White Rose Maths

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

Notes for 2020/21

Add and subtract multiples of 100

Add and subtract 1s ⓡ

Add and subtract 3-digit and 1-digit numbers – not crossing 10

Add a 2-digit and 1-digit number - crossing 10 ⓡ

Add 3-digit and 1-digit numbers – crossing 10

Subtract a 1-digit number from 2-digits - crossing 10 ⓡ

Subtract a 1-digit number from a 3-digit number – crossing 10

Add and subtract 3-digit and 2-digit numbers – not crossing 100

Add 3-digit and 2-digit numbers – crossing 100

Subtract a 2-digit number from a 3-digit number – crossing 100

Add and subtract 100s

Spot the pattern – making it explicit

Add two 2-digit numbers - crossing 10 - add ones & add tens ⓡ

Subtract a 2-digit number from a 2-digit number - crossing 10 ⓡ

Children should have met addition and subtraction of 2-digits + 2-digits, although it may not be embedded and they may not have met the formal column method.

We have added steps that provide opportunity for recap/introduce the formal method of 2-digits + 2-digits.

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Overview

Small Steps

Notes for 2020/21

Add and subtract a 2-digit and 3-digit numbers – not crossing 10 or 100

Add a 2-digit and 3-digit numbers – crossing 10 or 100

Subtract a 2-digit number from a 3-digit number – crossing 10 or 100

Add two 3-digit numbers – not crossing 10 or 100

Add two 3-digit numbers – crossing 10 or 100

Subtract a 3-digit number from a 3-digit number – no exchange

Subtract a 3-digit number from a 3-digit number – exchange

Estimate answers to calculations

Check answers

Use the early steps in this unit to recap place value of 2-digit and 3-digit numbers.

You may want to omit the estimate and check answers steps and instead embed this throughout the other steps.

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Add & Subtract Multiples of 100

Notes and Guidance

Children are introduced to adding numbers greater than 100

They will apply their prior knowledge of adding and subtracting ones and tens to adding and subtracting multiples of 100

Using concrete manipulatives and pictorial representations throughout is important so the children can see the value of the digits.

Mathematical Talk

What is the same and what is different about 2 ones and 3 ones, 2 tens and 3 tens and 2 hundreds and 3 hundreds?

What is ____ hundreds and ____ hundreds equal to?

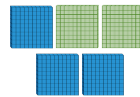How many different ways can you represent 200 + 300?

Varied Fluency

Complete:

2 ones and 3 ones is equal to ____ ones.
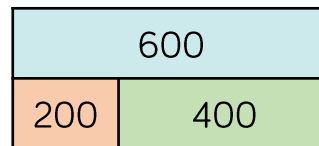
2 tens and 3 tens is equal to ____ tens.

2 hundreds and 3 hundreds is equal to ____ hundreds.

Complete each box for 400 + 500

Draw It	Write It	Part-Whole	Number Sentence
	___ hundreds and ___ hundreds is equal to ___ hundreds		___ + ___ = ___

Use the bar model to complete the number sentences.

600
200	400

___ + ___ = 600   600 = ___ − ___

___ + ___ = 600   600 = ___ − ___

___ − ___ = 400   400 = ___ − ___

___ − ___ = 200   200 = ___ − ___

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Add & Subtract Multiples of 100

Reasoning and Problem Solving

_____ + _____ = 800

Each of the missing numbers are multiples of 100

Find all the possible missing numbers.

0 + 800
100 + 700
200 + 600
300 + 500
400 + 400
500 + 300
600 + 200
700 + 100
800 + 0

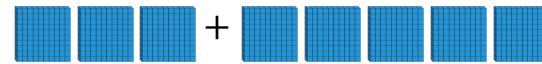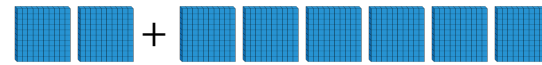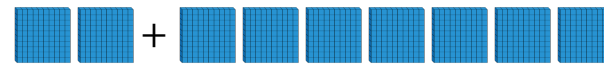If I know $700 - 500 = 200$, what else do I know?

Show me using concrete and pictorial representations.

Children may write all the related facts and link it to a bar model. They may also show $70 - 50$ or $7 - 5$

Odd One Out

Which is the odd one out?

Explain why.

Possible answers:
The odd one out could be $300 + 500 = 800$ because it does not have the number 200 in the calculation.

The odd one out could also be $200 + 700 = 900$ because the answer is not 800

Add and Subtract 1s

Notes and Guidance

Children should start seeing the pattern when we add and subtract 1 and comment upon what happens.

This is the step before finding ten more than or ten less than, as bridging beyond a 10 should not be attempted yet.

The pattern should be highlighted also by adding 2 (by adding another one) and then adding 3

Mathematical Talk

What happens when we add 2?

What is the link between adding 1 and adding 2?

What about if we want to add 3?

How can a bead string help when we are adding 1, 2, 3 etc.?

Where will be the best place to start on each number track? Why?

Varied Fluency

Create sentences based on the picture.

Example
There are 4 children playing in a park. One more child joins them so there will be 5 children playing together.

Continue the pattern

$$22 = 29 - 7$$
$$22 = 28 - 6$$

Can you create an addition pattern by adding in ones and starting at the number 13?

Continue the number tracks below.

31		34		

		45		48

			67	

	13			

Add and Subtract 1s

Reasoning and Problem Solving

True or False?

These four calculations have the same answer.

$1 + 4 + 2$ $4 + 2 + 1$

$2 + 4 + 1$ $4 + 1 + 2$

True, because they all equal 7 and addition is commutative.

These four calculations have the same answer.

$7 - 3 - 2$ $2 - 3 - 7$

$3 - 2 - 7$ $7 - 2 - 3$

False, because subtraction isn't commutative.

Jack's house

Annie's house
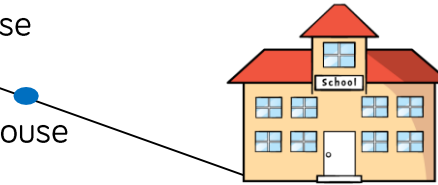
Jack lives 5 km from school.
Annie lives 4 km from school in the same direction.

What is the distance between Jack and Annie's houses?

After travelling to and from school, Jack thinks that he will walk 1 km more than Annie. Is he correct?
Explain your answer.

What will be the difference in distance walked after 2 school days?

1 km

No, he will walk 2 km further. 1 km on the way to school and 1 km on the way home.

4 km

7

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3-digit & 1-digit Numbers

Notes and Guidance

During this small step, children add and subtract ones from a 3-digit number without an exchange. They consider which digits are affected when adding ones. For example, if a child is completing $214 - 3$ and $214 + 3$ they see that they just need to focus on the ones column. Therefore, all they need to do is $4 + 3$ and $4 - 3$ respectively.
The use of the column method can be used but mental arithmetic is the best strategy.

Mathematical Talk

Which column do I need to focus on?

What is the same about the subtractions? What changes each time? Write the number sentence that would come next in each list. Can you write the number sentence that would come before?

Can you use $<$ and $>$ to compare Jack and Tommy's team points?

Varied Fluency

Hundreds	Tens	Ones

Use the place value grid to complete the calculations.

$$214 - 3 = \underline{\quad} \qquad\qquad 214 + 3 = \underline{\quad}$$

Complete:

$356 - 5 =$
$357 - 5 =$
$358 - 5 =$
$359 - 5 =$

$356 - 5 =$
$356 - 4 =$
$356 - 3 =$
$356 - 2 =$

$356 - 5 =$
$366 - 5 =$
$376 - 5 =$
$386 - 5 =$

Jack has 534 team points and gets four more.
Tommy has 534 team points and loses four of his.
How many team points does each person have?
Who has the most?

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3-digit & 1-digit Numbers

Reasoning and Problem Solving

Rosie has added or subtracted ones to get this answer.

Hundreds	Tens	Ones

What could her calculation have been?

Her starting numbers are between and include 340 and 350

Did you use a strategy?

Do you see a pattern?

Possible answers

340 + 2

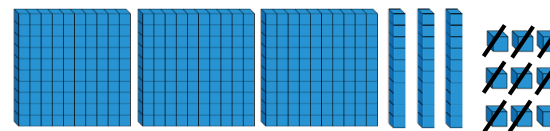341 + 1

342 + 0

343 – 1

344 – 2

345 – 3

346 – 4

347 – 5
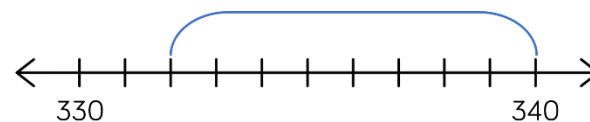
348 – 6

349 – 7

350 – 8

When the ones digit in the 3-digit number increases, the ones we subtract decreases.

Which image does not represent 339 – 8?

330   340

The number line does not, because it starts at 340 not 339

Alex thinks the chart shows 456 – 4
Do you agree?

Hundreds	Tens	Ones

Explain why.

No, I disagree. Alex has subtracted 4 tens not 4 ones.

Add 2-digits and 1-digit

Notes and Guidance

Before crossing the 10 with addition, children need to have a strong understanding of place value. The idea that ten ones are the same as one ten is essential here. They need to be able to count to 20 and need to be able to partition two-digit numbers in order to add them. They need to understand the difference between one-digit and two-digit numbers and line them up in columns. In order to progress to using the number line more efficiently, children need to be secure in their number bonds.

Mathematical Talk

Using Base 10, can you partition your numbers?
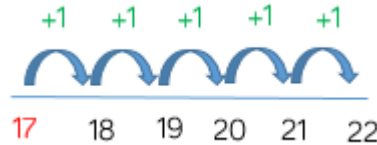
Can we exchange 10 ones for one ten?

How many ones do we have? How many tens do we have?

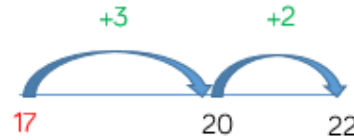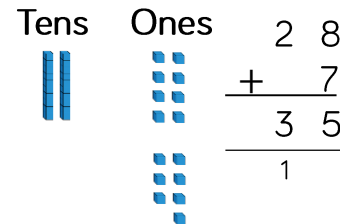Can you draw the Base 10 and show the addition pictorially?

Varied Fluency

$17 + 5 =$

Can you put the larger number in your head and count on the smaller number? Start at 17 and count on 5

Can we use number bonds to solve the addition more efficiently?

We can partition 5 into 3 and 2 and use this to bridge the 10
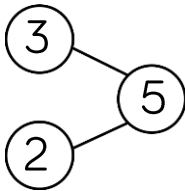
Find the total of 28 and 7

- Partition both the numbers.
- Add together the ones.
- Have we got 10 ones?
- Exchange 10 ones for 1 ten.
- How many ones do we have?
- How many tens do we have?

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Add 2-digits and 1-digit

Reasoning and Problem Solving

R

Always, Sometimes, Never

I am thinking of a two-digit number, if I add ones to it, I will only need to change the ones digit.

Explain your answer.

Sometimes, because if your ones total 10 or more you will have to exchange them which will change the tens digit.

Here are three digit cards.

6 7 8

Place the digit cards in the number sentence.

How many different totals can you find?

☐☐ + ☐ =

What is the smallest total?

What is the largest total?

$67 + 8 = 75$
$68 + 7 = 75$
$76 + 8 = 84$
$78 + 6 = 84$
$86 + 7 = 93$
$87 + 6 = 93$

75 is the smallest total.

93 is the largest total.

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Add 3-digit & 1-digit Numbers

Notes and Guidance

Children add ones to a 3-digit number, with an exchange. They discover that when adding ones it can affect the ones column and the tens column.

Children learn that we can only hold single digits in each column, anything over must be exchanged.

The use of 0 e.g. $145 - 5$ is important so they know to use zero as a place holder.

Mathematical Talk

When you add ones to a number does it always, sometimes or never affect the tens column?

What is the largest digit you can have in each column? Why?

How does using the number line support partitioning the number? What number bonds help us with this method?
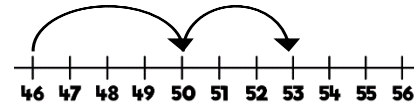
Varied Fluency

We can use Base 10 to solve $245 + 7$

Use this method to calculate:

| $357 + 8$ | $286 + 5$ | $419 + 1$ |

We can use a number line to calculate $346 + 7$

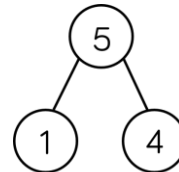$46 + 4 = 50$ $50 + 3 = 53$
so $346 + 7 = 353$

Use this method to calculate:

| $564 + 8$ | $716 + 9$ | $327 + 5$ |

We can partition our 1-digit number to calculate $379 + 5$

$379 + 1 = 380$ $380 + 4 = 384$

Use this method to calculate:

| $178 + 9$ | $826 + 7$ | $359 + 8$ |

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Add 3-digit & 1-digit Numbers

Reasoning and Problem Solving

Always, Sometimes, Never

When 7 and 5 are added together in the ones column, the digit in the ones column of the answer will always be 2

What other digits would always give a 2 in the ones column? Prove it.

Always

$1 + 1$

$2 + 0$

$9 + 3$

$8 + 4$

$6 + 6$

will also always give a 2 in the ones column.

Which questions are harder to calculate?

$$234 + 3 =$$

$$506 + 8 =$$

$$455 + 7 =$$

$$521 + 6 =$$

Explain your answer.

The second and third are harder as an exchange needs to be made.

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Subtract 1-digit from 2-digits

Notes and Guidance

Just as with addition, children need to have a strong understanding of place value for subtraction. Children need to be able to count to 20 and need to be able to partition two-digit numbers in order to subtract from them. They need to understand the difference between one-digit and two-digit numbers and line them up in columns.

In order to progress to using the number line more efficiently, children need to be secure in their number bonds.

Mathematical Talk

Are we counting backwards or forwards on the number line?
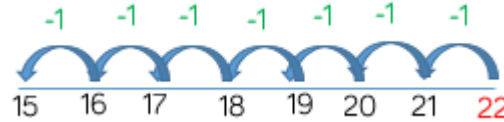
Have we got enough ones to subtract?

Can we exchange a ten for ten ones?

How can we show the takeaway? Can we cross out the cubes?
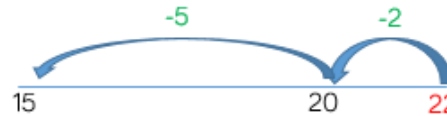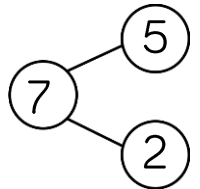
Varied Fluency

$22 - 7 =$

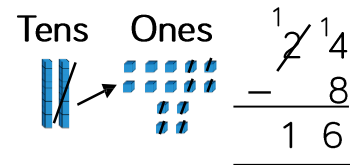Can you put the larger number in your head and count back the smaller number? Start at 22 and count back 7

Can we use number bonds to subtract more efficiently?

We can partition 7 into 5 and 2 and use this to bridge the 10

Subtract 8 from 24

Tens   Ones

- Do we have enough ones to take 8 ones away?
- Exchange one ten for ten ones.
- Take away 8 ones.
- Can you write this using the column method?

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Subtract 1-digit from 2-digits

Reasoning and Problem Solving

Jack and Eva are solving the subtraction $23 - 9$

Here are their methods:

Jack

I put 9 in my head and counted on to 23

Eva

I put 23 in my head and counted back 9

Who's method is the most efficient?

Can you explain why?

Can you think of another method to solve the subtraction.

Eva's method is most efficient because there are less steps to take. The numbers are quite far apart so Jack's method of finding the difference takes a long time and has more room for error.

Mo is counting back to solve $35 - 7$

He counts

35, 34, 33, 32, 31, 30, 29

Is Mo correct?

Explain your answer.

Match the number sentences to the number bonds that make the method more efficient.

$42 - 5$ $42 - 2 - 3$

$42 - 7$ $43 - 3 - 3$
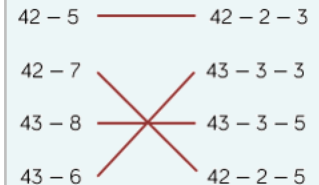
$43 - 8$ $43 - 3 - 5$

$43 - 6$ $42 - 2 - 5$

Mo is not correct as he has included 35 when counting back.

This is a common mistake and can be modelled on a number line.

$42 - 5$ ———— $42 - 2 - 3$

$42 - 7$ ⟍ ⟋ $43 - 3 - 3$

$43 - 8$ ⟋ ⟍ $43 - 3 - 5$

$43 - 6$ ———— $42 - 2 - 5$

Subtract 1-digit from 3-digits

Notes and Guidance

Children subtract a 1-digit number from a 3-digit number using an exchange.

Children need to be secure in the fact that 321 is 3 hundreds, 2 tens and 1 one but that it is also 3 hundreds, 1 ten and 11 ones.

If children are not secure with regrouping, it is important to revisit this before subtracting.
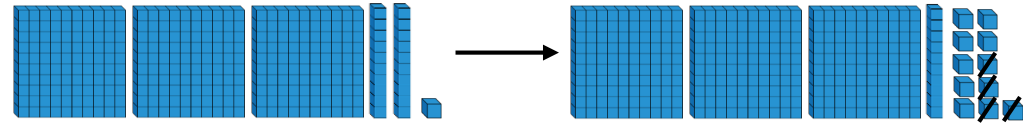
Mathematical Talk

How many ones do we exchange for one ten?

Why do all these subtractions require an exchange? When do we not need to exchange?

Which method do you prefer? Can you calculate the subtractions mentally?

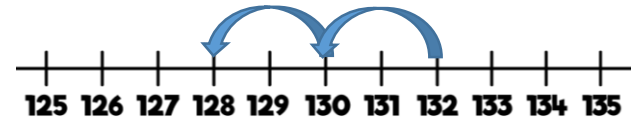## Varied Fluency

Teddy uses Base 10 to calculate $321 - 4$
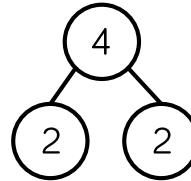
Use this method to calculate:

$322 - 4$ $\quad$ $322 - 7$ $\quad$ $435 - 7$

Dora uses the part-whole model and number line to solve $132 - 4$

125 126 127 128 129 130 131 132 133 134 135

Use this method to calculate:

$132 - 8$ $\quad$ $123 - 8$ $\quad$ $123 - 5$

Red team have 672 points.
Blue team have 7 fewer points than red team.
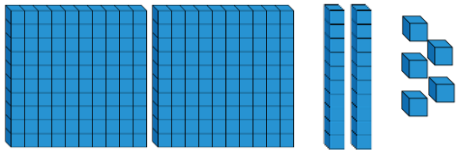How many points do blue team have?
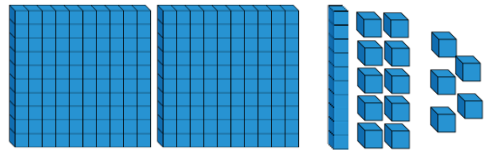
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Subtract 1-digit from 3-digits

Reasoning and Problem Solving

Ron and Jack use Base 10 to solve 225 – 8

Ron's method:

Jack's method:

Explain which method you would use and why.

Both methods can get the answer of 217 but I would choose Jack's because he has already exchanged one of his tens for ten ones.

Whitney has 125 stickers.
She gives less than 10 stickers to Eva.
She has an odd number of stickers left.
How many stickers might Whitney have given away?

What do you notice is the same about your answers?
If Whitney had an even number of stickers left, how many might she have given away?

Whitney might have given Eva 2, 4, 6 or 8 stickers.

All the answers are even.

If Whitney had an even number of stickers left she might have given 1, 3, 5, 7 or 9 away.

Explain how you would solve these calculations:

$$564 - \underline{\quad} = 558$$

$$\underline{\quad} - \ 8 \ = 725$$

$$352 = 361 - \underline{\quad}$$

Children explain their methods, they may count on or back, use a number line, part-whole model or Base 10

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3-digit & 2-digit Numbers

Notes and Guidance

Children look at what happens to a 3-digit number when a multiple of 10 is added or subtracted.

Different representations such as Base 10, arrow cards, place value charts should be used.

The use of the column method is exemplified in this example, but children should explore whether or not this is needed and explain why. Mental methods should be encouraged throughout.

Mathematical Talk

How many tens can we add to 352 without exchanging?
How many tens can we subtract from 352 without exchanging?

What patterns can you see between the additions and subtractions?
Can you see links between the columns?

Can you compare the calculations without finding the answer?

Varied Fluency

Hundreds	Tens	Ones

Use place value counters to complete the number sentences.

$352 + 4$ tens = ___ $352 - 2$ tens = ___

Complete:

$793 - 60 =$	$793 - 60 =$	$733 + 60 =$
$793 - 70 =$	$783 - 60 =$	$723 + 60 =$
$793 - 80 =$	$773 - 60 =$	$713 + 60 =$
$793 - 90 =$	$763 - 60 =$	$703 + 60 =$

Complete using $<$, $>$ or $=$

$773 + 1$ ◯ $773 + 10$
$653 + 10$ ◯ $653 - 10$
$647 + 10$ ◯ $657 - 10$
$721 + 10$ ◯ $653 + 10$

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3-digit & 2-digit Numbers

Reasoning and Problem Solving

Spot the Mistake

Amir

589 − 70 is equal to 582

What should the answer be?

Amir has subtracted 7 ones instead of 7 tens. The answer should be 519

Write **one** calculation that could complete **all** of the statements.

$456 - 10 < \boxed{}$

$466 + 1 > \boxed{}$

$466 + 0 = \boxed{}$

Possible answers include:

496 – 30
406 + 60
416 + 50

(Any calculation with an answer of 466)

When I calculated 392 subtract 20 I used my known fact that $9 - 2 = 7$

Rosie

Explain Rosie's method.

Rosie was able to use this fact because 9 tens subtract 2 tens is like doing 9 ones subtract 2 ones. We do not need to subtract any ones or hundreds so those columns will stay the same.

Add 3-digit & 2-digit Numbers

Notes and Guidance

Children add multiples of 10, to a 3-digit number with an exchange.

They recognise that when adding tens, it can change the tens and hundreds column. Encourage children to count in tens rather than use column addition.

Draw on knowledge of inverse to work out missing number problems.
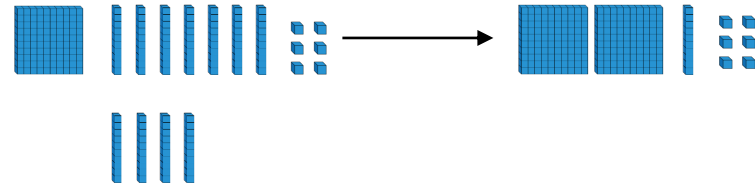
Mathematical Talk

How many tens do we have? How many tens do we need to exchange for 100?

If we know how to count in tens, do we always need to use the column method or other methods?

Would it be easier for us to just count up in our heads?
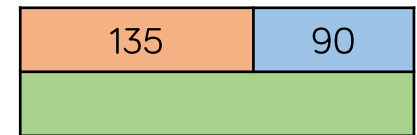
Varied Fluency

Mo uses Base 10 to calculate 176 + 40
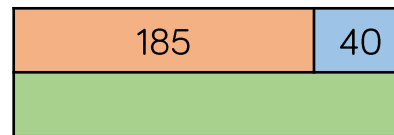
Use Mo's method to calculate:

276 + 40   266 + 40   266 + 70

Miss Wilson has 237 marbles in a box.
She adds 8 more bags of 10 marbles.
How many marbles does she have now?
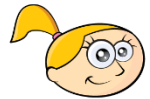Write the calculation for this problem.

Complete the bar models.

185	40

135	90

What do you notice?

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Add 3-digit & 2-digit Numbers

Reasoning and Problem Solving

Eva and Amir are calculating $783 + 90$

793, 803, 813, 823, 833, 843, 853, 863, 873

$783 + 100 = 883$
$883 - 10 = 873$

Whose method do you prefer?
Explain why.

Amir's method is a more efficient method of adding 90. Give children time to discuss each method and try them out with different numbers.

Sort these calculations into two groups.
Justify your answer.

$257 + 60$
$70 + 637$
$40 + 234$
$20 + 391$

Compare your groups with a friend. Are they the same?

Possible ways to sort:
Odds and evens
Over and under 500
Exchanging and not exchanging

Which is the odd one out? Why?

$336 + 80$

$453 + 60$

$347 + 70$

$285 + 80$

$285 + 80$ is the odd one out because in all the others the tens columns add up to 11 tens.

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Subtract 2-digits from 3-digits

Notes and Guidance

Children subtract multiples of 10 from a 3-digit number, with an exchange. The examples show different ways this concept could be taught using number lines and part-whole models.

The column method could be used, however, it is not the most efficient method.

Counting backwards in tens or using 100 to help will support mental strategies.
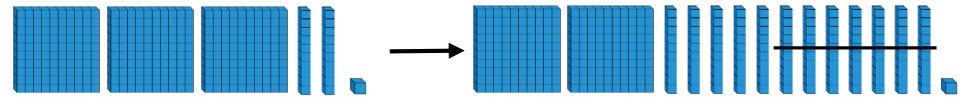
Mathematical Talk

How many tens do we exchange one hundred for?

How can we partition 70 to subtract it from 240 more efficiently? Show this on the number line.

Can you model Amir's method using a number line?

Varied Fluency

Rosie uses Base 10 to subtract 70 from 321

$$321 - 70 = 251$$

Use Rosie's method to calculate:

$321 - 80$ $421 - 6$ tens $451 - 60$

Count back in tens to solve $240 - 70$

160 170 180 190 200 210 220 230 240 250 260
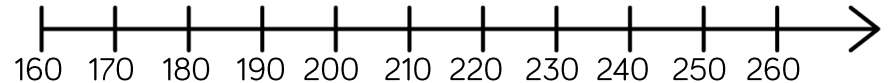
Amir calculates $425 - 90$ by subtracting 100 and then adding 10

$$425 - 100 = 325$$
$$325 + 10 = 335$$

Use Amir's method to solve:

$386 - 90$ $574 - 90$ $212 - 90$

Subtract 2-digits from 3-digits

Reasoning and Problem Solving

Complete the missing digits.

$$13\boxed{} - 50 = 85$$

$$334 - \boxed{}0 = 294$$

$$545 = 6\boxed{}5 - 70$$

135
40
615

Whitney thinks the rule for the function machine is subtract 60
Is she correct? Explain why.

Input	Rule	Output
567	→ ? →	497

She is wrong because 567 subtract 60 is 507

The rule is subtract 70

How many different methods could you use to solve 837 – 90?

Share your methods with a partner.

Possible methods:
$837 - 100 = 737$
$737 + 10 = 747$

$90 = 37$ and 53
(could show in part-whole model)
$837 - 37 = 800$
$800 - 53 = 747$

$837 - 30 = 807$
$807 - 60 = 747$

Expanded or formal written methods.

Add & Subtract 100s

Notes and Guidance

Children build on their knowledge of adding 100s together e.g. $300 + 500$, by adding ones and tens to solve calculations such as $234 + 500$

It is important to develop flexibility and ask the children why the column method isn't always the most effective method. Highlight that when adding and subtracting 100s, the ones and tens columns are not affected.

Mathematical Talk

What do you notice when we add and subtract 100s from a 3-digit number?

Do I need to add or subtract £200 to solve the worded problem? Can you show this on a number line or a bar model?

Is there more than one way to complete the boxes?

Varied Fluency

Use the place value grid and Base 10 to help you calculate two hundred and thirty-four add three hundred.

Hundreds	Tens	Ones

Eva has saved £675
She saved £200 more than Tommy.
How much has Tommy saved?

Complete the boxes with a calculation that either adds or subtracts 100s.

$401 + 300$		$961 - 200$

Smallest ⟶ Greatest

	$105 + 100$	$393 - 200$

Smallest ⟶ Greatest

Add & Subtract 100s

Reasoning and Problem Solving

Alex
$306 + 300 = 906 - 300$

Is she correct?
Explain how you know.

She is correct because both give an answer of 606

Teddy starts with the number 356
He adds a multiple of 100
His new number is greater than 500 but less than 800
Complete the table.

Numbers he couldn't have added	Numbers he could have added

He couldn't have added 100, 500 or 600 but he could have added 200, 300 or 400

Complete the scenarios so they match the bar model.

476	200
676	
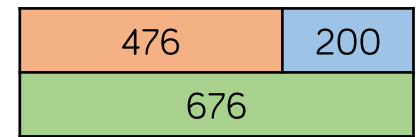
Ron has ____ altogether.
He spends _____ and has £476 pounds left.

Jack has _____
Eva has £200
They have ____ altogether.

Amir has £200 more than Rosie.
Amir has _____
Rosie has _____

Draw your own bar model where one of the parts is a multiple of 100
Write scenarios to match the bar model.

Ron has £676 altogether.
He spends £200 and has £476 pounds left.

Jack has £476
Eva has £200
They have £676 altogether.

Amir has £200 more than Rosie.
Amir has £676
Rosie has £476

Children will then draw their own bar models to match the numbers they have chosen.

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Pattern Spotting

Notes and Guidance

Children consolidate adding ones, tens and hundreds to 3-digit numbers.

Drawing the previous steps together, children look for patterns between calculations to enable them to predict answers and to develop their number sense.

Ensure children reflect on the similarities and differences between calculations to highlight the patterns.
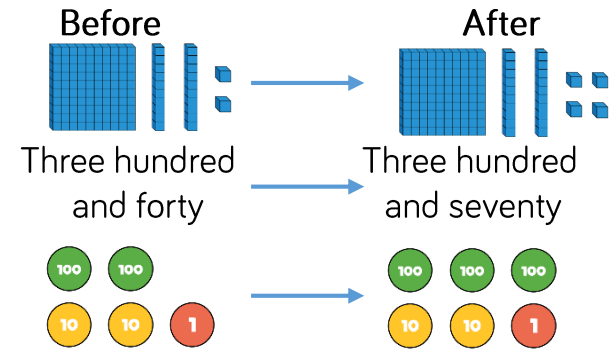
Mathematical Talk

What do you notice? Which strategy can we use to add these numbers?

Do we need to write a zero in the hundreds column when there are no hundreds left?

If I know $7 + 8 = 15$, what else do I know?

Varied Fluency

What has happened to each starting number? How do you know?

Before

Three hundred and forty

After

Three hundred and seventy

Calculate:

$253 + 2$	$253 + 20$	$253 + 200$
$253 - 2$	$253 - 20$	$253 - 200$

What is the same and what is different about each calculation?

If we know $250 + 40 = 290$, what else do we know?
Show your findings in part-whole models or bar models and write number sentences to match.

26

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Pattern Spotting

Reasoning and Problem Solving

Dora uses column addition to solve $251 + 4$

	2	5	1
+			4
	2	5	5

Is this the most efficient method?

Explain what Dora could have done.

Tell Dora how she can use your strategy to solve $241 + 40$ and $241 + 400$

The best strategy is to complete $1 + 4$, which is 5 and the 2 hundreds and 5 tens stay the same.

When adding 40 it is the tens column which Dora needs to look at because 40 is 4 tens.

When adding 400, she needs to look at the hundreds column because 400 is 4 hundreds.

Investigate

Does adding and subtracting ones to a 3-digit number only affect the ones column?

Does adding and subtracting tens to a 3-digit number only affect the tens column?

No, the ones can change the ones column and any column to the left e.g. $123 + 9$ and $402 - 4$
The tens column can change itself and the hundreds column e.g.
$456 + 50$ and $456 - 60$
When adding and subtracting from any column, it can only affect its own column and columns to the left.

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Add 2-digit Numbers (2)

Notes and Guidance

Children use Base 10 and partitioning to add together 2-digit numbers including an exchange. They could be encouraged to draw the Base 10 alongside recording any formal column method.

They have already seen what happens when there are more than 10 ones and should be confident in exchanging 10 ones for one 10.

Mathematical Talk

Can you represent the ones and tens using Base 10?
What is the value of the digits?
How many ones do we have altogether?
How many tens do we have altogether?
Can we exchange ten ones for one ten?
What is the sum of the numbers?
What is the total?
How many have we got altogether?

Varied Fluency

$64 + 17 =$ _____

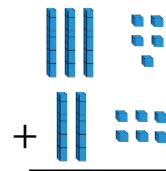$4 \text{ ones} + 7 \text{ ones} =$ _____

$6 \text{ tens} + 1 \text{ ten} =$ _____
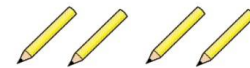
_____ tens + _____ ones = _____

$$\begin{array}{r} 6\,4 \\ +\,1\,7 \\ \hline 1\,1 \\ +\,7\,0 \\ \hline 8\,1 \end{array}$$

Find the sum of 35 and 26

- Partition both the numbers.
- Add together the ones. Have we got 10 ones?
- Exchange 10 ones for 1 ten.
- How many ones do we have?
- Add together the tens. How many do we have altogether?

Class 3 has 37 pencils.
Class 4 has 43 pencils.

How many pencils do they have altogether?

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Add 2-digit Numbers (2)

Reasoning and Problem Solving

R

Can you create a calculation where there will be an exchange in the ones and your answer will have two ones and be less than 100?	There are lots of possible solutions. E.g. 33 + 29 = 62
How many different ways can you solve 19 + 11? Explain your method to a partner. Use concrete or pictorial resources to help explain your method.	Children might add the ones and then the tens. Children should notice that 1 and 9 are a number bond to 10 which makes the calculation easier to complete mentally.

Find all the possible pairs of numbers that can complete the addition. How do you know you have found all the pairs? What is the same about all the pairs of numbers?	13 + 29 19 + 23 14 + 28 18 + 24 15 + 27 17 + 25 16 + 26 All the pairs of ones add up to 12

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Subtract with 2-digits (2)

Notes and Guidance

Children use their knowledge that one ten is the same as ten ones to exchange when crossing a ten in subtraction.

Continue to use concrete manipulatives (such as Base 10) and pictorial representations (such as number lines and part-whole models) to develop the children's understanding.

The skill of flexible partitioning is useful here when the children are calculating with exchanges.

Mathematical Talk

Have we got enough ones to take away?

Can we exchange one ten for ten ones?

How many have we got left?

What is the difference between the numbers?

Do we always need to subtract the ones first? Why do we always subtract the ones first?

Which method is the most efficient to find the difference, subtraction or counting on?
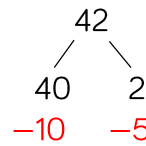
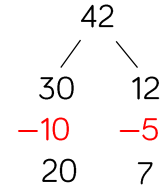## Varied Fluency

Use the number line to subtract 12 from 51

51

Can you subtract the ones first and then the tens?
Can you partition the ones to count back to the next ten and then subtract the tens?

$42 - 15 =$

42
/ \
40   2
-10 -5

We can't subtract the ones. Can we partition differently?

42
/ \
30   12
-10 -5
20   7

Now we can subtract the ones and then subtract the tens.
$42 - 15 = 27$

Take 16 away from 34
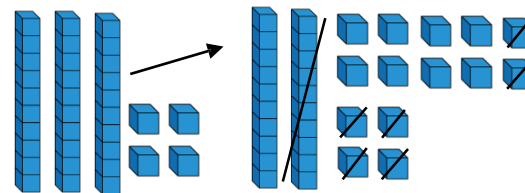
$$\begin{array}{r} {}^{2}\!\!\not{3}\ {}^{1}4 \\ -\ 1\ 6 \\ \hline 1\ 8 \end{array}$$

Subtract with 2-digits (2)

Reasoning and Problem Solving

Eva and Whitney are working out some subtractions.

I am working out
74 − 56

Whitney

One of my numbers in my question is 15

Eva

Whitney's answer is double Eva's answer.

What could Eva's subtraction be?

Whitney's answer is 18

Eva's answer is 9

Eva's question could be 15 − 6 or 24 − 15

Find the greatest whole number that can complete each number sentence below.

45 − 17 > 14 + ___

26 + 15 < 60 − ___

Explain your answer.

13

18

2-digit & 3-digit Numbers

Notes and Guidance

Children focus on the position of numbers and place value to add and subtract 2-digit and 3-digit numbers.

They represent numbers using Base 10 and line up the place value columns.

In this step, children add numbers without an exchange.

Mathematical Talk

Where would these digits go on the place value chart? Why?

When we subtract, why do we not make both numbers? Why do we make both numbers when we add?

What is the same about the additions and subtractions? What changes?

Varied Fluency

Match the calculation to the correct representation and solve.

26 + 461

H	T	O

553 − 32

H	T	O

544 + 22

H	T	O
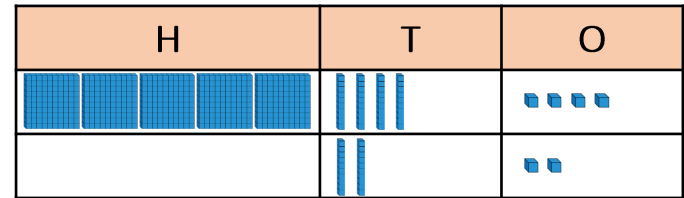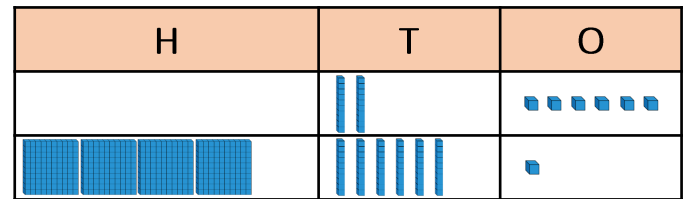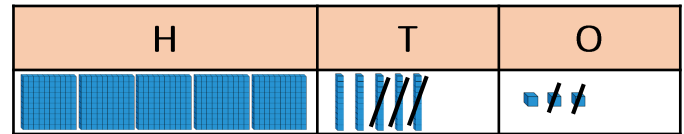
Represent the calculations using Base 10 and solve them.

388 − 44   167 + 32   265 − 43

Calculate:

365	365	365	365
+ 23	− 23	+ 32	− 32

2-digit & 3-digit Numbers

Reasoning and Problem Solving

Eva has 169 sweets in a jar.
She gives 37 sweets to Mo.
Which model represents this problem?

a)

132	
37	169

b)

169

132

37

c)

169	
37	132

d)

132

37

169
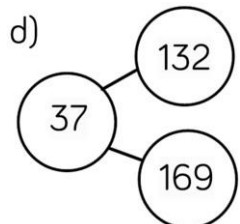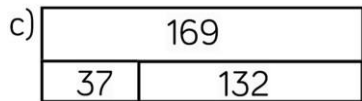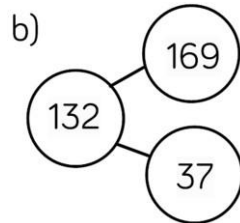
C is correct because

$37 + 132 = 169$

37 is a part, 132 is a part and 169 is the whole.

Explain the mistake Jack has made.

H T O
2 3 1

+ 6 3
____

Jack has put 63 in the wrong place value columns.

Rosie has 77 sweets.
Mo has 121 sweets.
Which addition will find how many sweets they have altogether?

$\begin{array}{r} 1\ 21 \\ +\ \ 77 \\ \hline \end{array}$ $\begin{array}{r} 77 \\ +1\ 21 \\ \hline \end{array}$

Explain your answer.

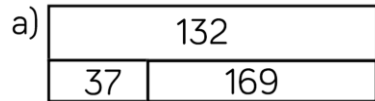Both are correct because addition is commutative and the numbers can be added either way round.

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Add 2-digit & 3-digit Numbers

Notes and Guidance

Children deepen their understanding of adding 2-digit and 3-digit numbers in this step. They start adding numbers where there is an exchange from ones to tens, they then move on to exchanging tens to hundreds before adding numbers where there are exchanges in both columns.

Highlight the links between the concrete representations and the column method to support children in understanding how the column method works.

Mathematical Talk

What happens when we have 10 ones in a column? How many tens do we exchange 10 ones for? How do we show the exchange in the column method?

What happens when we have 10 tens in a column? How many hundreds do we exchange 10 tens for? How do we show the exchange in the column method?

What do you notice about the additions in the models? How many exchanges do we need to make?

Varied Fluency

Annie uses Base 10 to calculate $317 + 46$
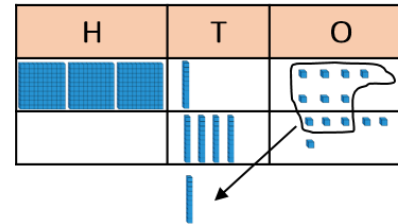
Use Annie's method to calculate:

$327 + 46$ $537 + 36$ $538 + 32$ $267 + 24$

Dexter uses place value counters to calculate $163 + 52$
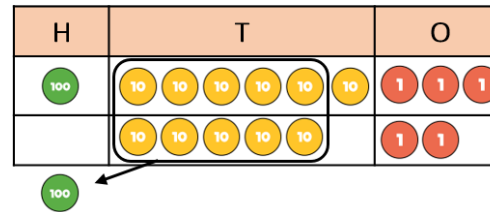
Use Dexter's method to calculate:

$372 + 64$ $537 + 82$ $537 + 72$ $248 + 70$

Complete the models using column addition.

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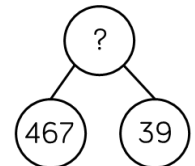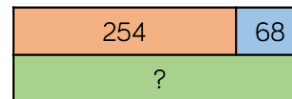
Add 2-digit & 3-digit Numbers

Reasoning and Problem Solving

Eva

$265 + 27 = 282$

Here is her working out:

	2	6	5
+		2	7
	2	8	2

Is she correct? Explain why.

Eva is incorrect because she has not exchanged ten ones for one ten or shown this in the column method.

She should have added an extra ten to the tens column. The correct answer is 292

Sort the additions into the table.

No exchange	Exchange 10 ones	Exchange 10 tens

$375 + 18$ $456 + 72$ $912 + 79$
$910 + 79$ $456 + 27$ $342 + 35$

Can you write 2 more additions in each column?

No exchange:
$910 + 79$
$342 + 35$

Exchange 10 ones
$375 + 18$
$456 + 27$
$912 + 79$

Exchange 10 tens
$456 + 72$

Choose one 2-digit and one 3-digit number.
Write additions that have an exchange in the ones and the tens columns.

23   35
81   56

756   467
487   619

$23 + 487$
$35 + 467$
$56 + 756$
$619 + 81$

Subtract 2-digits from 3-digits

Notes and Guidance

Children focus on the position of numbers and place value to subtract 2-digits from 3-digits using the column method. Children start by exchanging one ten for ten ones. Next they exchange one hundred for ten tens before subtracting numbers where there are exchanges in both columns. Encourage children to use Base 10 and place value counters so they can physically exchange and see the link between the concrete and the written column method.

Mathematical Talk

How does the concrete representation match the written column method?

How do you know that you need to exchange?

What do you notice about the subtractions to find the missing numbers? How many exchanges are there?

Varied Fluency

Teddy uses Base 10 to subtract 28 from 255

Use Teddy's method to calculate:

365 − 48   492 − 38   722 − 16

Alex uses place value counters to calculate 434 − 72

Use Alex's method to calculate:

248 − 67   247 − 67   354 − 92

Calculate the missing number in each model.
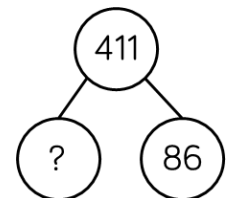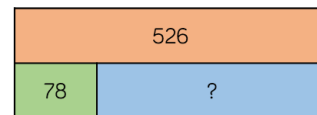
Subtract 2-digits from 3-digits

Reasoning and Problem Solving

Rosie thinks $352 - 89 = 337$

H	T	O
3	5	2
−	8	9
3	3	7

Is she correct?
Explain why.

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

$234 - 47 \bigcirc 234 - 57$

$472 - 84 \bigcirc 473 - 84$

$406 - 89 \bigcirc 416 - 99$

Rosie is incorrect because she has subtracted the digits in a different order instead of exchanging.

The answer should be 263

\>

\<

=

Alex, Teddy and Dora are trying to work out $300 - 57$

Who has the most efficient way of working it out?
Explain how you know.

Alex: I know that take away means difference, so I can do 299 take away 56 and get the right answer.

Teddy: I can count on from 57 to 100, and then count on to 300

Dora: I can use the column method to work it out and exchange when I need to.

Accept different answers as long as they are justified. Children might even suggest subtracting 60 and then adding 3

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Add Two 3-digit Numbers (1)

Notes and Guidance

Children add two 3-digit numbers with no exchange. They should focus on the lining up of the digits and setting the additions clearly out in columns.

Having exchanged between columns in recent steps, look out for children who exchange ones and tens when they don't need to.

Reinforce that we only exchange when there are 10 or more in a column.

Mathematical Talk

Where would these digits go on the place value chart? Why?

Why do we make both numbers when we add?

Can you represent____ using the equipment?

Can you draw a picture to represent this?

Why is it important to put the digits in the correct column?

Varied Fluency

Complete the calculations.

H	T	O
100 100 100 100	10 10 10 10	1 1 1 1 1 1 1
100 100 100	10 10 10	1 1

___ + ___ = ___

H	T	O
100 100	10 10 10 10 10	1 1 1 1 1 1
100 100 100 100 100	10 10 10 10	1 1 1

___ + ___ = ___

Use the column method to calculate:

- Three hundred and forty-five add two hundred and thirty-six.

- Five hundred and sixteen plus three hundred and sixty-two.

- The total of two hundred and forty-seven and four hundred and two.

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Add Two 3-digit Numbers (1)

Reasoning and Problem Solving

Jack is calculating 506 + 243

Here is his working out.

		5	6
+	2	4	3
	2	9	9

Can you spot Jack's mistake?
Work out the correct answer.

Jack hasn't used zero as a place holder in the tens column.
The correct answer should be 749

Here are three digit cards.

2   **3**   **4**

Alex and Teddy are making 3-digit numbers using each card once.

Alex: I have made the greatest possible number.

Teddy: I have made the smallest possible number.

Work out the total of their two numbers.

Alex's number is 432
Teddy's number is 234

The total is 666

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Add Two 3-digit Numbers (2)

Notes and Guidance

Children add two 3-digit numbers with an exchange. They start by adding numbers where there is one exchange required before looking at questions where they need to exchange in two different columns. Children may use Base 10 or place value counters to model their understanding. Ensure that children continue to show the written method alongside the concrete so they understand when and why an exchange takes place.

Mathematical Talk

How many ones do we need to exchange for one ten?

How many tens do we need to exchange for one hundred?

Can you work out how many points Eva and Ron scored each over the two games?

Why is it so important to show the exchanged digit on the column method?

Varied Fluency

Use place value counters to calculate 455 + 436

H	T	O
100 100 100 100	10 10 10 10 10	1 1 1 1 1
100 100 100 100	10 10 10	1 1 1 1 1 1

	4	5	5
+	4	3	6

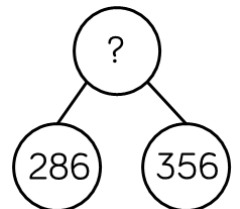Eva and Ron are playing a game.
Eva scores 351 points and Ron scores 478 points.
How many points do they score altogether?
How many more points does Ron score than Eva?

Eva and Ron play the game again.
Eva scores 281 points, Ron scores 60 less than Eva.
How many points do they score altogether?

Complete the models.

457	187

178	349

?
286 356

Add Two 3-digit Numbers (2)

Reasoning and Problem Solving

Roll a 1 to 6 die.

Fill in a box each time you roll.

$\square\square\square + \square\square\square =$

Can you make the total:

- An odd number

- An even number

- A multiple of 5

- The greatest possible number

- The smallest possible number

Discuss the rules with the children and what they would need to roll to get them e.g. to get an odd number only one of the ones should be odd because if both ones have an odd number, their total will be even.

Complete the statements to make them correct.

$487 + 368 \bigcirc 487 + 468$

$326 + 258 \bigcirc 325 + 259$

$391 + 600 = 401 + \underline{}$

Explain why you do not have to work out the answers to compare them.

$<$
$=$
590

In the first one we start with the same number, so the one we add more to will be greater.
In the second 325 is one less than 326 and 259 is one more than 258, so the total will be the same.
In the last one 401 is 10 more than 391, so we need to add 10 less than 600.

Subtract 3-digits from 3-digits (1)

Notes and Guidance

It is important for the children to understand that there are different methods of subtraction. They need to explore efficient strategies for subtraction, including:
- counting on (number lines)
- near subtraction
- number bonds

They then move on to setting out formal column subtraction supported by practical equipment.
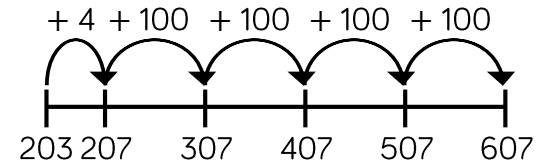
Mathematical Talk

Which strategy would you use and why?

How could you check your answer is correct?

Does it matter which number is at the top of the subtraction?

Varied Fluency

We can count on using a number line to find the missing value on the bar model. E.g.

607
203	404

$+ 4$ $+ 100$ $+ 100$ $+ 100$ $+ 100$

203 207   307   407   507   607

Use this method to find the missing values.

390
273	?

294
?	134
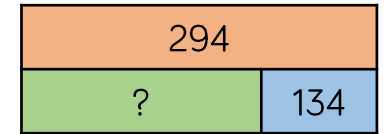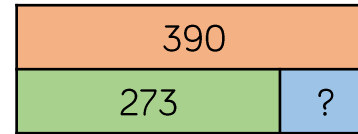
There are 146 girls and boys in a swimming club. 115 of them are girls. How many are boys?

Mo uses Base 10 to subtract 142 from 373

H	T	O
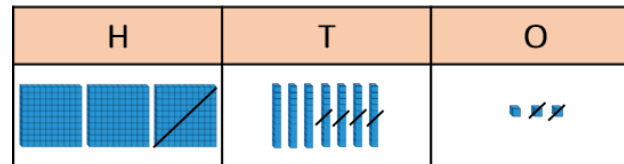
	3	7	3
—	1	4	2

Use Mo's method to calculate:
$565 - 154$ $565 - 145$ $565 - 165$

Subtract 3-digits from 3-digits (1)

Reasoning and Problem Solving

Start with the number 888
Roll a 1-6 die three times, to make a 3-digit number.
Subtract the number from 888
What number have you got now?

What's the smallest possible difference?

What's the largest possible difference?

What if all the digits have to be different?

Will you ever find a difference that is a multiple of 10? Why?

Do you have more odd or even differences?

The smallest difference is 222 from rolling 111

The largest difference is 777 from rolling 666

Children will never have a multiple of 10 because you can't roll an 8 to subtract 8 ones.

Children may investigate what is subtracted in the ones column to make odd and even numbers.

Use the digit cards to complete the calculation.

| 0 | 3 | 4 | 4 | 6 |

| 7 | 7 | 8 | 9 |

The digits in the shaded boxes are odd.

Is there more than one answer?

Possible answers include:

$987 - 647 = 340$

$879 - 473 = 406$

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Subtract 3-digits from 3-digits (2)

Notes and Guidance

Children explore column subtraction using concrete manipulatives. It is important to show the column method alongside so that children make the connection to the abstract method and so understand what is happening.
Children progress from an exchange in one column, to an exchange in two columns. Reinforce the importance of recording any exchanges clearly in the written method.

Mathematical Talk

Which method would you use for this calculation and why?

What happens when you can't subtract 9 ones from 7 ones? What do we need to do?

How would you teach somebody else to use column subtraction with exchange?

Why do we exchange? When do we exchange?

Varied Fluency

Complete the calculations using place value counters.

$372 - 145$

H	T	O
100 100 100	10 10 10 10 10 10 10	1 1

$629 - 483$

H	T	O
100 100 100 100 100 100	10 10	1 1 1 1 1 1 1 1 1

Complete the column subtractions showing any exchanges.

	H	T	O
	6	8	3
−	2	3	4

	H	T	O
	2	3	4
−	1	9	5

	H	T	O
	5	0	7
−	4	5	1

Subtract 3-digits from 3-digits (2)

Reasoning and Problem Solving

Work out the missing digits.

	H	T	O
	5	?	3
−	2	1	8
	3	1	5

	H	T	O
	?	0	?
−	2	?	8
	2	4	6

$533 − 218 = 315$

$504 − 258 = 246$

Eva is working out $406 − 289$

Here is her working out:

Step 1

Step 2

Explain her mistake.

What should the answer be?

Eva has exchanged from the hundred column to the ones so there are 106 ones in the ones column. She should have exchanged 1 hundred for 10 tens and then 1 ten for 10 ones.

$406 − 289 = 117$

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Estimate Answers

Notes and Guidance

Children check how reasonable their answers are. While rounding is not formally introduced until Year 4, it is helpful that children can refer to 'near numbers' to see whether an estimate is sensible.

Discuss why estimations are important. Consider real life situations where children or adults need to estimate. Encourage children to estimate calculations before working out precisely to help to check working.

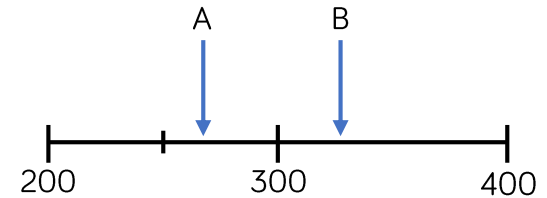## Mathematical Talk

What would you estimate this to be?

Why did you choose this number?

Why is/isn't this a sensible estimation to an answer?

How does estimating answers help us in real life?

Varied Fluency

Estimate the position of arrows A and B on the number line.
Use your estimations to estimate the difference between A and B.

A   B

200   300   400

Match each number to it's 'near number'.

| 497 | 304 | 52 | 27 |

| 30 | 500 | 50 | 300 |

Use the near numbers to estimate the answers to the calculations:

$497 + 304$ $304 - 27$ $27 + 52 + 304$

$27 + 304$ $497 - 52$ $304 - 52 - 27$

$52 + 497$ $497 - 304$ $304 + 52 - 27$

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Estimate Answers

Reasoning and Problem Solving

Tommy

> I estimate 143 − 95 will be 50 because I will subtract 100 from 150
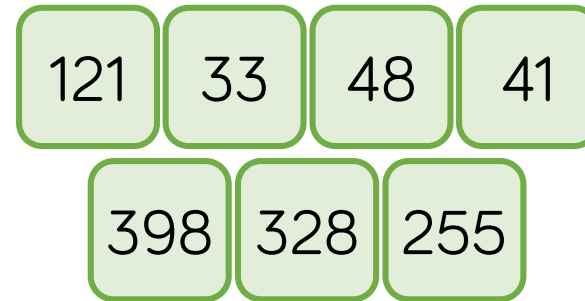
Is this a good estimate? Why?

Are there any other ways he could have estimated?

Yes, because he found two numbers close to the original numbers.

He could have rounded to the nearest 10 and calculated.

140 − 100 (= 40)

Use the number cards to make different calculations with an estimated answer of 70

| 121 | 33 | 48 | 41 |

| 398 | 328 | 255 |

Possible answers:

121 − 48
(120 − 50)

41 + 33
(40 + 30)

398 − 328
(400 − 330)

Check Answers

Notes and Guidance

Children explore ways of checking to see if an answer is reasonable.

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?

Does knowing if a number is close to a multiple of 100 help when adding and subtracting 3-digit numbers?
How does it help?

Does it help to check your answer if you spot which numbers are near to multiples of 10?

How does counting in 10s, 50s and 100s help?

Varied Fluency

Use a subtraction to check the answer to the addition.

$$134 + 45 = 179$$

Alex has baked 145 cakes for a bun sale.
She sells 78 cakes.
How many does she have left?

Show your answer using a bar model and check your answer using an addition.

Write all the calculations you could make using these cards.

| 660 | 120 | 540 | + | − | = |

Check Answers

Reasoning and Problem Solving

Mo

If I add two numbers together, I can check my answer by using a subtraction of the same numbers after e.g. to check $23 + 14$, I can do $14 - 23$

Do you agree? Explain why.

No, because you cannot have "part subtract part".

You need to find the whole and this needs to be at the start of the subtraction then you subtract a part to check the remaining part.

I completed an addition and then used the inverse to check my calculation.

When I checked my calculation, the answer was 250.

One of the other numbers was 355.

What could the calculation be?

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

$$\_\_\_ - \_\_\_ = 250$$

Possible answers:

$355 - 105 = 250$

$605 - 355 = 250$

So the calculation could have been:

$250 + 105 = 355$

$250 + 355 = 605$

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