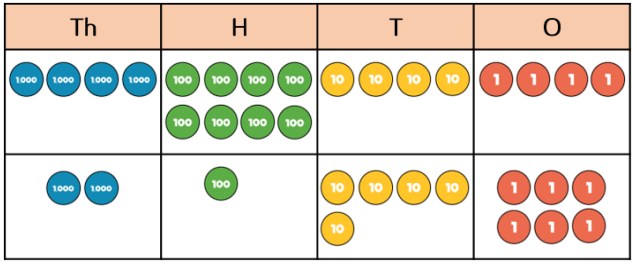
- Use counters and a place value grid to calculate:

	5	9	3	4
+	2	2	4	6

	3	2	7	5
+	6	1	5	6

	1	7	7	2
+	2	2	5	0

- Find the total of 4,844 and 2,156



	4	8	4	4
+	2	1	5	6

- Use <, > or = to make the statements correct.

3,456 + 789	◯	1,810 + 2,436
2,829 + 1,901	◯	2,312 + 2,418
7,542 + 1,858	◯	902 + 8,496
1,818 + 1,999	◯	3,110 + 707

Add Two 4-digit Numbers (3)

Reasoning and Problem Solving

R

Jack says,

When I add two numbers together I will only ever make up to one exchange in each column.

Do you agree?
Explain your reasoning.

Jack is correct. When adding any two numbers together, the maximum value in any given column will be 18 (e.g. 18 ones, 18 tens, 18 hundreds). This means that only one exchange can occur in each place value column.
Children may explore what happens when more than two numbers are added together.

Complete:

	Th	H	T	O
	6	?	?	8
+	?	?	8	?
	9	3	2	5

Mo says that there is more than one possible answer for the missing numbers in the hundreds column.
Is he correct?
Explain your answer.

The solution shows the missing numbers for the ones, tens and thousands columns.

6,__38 + 2,__87

Mo is correct. The missing numbers in the hundreds column must total 1,200 (the additional 100 has been exchanged).

Possible answers include:
6,338 + 2,987
6,438 + 2,887

Add More than 4-digits

Notes and Guidance

Children will build upon previous learning of column addition. They will now look at numbers with more than four digits and use their place value knowledge to line the numbers up accurately.

Children use a range of manipulatives to demonstrate their understanding and use pictorial representations to support their problem solving.

Mathematical Talk

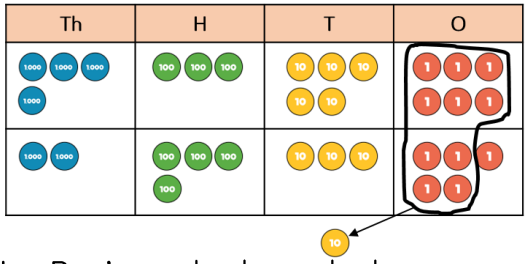
Will you have to exchange? How do you know which columns will be affected?

Does it matter that the two numbers don't have the same amount of digits?

Which number goes on top in the calculation? Does it affect the answer?

Varied Fluency

Ron uses place value counters to calculate 4,356 + 2,435



	Th	H	T	O
	4	3	5	6
+	2	4	3	5
	6	7	9	1
			1	

Use Ron's method to calculate:

	3	2	4	6	1
+		4	3	5	2

	4	8	2	7	6
+		5	6	1	3

Jack, Rosie and Eva are playing a computer game. Jack has 3,452 points, Rosie has 4,039 points and Eva has 10,989 points.

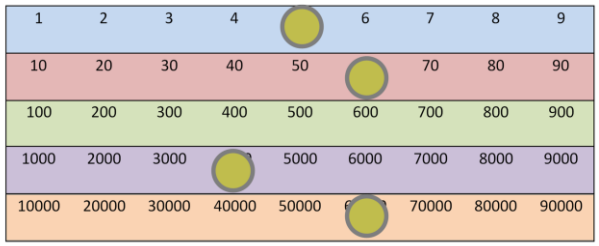
How many points do Jack and Rosie have altogether?
How many points do Rosie and Eva have altogether?
How many points do Jack and Eva have altogether?
How many points do Jack, Rosie and Eva have altogether?

Add More than 4-digits

Reasoning and Problem Solving

Amir is discovering numbers on a Gattegno chart.

He makes this number.



Amir moves one counter three spaces on a horizontal line to create a new number.

When he adds this to his original number he gets 131,130

Which counter did he move?

He moved the counter on the thousands row, he moved it from 4,000 to 7,000

Work out the missing numbers.

	?	4	?	3	?
+	2	?	5	?	2
	7	8	5	2	9

54,937 + 23,592 = 78,529

Subtract Two 4-digit Numbers (2)

Notes and Guidance

Building on their experiences in Year 3, children use their knowledge of subtracting using the formal column method to subtract two 4-digit numbers.

Children explore subtractions where there is one exchange. They use place value counters to model the exchange and match this with the written column method.

Mathematical Talk

When do we need to exchange in a subtraction?
How do we indicate the exchange on the written method?

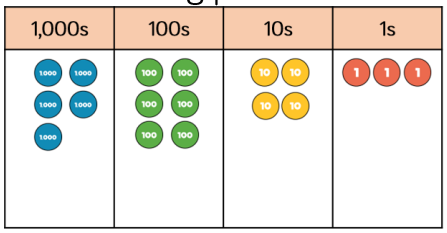
How many bars are you going to use in your bar model?
Can you find out how many tokens Mo has?
Can you find out how many tokens they have altogether?

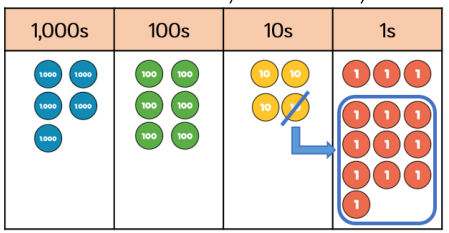
Can you create your own scenario for a friend to represent?

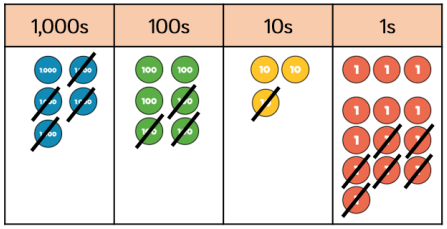
Varied Fluency

R

Dexter is using place value counters to calculate 5,643 – 4,316







	Th	H	T	O
	5	6	3 4	1 3
–	4	3	1	6
	1	3	2	7

Use Dexter's method to calculate:

4,721 – 3,605 = 4,721 – 3,650 = 4,172 – 3,650 =

Dora and Mo are collecting book tokens.
Dora has collected 1,452 tokens.
Mo has collected 621 tokens fewer than Dora.

Represent this scenario on a bar model.
What can you find out?

Subtract Two 4-digit Numbers (2)

Reasoning and Problem Solving

R

1,235 people go on a school trip.

There are 1,179 children and 27 teachers. The rest are parents.

How many parents are there?

Explain your method to a friend.

Add children and teachers together first.

1,179 + 27 = 1,206

Subtract this from total number of people.

1,235 – 1,206 = 29

29 parents.

Find the missing numbers that could go into the spaces.

Give reasons for your answers.

____ – 1,345 = 4__6

What is the greatest number that could go in the first space?

What is the smallest?

How many possible answers could you have?

What is the pattern between the numbers?

What method did you use?

Possible answers:

1,751 and 0
1,761 and 10
1,771 and 20
1,781 and 30
1,791 and 40
1,801 and 50
1,811 and 60
1,821 and 70
1,831 and 80
1,841 and 90
1,841 is the greatest
1,751 is the smallest.

There are 10 possible answers. Both numbers increase by 10

Subtract Two 4-digit Numbers (3)

Notes and Guidance

Children explore whathappens when a subtraction has more than oneexchange. They can continue to use manipulatives to support their understanding. Some children may feel confident calculating with a written method.

Encourage children to continue to explain their working to ensure they have a secure understanding of exchange within 4-digits numbers

Mathematical Talk

When do we need to exchange within a column subtraction?

What happens if there is a zero in the next column? How do we exchange?

Can you use place value counters or Base 10 to support your understanding?

How can you find the missing 4-digit number? Are you going to add or subtract?

Varied Fluency

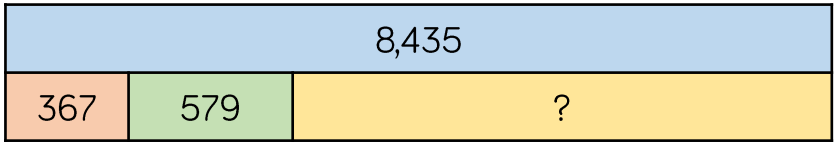
R

- Use place value counters and the column method to calculate:

5,783 – 844	6,737 – 759	8,252 – 6,560
1,205 – 398	2,037 – 889	2,037 – 1,589

- A shop has 8,435 magazines.
  367 are sold in the morning and 579 are sold in the afternoon.

  How many magazines are left?



  There are ____ magazines left.

- Find the missing 4-digit number.

	Th	H	T	O
	?	?	?	?
+	4	6	7	8
	7	4	3	1

Subtract Two 4-digit Numbers (3)

Reasoning and Problem Solving

R

Amir and Tommy solve a problem.

When I subtract 546 from 3,232 my answer is 2,714

Amir

Tommy

When I subtract 546 from 3,232 my answer is 2,686

Who is correct?
Explain your reasoning.
Why is one of the answers wrong?

Tommy is correct.

Amir is incorrect because he did not exchange, he just found the difference between the numbers in the columns instead.

There were 2,114 visitors to the museum on Saturday.
650 more people visited the museum on Saturday than on Sunday.

Altogether how many people visited the museum over the two days?

What do you need to do first to solve this problem?

First you need to find the number of visitors on Sunday which is
2,114 – 650 = 1,464

Then you need to add Saturday's visitors to that number to solve the problem.
1,464 + 2,114 = 3,578

Subtract More than 4-digits

Notes and Guidance

Building on Year 4 experience, children use their knowledge of subtracting using the formal column method to subtract numbers with more than four digits. Children will be focusing on exchange and will be concentrating on the correct place value.

It is important that children know when an exchange is and isn't needed. Children need to experience '0' as a place holder.

Mathematical Talk

Why is it important that we start subtracting the smallest place value first?

Does it matter which number goes on top? Why? Will you have to exchange? How do you know which columns will be affected?

Does it matter that the two numbers don't have the same amount of digits?

Varied Fluency

Calculate:

4,648 – 2,347

1,000s	100s	10s	1s
1000 1000 1000 1000	100 100 100 100 100 100	10 10 10 10	1 1 1 1 1 1 1 1

45,536 – 8,426

TTh	Th	H	T	O
10000 10000 10000 10000	1000 1000 1000 1000 1000	100 100 100 100	10 10 10	1 1 1 1 1 1

Represent each problem as a bar model, and solve them.

A plane is flying at 29,456 feet.
During the flight the plane descends 8,896 feet.
What height is the plane now flying at?

Tommy earns £37,506 pounds a year.
Dora earns £22,819 a year.
How much more money does Tommy earn than Dora?

There are 83,065 fans at a football match.
45,927 fans are male. How many fans are female?

Subtract More than 4-digits

Reasoning and Problem Solving

Eva makes a 5-digit number.

Mo makes a 4-digit number.

The difference between their numbers is 3,465

What could their numbers be?

Possible answers:

9,658 and 14,023
12,654 and 8,289
5,635 and 10,000

Etc.

Rosie completes this subtraction incorrectly.

$$\begin{array}{r} 28701 \\ -\ 7621 \\ \hline 21180 \\ \hline \end{array}$$

Explain the mistake to Rosie and correct it for her.

Rosie did not write down the exchange she made when she exchanged 1 hundred for 10 tens. This means she still had 7 hundreds subtract 6 hundreds when she should have 6 hundreds subtract 6 hundreds.
The correct answer is 21,080

Estimate and Approximate

Notes and Guidance

Children build on their understanding of estimating and rounding to estimate answers for calculations and problems. The term approximate is used throughout.

Encourage children to consider the most appropriate number to round to e.g. the nearest ten, hundred or thousand. Reinforce the idea that an estimate should be performed quickly by choosing much easier numbers.

Mathematical Talk

Which numbers shall I round to?

Why should I round to this number?

Why should an estimate be quick?

When, in real life, would we use an estimate?

Varied Fluency

Which is best to estimate the total of 22,223 and 5,687?

22,300 + 5,700

22,200 + 5,700

22,200 + 5,600

Here are the attendances from the last 3 months at a rugby club.

Month	Attendance
February	18,655
March	31,402
April	27,092

What is the approximate total of February and March?
What is the approximate difference between March and April?
What is the approximate total of the three months?

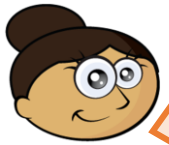
April and May had an approximate total of 50,000
Estimate the attendance in May.

Estimate and Approximate

Reasoning and Problem Solving

True or False?

49,999 – 19,999 = 50,000 – 20,000



I did not need to use a written method to work this out.

Dora

Can you explain why Dora's method work?

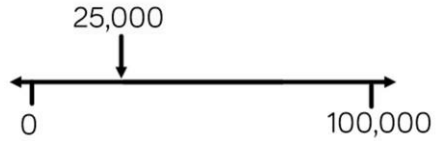
Can you think of another example where this method could be used?

True

Dora has used her related number facts. Both numbers on the right have increased by 1 therefore whatever the difference is, it will remain the same as the left hand side.

Which estimate is inaccurate?

a)



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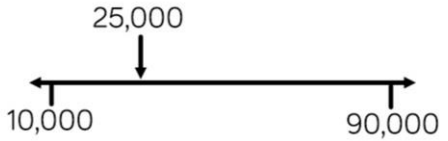
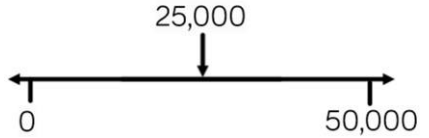


c)



Explain how you know.

B is inaccurate. The arrow is about a quarter of the way along the number line so it should be 30,000

Inverse Operations

Notes and Guidance

In this small step, children will use their knowledge of addition and subtraction to check their workings to ensure accuracy.

They use the commutative law to see that addition can be done in any order but subtraction cannot.

Mathematical Talk

How can you tell if your answer is sensible?

What is the inverse of addition?

What is the inverse of subtraction?

Varied Fluency

- When calculating 17,468 – 8,947, which answer gives the corresponding addition question?

  8,947 + 8,631 = 17,468

  8,947 + 8,521 = 17,468

  8,251 + 8,947 = 17,468

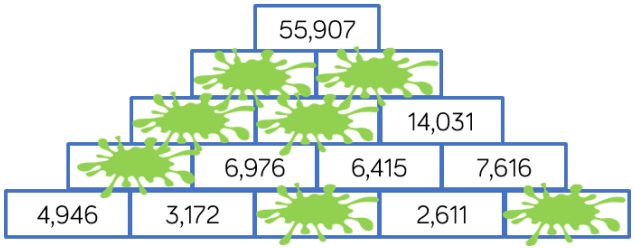
- I'm thinking of a number.
  After I add 5,241 and subtract 352, my number is 9,485
  What was my original number?

- Eva and Dexter are playing a computer game.
  Eva's high score is 8,524
  Dexter's high score is greater than Eva's.
  The total of both of their scores is 19,384
  What is Dexter's high score?

Inverse Operations

Reasoning and Problem Solving

Complete the pyramid using addition and subtraction.



From left to right:

Bottom row:
3,804, 5,005

Second row:
8,118

Third row:
15,094, 13,391

Fourth row:
28,485, 27,422

Mo, Whitney, Teddy and Eva collect marbles.

Mo: I have 1,648 marbles.

I have double the amount of marbles Mo has.

Whitney

Teddy: I have half the amount of marbles Mo has.

In total they have 8,524 marbles between them.
How many does Eva have?

Eva has 2,756 marbles.

Multi-step Problems

Notes and Guidance

In this small step children will be using their knowledge of addition and subtraction to solve multi-step problems.

The problems will appear in different contexts and in different forms i.e. bar models and word problems.

Mathematical Talk

What is the key vocabulary in thequestion?

What are the key bits ofinformation?

Can we put this information into amodel?

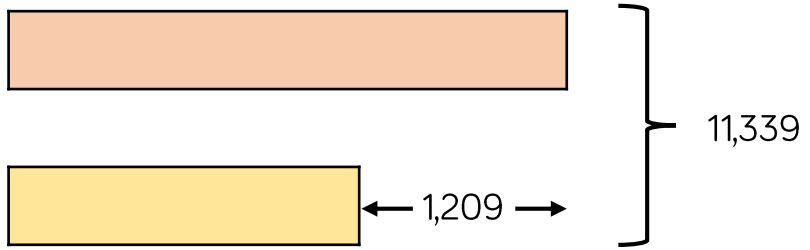
Which operations do we need touse?

Varied Fluency

- When Annie opened her book, she saw two numbered pages.
  The sum of these two pages was 317
  What would the next page number be?

- Adam is twice as old as Barry.
  Charlie is 3 years younger than Barry.
  The sum of all their ages is 53.
  How old is Barry?

- The sum of two numbers is 11,339
  The difference between the same two numbers is 1,209
  Use the bar model to help you find the numbers.



Multi-step Problems

Reasoning and Problem Solving

A milkman has 250 bottles of milk.

He collects another 160 from the dairy, and delivers 375 during the day.

How many does he have left?

Tommy

My method:

$375 - 250 = 125$

$125 + 160 = 285$

Do you agree with Tommy?
Explain why.

Tommy is wrong. He should have added 250 and 160, then subtracted 375 from the answer.

There are 35 bottles of milk remaining.

On Monday, Whitney was paid £114

On Tuesday, she was paid £27 more than on Monday.

On Wednesday, she was paid £27 less than on Monday.

How much was Whitney paid in total?

How many calculations did you do?

Is there a more efficient method?

£342

Children might add 114 and 27, subtract 27 from 114 and then add their numbers.

A more efficient method is to recognise that the '£27 more' and '£27 less' cancel out so they can just multiply £114 by three.