Autumn Scheme of Learning

Year 4/5

#MathsEveryoneCan

2019-20

White Rose Maths

How to use the mixed-age SOL

In this document, you will find suggestions of how you may structure a progression in learning for a mixed-age class.

Firstly, we have created a yearly overview.

Each term has 12 weeks of learning. We are aware that some terms are longer and shorter than others, so teachers may adapt the overview to fit their term dates.

The overview shows how the content has been matched up over the year to support teachers in teaching similar concepts to both year groups. Where this is not possible, it is clearly indicated on the overview with 2 separate blocks.

For each block of learning, we have grouped the small steps into themes that have similar content. Within these themes, we list the corresponding small steps from one or both year groups. Teachers can then use the single-age schemes to access the guidance on each small step listed within each theme.

The themes are organised into common content (above the line) and year specific content (below the line). Moving from left to right, the arrows on the line suggest the order to teach the themes.
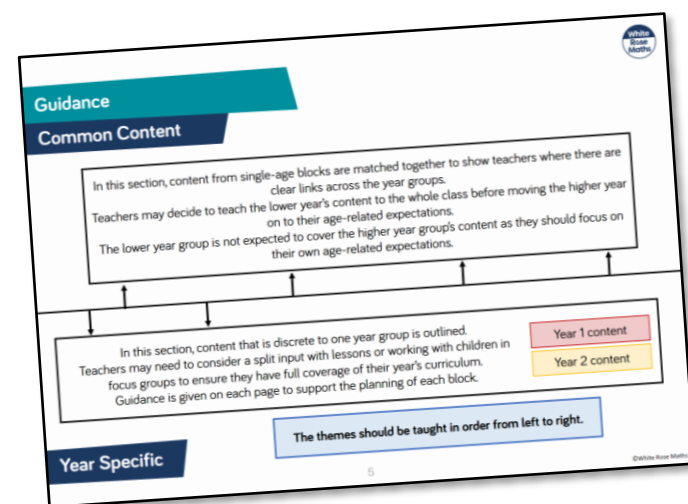
How to use the mixed-age SOL

Here is an example of one of the themes from the Year 1/2 mixed-age guidance.

Subtraction

Year 1 (Aut B2, Spr B1)
- How many left? (1)
- How many left? (2)
- Counting back
- Subtraction - not crossing 10
- Subtraction - crossing 10 (1)
- Subtraction - crossing 10 (2)

Year 2 (Aut B2, B3)
- Subtract 1-digit from 2-digits
- Subtract with 2-digits (1)
- Subtract with 2-digits (2)
- Find change - money

In order to create a more coherent journey for mixed-age classes, we have re-ordered some of the single-age steps and combined some blocks of learning e.g. Money is covered within Addition and Subtraction.

The bullet points are the names of the small steps from the single-age SOL. We have referenced where the steps are from at the top of each theme e.g. Aut B2 means Autumn term, Block 2. Teachers will need to access both of the single-age SOLs from our website together with this mixed-age guidance in order to plan their learning.

Points to consider
- Use the mixed-age schemes to see where similar skills from both year groups can be taught together. Learning can then be differentiated through the questions on the single-age small steps so both year groups are focusing on their year group content.
- When there is year group specific content, consider teaching in split inputs to classes. This will depend on support in class and may need to be done through focus groups .
- On each of the block overview pages, we have described the key learning in each block and have given suggestions as to how the themes could be approached for each year group.
- We are fully aware that every class is different and the logistics of mixed-age classes can be tricky. We hope that our mixed-age SOL can help teachers to start to draw learning together.

Common Content

In this section, content from single-age blocks are matched together to show teachers where there are clear links across the year groups.

Teachers may decide to teach the lower year's content to the whole class before moving the higher year on to their age-related expectations.

The lower year group is not expected to cover the higher year group's content as they should focus on their own age-related expectations.

In this section, content that is discrete to one year group is outlined.
Teachers may need to consider a split input with lessons or working with children in focus groups to ensure they have full coverage of their year's curriculum.
Guidance is given on each page to support the planning of each block.

Year 4 content

Year 5 content

Year Specific

The themes should be taught in order from left to right.

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	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value				Number: Addition and Subtraction			Number: Multiplication and Division			Measurement: Length, Perimeter and Area	
Spring	Number: Multiplication and Division		Number: Fractions						Number: Decimals (including Y5 Percentages)			
Summer	Number: Decimals (including Y4 Money)		Measurement: Time	Statistics		Geometry: Properties of Shape			Geometry: Position and Direction	Y4: Consolidation / Y5: Converting Units & Volume		Consolidation

Addition and Subtraction

Common Content

Addition

Year 4 (Aut B2)
- Add two 4-digit numbers - no exchange
- Add two 4-digit numbers - one exchange
- Add two 4-digit numbers - more than one exchange

Year 5 (Aut B2)
- Add whole numbers with more than 4-digits (column method)

Subtraction

Year 4 (Aut B2)
- Subtract two 4-digit numbers - no exchange
- Subtract two 4-digit numbers – one exchange
- Subtract two 4-digit numbers - more than one exchange
- Efficient subtraction

Year 5 (Aut B2)
- Subtract whole numbers with more than 4 digits (column method)

Estimate and check

Year 4 (Aut B2)
- Estimate answers
- Checking strategies

Year 5 (Aut B2)
- Round to estimate and approximate
- Inverse operations (addition and subtraction)

Add and subtract multiples of 10

Year 4 (Aut B2)
- Add and subtract 1s, 10s, 100s and 1'000s

In this block, the Year 4 steps for both addition and subtraction are broken down into steps that focus on the number of exchanges the children are dealing with. Whilst Year 5 only have one small step for both addition and subtraction, teachers may decide to recap previous learning or break down their learning in a similar way to Year 4.

Although Year 4 focus on 4-digit numbers and Year 5 focus on 5-digit numbers, the skills that children use are similar across both year groups allowing teachers to teach the class as a whole group.

Multi-step problems

Year 5 (Aut B2)
- Multi-step addition and subtraction problems

Year Specific

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Addition & Subtraction

Theme 1 – Add and subtract multiples of 10

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

Notes and Guidance

Children build on prior learning of adding and subtracting hundreds, tens and ones. They are introduced to adding and subtracting thousands.

Children should use concrete representations (Base 10, place value counters etc.) before moving to abstract and mental methods.

Mathematical Talk

Can you represent the numbers using Base 10 and place value counters? What's the same about the representations? What's different?

If we are adding tens, are the digits in the tens column the only ones that change? Do the ones/hundreds/thousands ever change?

Varied Fluency
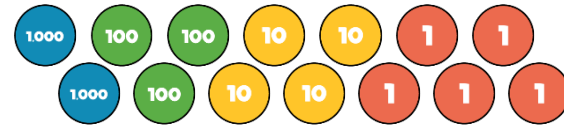
The number being represented is _____.

Add 3 thousands to the number. What do you have now?

Add 3 hundreds to the number. What do you have now?

Subtract 3 tens from the number. What do you have now?

Add 5 ones to the number. What do you have now?

Here is a number.

Thousands	Hundreds	Tens	Ones
5	3	8	2

Add 3 thousands to the number.
Subtract 4 thousands from the answer.
Subtract 2 ones.
Add 5 tens.
What number do you have now?

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

Reasoning and Problem Solving

Which questions are easy?
Which questions are hard?

$$8,273 + 4 = \_\_\_$$

$$8,273 + 4 \text{ tens} = \_\_\_$$

$$8,273 - 500 = \_\_\_$$

$$8,273 - 5 \text{ thousands} = \_\_\_$$

Why are some easier than others?

8,273 + 4 and 8,273 – 5 thousands are easier because you do not cross any boundaries. 8,723 + 4 tens and 8,273 – 500 are harder because you have to cross boundaries and make an exchange.

Mo says,

When I add hundreds to a number, only the hundreds column will change.

Is Mo correct? Explain your answer.

Mo is incorrect because when you add hundreds to a number and end up with more than ten hundreds, you have to make an exchange which also affects the thousands column.

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Addition & Subtraction

Theme 2 – Addition

Add Two 4-digit Numbers (1)

Notes and Guidance

Children use their understanding of addition of 3-digit numbers to add two 4-digit numbers with no exchange.

They use concrete equipment and a place value grid to support their understanding alongside column addition.

Mathematical Talk

How many ones are there altogether? Can we make an exchange? Why? (Repeat questions for other columns)

Is it more difficult to add 3-digit or 4-digit numbers without exchanging? Why?

How can you find the missing numbers? Do you need to add or subtract?

Varied Fluency

▪ Use counters and a place value grid to calculate 242 + 213

▪ Use counters and a place value grid to calculate 3,242 + 2,213

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

Now calculate 3,242 + 213 in the same way.
What is the same and what is different?

▪ Work out the missing numbers.

	Th	H	T	O
	4	___	6	___
+	2	5	___	1
	___	7	8	9

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Add Two 4-digit Numbers (1)

Reasoning and Problem Solving

Rosie adds 2 numbers together that total 4,444

Both numbers have 4 digits.

All the digits in both numbers are even.

What could the numbers be?

Prove it.

How many ways can you find?

Possible answers:

2,222 + 2,222
2,244 + 2,200
2,224 + 2,220
2,442 + 2,002
2,242 + 2,202
2,424 + 2,020
2,422 + 2,022
2,444 + 2,000

There are more possible pairs. This includes 0 as an even number. Discussion could be had around whether 0 is odd or even and why.

Two children completed the following calculation:

1,234 + 345

My answer is 1,589

Dora

My answer is 4,684

Alex

Both of the children have made a mistake in their calculations.

Calculate the actual answer to the question.

What mistakes did they make?

The actual answer is 1,579
Dora's mistake was a miscalculation for the 10s column, adding 30 and 40 to get 80 rather than 70
Alex's mistake was a place value error, placing the 3 hundred in the thousands column and following the calculation through incorrectly.

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

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

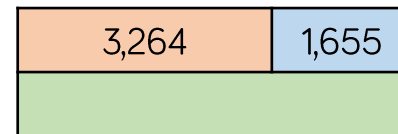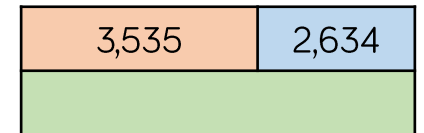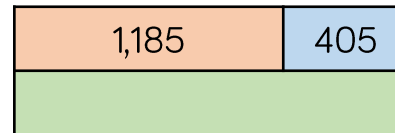Use Rosie's method to calculate:

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.

1,185	405

3,535	2,634

3,264	1,655

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Add Two 4-digit Numbers (2)

Reasoning and Problem Solving

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

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

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Add Two 4-digit Numbers (3)

Reasoning and Problem Solving

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:
$6,338 + 2,987$
$6,438 + 2,887$

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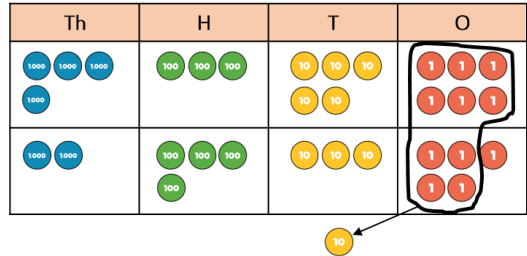
Th	H	T	O
4	3	5	6
+ 2	4	3	5
6	7	9	1

Use Ron's method to calculate:

	3	2	4	6	1
+		4	3	5	2

	4	8	2	7	6
+		5	6	1	3

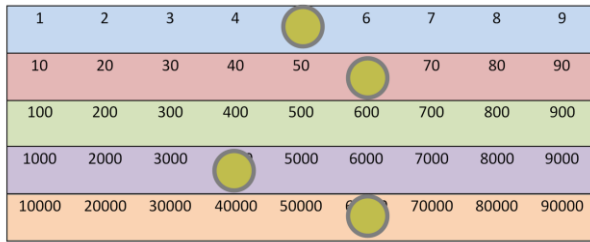Jack, Rosie and Eva are playing a computer game. Jack has 3,452 points, Rosie has 4,039 points and Eva has 10,989 points.

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.

1	2	3	4	5	6	7	8	9
10	20	30	40	50	60	70	80	90
100	200	300	400	500	600	700	800	900
1000	2000	3000	4000	5000	6000	7000	8000	9000
10000	20000	30000	40000	50000	60000	70000	80000	90000

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

$54,937 + 23,592 = 78,529$

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Addition & Subtraction

Theme 3 – Subtraction

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Subtract Two 4-digit Numbers (1)

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 will focus on calculations with no exchanges, concentrating on the value of each digit.

Mathematical Talk

Do you need to make both numbers when you are subtracting with counters? Why?

Why is it important to always subtract the smallest place value column first?

How are your bar models different for the two problems? Can you use the written method to calculate the missing numbers?

Varied Fluency

Eva uses place value counters to calculate $3,454 - 1,224$

Th	H	T	O
3	4	5	4
− 1	2	2	4
2	2	3	0

Use Eva's method to calculate:

$2,348 - 235 = \underline{\hspace{1cm}}$ $\underline{\hspace{1cm}} = 4,572 - 2,341$

$6,582 - 582 = \underline{\hspace{1cm}}$ $\underline{\hspace{1cm}} = 7,262 - 7,151$

Use a bar model to represent each problem.

There are 3,597 boys and girls in a school.
2,182 are boys. How many are girls?

Car A travels 7,653 miles per year.
Car B travels 5,612 miles per year.
How much further does Car A travel than Car B per year?

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Subtract Two 4-digit Numbers (1)

Reasoning and Problem Solving

Eva is performing a column subtraction with two four digit numbers.

The larger number has a digit total of 35

The smaller number has a digit total of 2

Use cards to help you find the numbers.

What could Eva's subtraction be?

How many different options can you find?

9998 – 1100 = 8898
9998 – 1010 = 8988
9998 – 1001 = 8997
9998 – 2000 = 7998
9989 – 1100 = 8889
9989 – 1010 = 8979
9989 – 1001 = 8988
9989 – 2000 = 7989
9899 – 1100 = 8799
9899 – 1010 = 8889
9899 – 1001 = 8898
9899 – 2000 = 7899
8999 – 1100 = 7899
8999 – 1010 = 7889
8999 – 1001 = 7998
8999 – 2000 = 6999

There are counters to the value of 3,470 on the table but some have been covered by the splat.
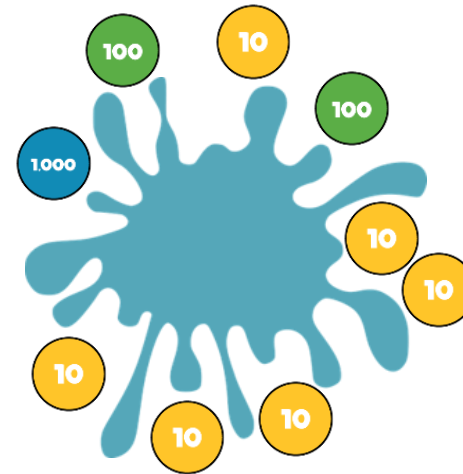
What is the total of the counters covered? How many different ways can you make the missing total?

3470 − 1260 = 2210

Possible answers include:

- two 1000s, two 100s and one 10

- twenty-two 100s and one 10

- twenty-two 100s and ten 1s

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

Dexter is using place value counters to calculate $5,643 - 4,316$
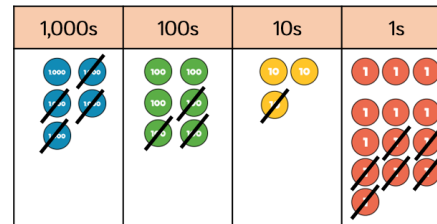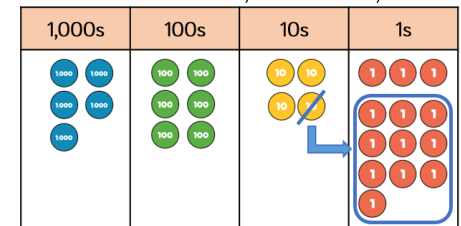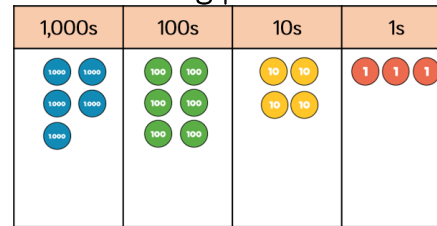
	Th	H	T	O
	5	6	3̸4	1̸3
−	4	3	1	6
	1	3	2	7

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?

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Subtract Two 4-digit Numbers (2)

Reasoning and Problem Solving

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.

$$\underline{\quad\quad} - 1,345 = 4\underline{\quad}6$$

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 what happens when a subtraction has more than one exchange. 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

Use place value counters and the column method to calculate:

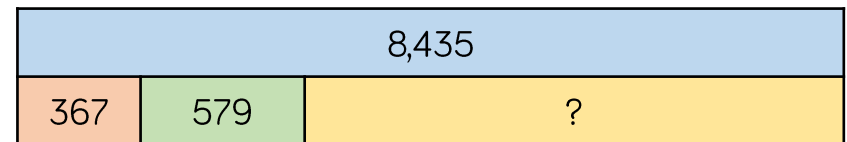|		
$5{,}783 - 844$	$6{,}737 - 759$	$8{,}252 - 6{,}560$
$1{,}205 - 398$	$2{,}037 - 889$	$2{,}037 - 1{,}589$

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

How many magazines are left?

8,435		
367	579	?

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

Amir and Tommy solve a problem.

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

Amir

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

Tommy

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.
$1,464 + 2,114 = 3,578$

Efficient Subtraction

Notes and Guidance

Children use their understanding of column subtraction and mental methods to find the most efficient methods of subtraction.

They compare the different methods of subtraction and discuss whether they would partition, take away or find the difference.

Mathematical Talk

Is the column method always the most efficient method?
When we find the difference, what happens if we take one off each number? Is the difference the same? How does this help us when subtracting large numbers?
When is it more efficient to count on rather than use the column method?
Can you represent your subtraction in a part-whole model or a bar model?

Varied Fluency

Ron, Rosie and Dexter are calculating $7,000 - 3,582$
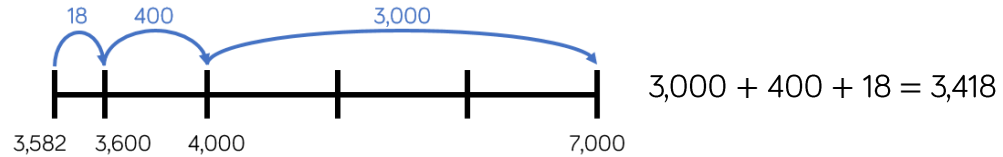
Here are their methods:

Ron

	Th	H	T	O
	$^6\!\!\!/7$	$^9\!\!\!/0$	$^9\!\!\!/0$	$^1 0$
−	3	5	8	2
	3	4	1	8

Rosie

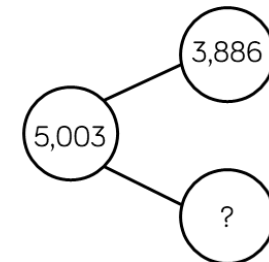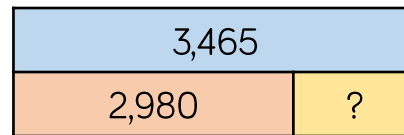|	Th	H	T	O
		6	9	9	9
−		3	5	8	1
		3	4	1	8

Dexter

$3,000 + 400 + 18 = 3,418$

Whose method is most efficient?
Use the different methods to calculate $4,000 - 2,831$

Find the missing numbers.
What methods did you use?

3,465	
2,980	?

3,886

5,003

?

Efficient Subtraction

Reasoning and Problem Solving

Amir has £1,000

He buys a scooter for £345 and a skateboard for £110

How much money does he have left?

Show 3 different methods of finding the answer.

Explain how you completed each one.

Which is the most effective method?

Children should use the three methods demonstrated in the varied fluency section to get an answer of £545

Look at each pair of calculations.
Which one out of each pair has the same difference as $2,450 - 1,830$?

$2,451 - 1,831$	$2,451 - 1,829$
$2,500 - 1,880$	$2,500 - 1,780$
$2,449 - 1,829$	$2,449 - 1,831$

When is it useful to use difference to solve subtractions?

$2,451 - 1,831$
Added one to each number.
$2,500 - 1,880$
Added 50 to both numbers.
$2,449 - 1,829$
Subtracted one from each number.

The difference is 620

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

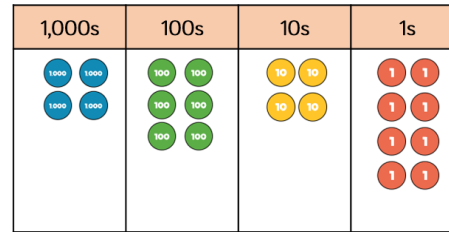Why is it important that we start subtracting the smallest place value first?

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

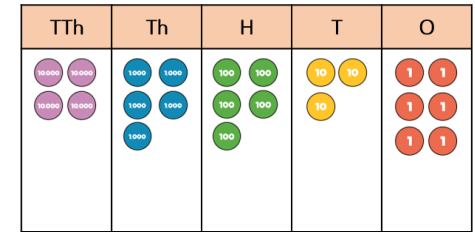Does it matter that the two numbers don't have the same amount of digits?

Varied Fluency

Calculate:

$$4,648 - 2,347 \qquad\qquad 45,536 - 8,426$$

1,000s	100s	10s	1s

TTh	Th	H	T	O

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

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Addition & Subtraction

Theme 4 – Estimate and check

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Estimate Answers

Notes and Guidance

In this step, children use their knowledge of rounding to estimate answers for calculations and word problems.

They build on their understanding of near numbers in Year 3 to make sensible estimates.

Mathematical Talk

When in real life would we use an estimate?

Why should an estimate be quick?

Why have you rounded to the nearest 10/100/1,000?

Varied Fluency

Match the calculations with a good estimate.

345 + 1,234	3,000 + 6,000
2,985 + 6,325	3,500 + 1,200
3,541 + 1,179	350 + 1,200
2,135 + 6,292	2,000 + 6,000

Alex is estimating the answer to 3,625 + 4,277
She rounds the numbers to the nearest thousand, hundred and ten to give different estimates. Complete her working.

Original calculation: 3,625 + 4,277 = ____
Round to nearest thousands: 4,000 + 4,000 = ____
Round to nearest hundreds: 3,600 + ____ = ____
Round to nearest tens: ____ + ____ = ____

Decide whether to round to the nearest 10, 100 or 1,000 and estimate the answers to the calculations.
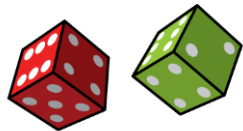
4,623 + 3,421   9,732 − 6,489   8,934 − 1,187

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Estimate Answers

Reasoning and Problem Solving

Game

The aim of the game is to get a number as close to 5,000 as possible.

Each child rolls a 1-6 die and chooses where to put the number on their grid.

Once they have each filled their grid, they add up their totals to see who is the closest.

	Th	H	T	O
	?	?	?	?
+	?	?	?	?

The aim of the game can be changed, i.e. make the smallest/largest possible total etc. Dice with more faces could also be used.

The estimated answer to a calculation is 3,400
The numbers in the calculation were rounded to the nearest 100 to find an estimate.
What could the numbers be in the original calculation?

Possible answers include

2,343 + 1,089 =

4,730 – 1,304 =

Use the number cards and + or − to make three calculations with an estimated answer of 2,500

1,295	1,120
4,002	1,489
3,812	1,449

3,812 – 1,295
(3,800 – 1,300 = 2,500)

4,002 – 1,489
(4,000 – 1,500 = 2,500)

1,449 + 1,120
(1,400 + 1,100 = 2,500)

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Checking Strategies

Notes and Guidance

Children explore ways of checking to see if an answer is correct by using inverse operations.

Checking using inverse is to be encouraged so that children are using a different method and not just potentially repeating an error, for example, if they add in a different order.

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

$$2,300 + 4,560 = 6,860$$

Use a subtraction to check the answer to the addition.
Is there more than one subtraction we can do to check the answer?

If we know $3,450 + 4,520 = 7,970$, what other addition and subtraction facts do we know?

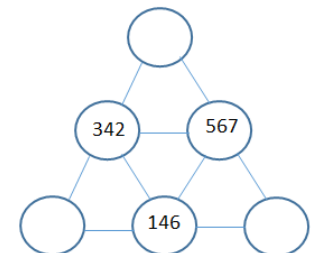$$\underline{\quad} + \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} - \underline{\quad} = \underline{\quad}$$

Does the equal sign have to go at the end? Could we write an addition or subtraction with the equals sign at the beginning? How many more facts can you write now?

Complete the pyramid.
Which calculations do you use to find the missing numbers?
Which strategies do you use to check your calculations?

342   567

146

33

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Checking Strategies

Reasoning and Problem Solving

Here is a number sentence.

$$350 + 278 + 250$$

Add the numbers in different orders to find the answer.
Is one order of adding easier? Why?

Create a rule when adding more than one number of what to look for in a number.

I completed an addition and then used the inverse to check my calculation.
When I checked my calculation, the answer was 3,800
One of the other numbers was 5,200
What could the calculation be?

$$\_\_\_ + \_\_\_ = \_\_\_$$

$$\_\_\_ - \_\_\_ = 3,800$$

It is easier to add 350 and 250 to make 600 and then add on 278 to make 878.
We can look for making number bonds to 10, 100 or 1,000 to make a calculation easier.

Possible answers:

$$5,200 - 1,400 = 3,800$$

$$9,000 - 5,200 = 3,800$$

In the number square below, each horizontal row and vertical column adds up to 1,200
Find the missing numbers.
Is there more than one option?

897		
		832
	762	

Check the rows and columns using the inverse and adding the numbers in different orders.

There are many correct answers.

Top row missing boxes need to total 303

Middle row total 368

Bottom row total 438

897	270	33
200	168	832
103	762	335

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.

35

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Estimate and Approximate

Reasoning and Problem Solving

True or False?

$49,999 - 19,999 = 50,000 - 20,000$

Dora

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

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)

25,000

0   100,000

b)

25,000

10,000   90,000

c)

25,000

0   50,000
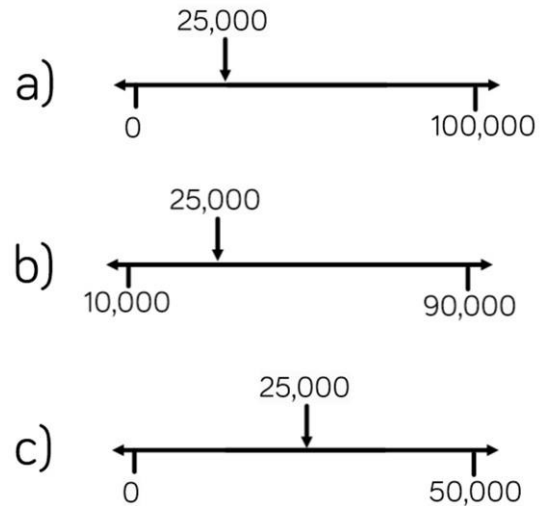
Explain how you know.

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

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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.

		55,907		
			14,031	
	6,976	6,415	7,616	
4,946	3,172		2,611	
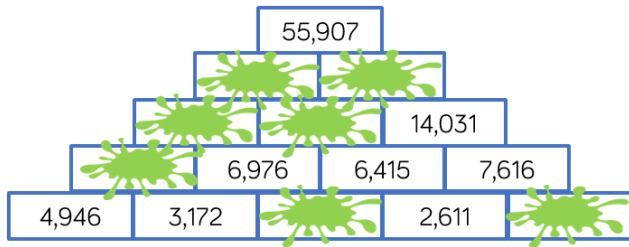
From left to right:

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

I have half the amount of marbles Mo has.

Teddy

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

Eva has 2,756 marbles.

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Addition & Subtraction

Theme 5 – Multi-step problems

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 the question?

What are the key bits of information?

Can we put this information into a model?

Which operations do we need to use?

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.

11,339

1,209
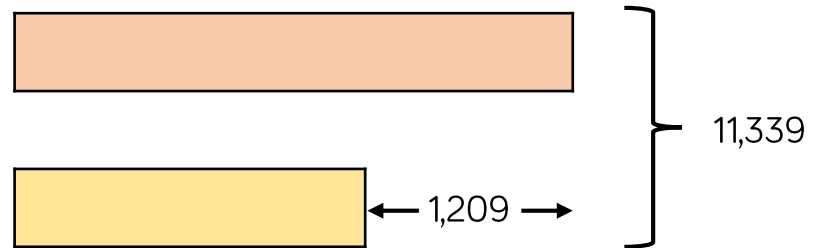
Multi-step Problems

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?

My method:

$375 - 250 = 125$

$125 + 160 = 285$

Tommy

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.