White Rose Maths

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

1. Fact families – addition and subtraction bonds to 20
2. Check calculations
3. Compare number sentences
4. Related facts
5. Bonds to 100 (tens)
6. Add and subtract 1s
7. 10 more and 10 less
8. Add and subtract 10s
9. Add by making 10 (R)
10. Add a 2-digit and 1-digit number – crossing ten
11. Subtraction - crossing 10 (R)
12. Subtract a 1-digit number from a 2-digit number – crossing ten
13. Add two 2-digit numbers – not crossing ten – add ones and add tens
14. Add two 2-digit numbers – crossing ten – add ones and add tens

Notes for 2020/21

Adding by making 10 can be a difficult concept for children to grasp therefore we have included this as a recap from Year 1.

Similarly subtraction crossing 10 is recapped before children move onto more formal subtraction.

Overview

Small Steps

- Subtract a 2-digit number from a 2-digit number – not crossing ten
- Subtract a 2-digit number from a 2-digit number – crossing ten – subtract ones and tens
- Find and make number bonds (R)
- Bonds to 100 (tens and ones)
- Add three 1-digit numbers

Notes for 2020/21

Number bonds are an important aspect of mathematics. Extra time is devoted to this to help children become fluent.

Fact Families

Notes and Guidance

Children apply their understanding of known addition and subtraction facts within 20 to identify all related facts.
This will include an understanding of the relationship between addition and subtraction, and knowing the purpose of the equals sign, as well as the addition and subtraction signs.
Showing the link between representations, such as part-whole models and bar models can support and deepen the children's understanding.

Mathematical Talk

What if we took away the red flowers? What are the parts? What is the whole?

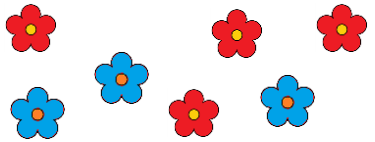
Does it change the answer if we add the blue and red flowers in a different order?

What does each circle represent on the part-whole model?

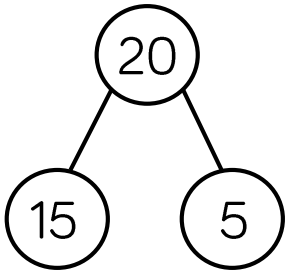
How many different number sentences are there in the fact family?

Varied Fluency

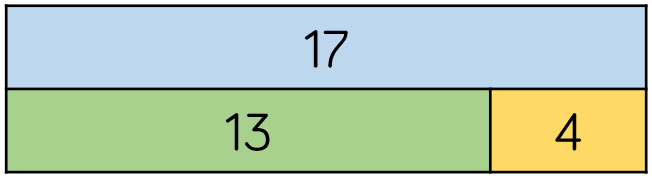
- Using concrete apparatus, can you talk about the relationships between the different flowers?



- One relationship shown by this part-whole model is 15 + 5 = 20
Can you write all associated number sentences in the fact family?



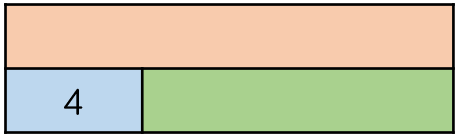
- Look at the bar model below.
Can you write all of the number sentences in the fact family?



Fact Families

Reasoning and Problem Solving

Here is an incomplete bar model.
The total is greater than 10 but less than 20
What could the missing numbers be?
How many different combinations can you find?



7 and 11
8 and 12
9 and 13
10 and 14
11 and 15
12 and 16
13 and 17
14 and 18
15 and 19

Rosie says,

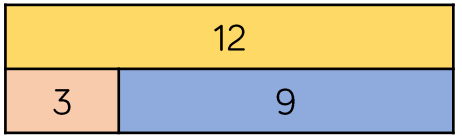
$8 - 5 = 3$
$8 - 3 = 5$
$8 = 5 - 3$
$3 = 8 - 5$

I think that all of these facts are correct because the numbers are related

Ron disagrees.
Who is correct? Can you prove it?

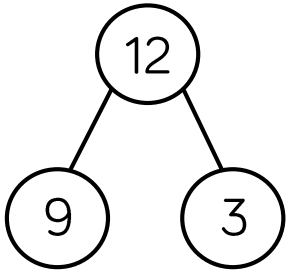
Ron is correct because 8 is not equal to 5 – 3

Which of the representations are equivalent to the bar model?



$12 = 9 + 3$

There are 9 cars in a car park, 3 cars leave.



$9 - 3 = 12$

The number line, the part-whole model and $12 = 9 + 3$

Check Calculations

Notes and Guidance

It is essential that children have the opportunity to discuss and share strategies for checking addition and subtraction calculations.
Checking calculations is not restricted to using the inverse.
Teachers should discuss using concrete resources, number lines and estimating as part of a wide range of checking strategies.

Mathematical Talk

What resources could you use to check your calculation?

Can you check it in more than one way?

Why do we need to check our calculation?

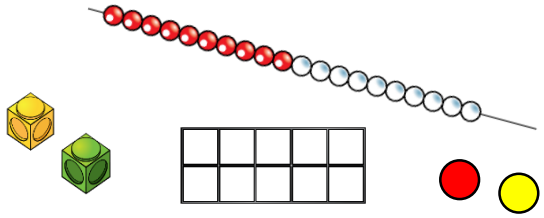
Is there another way you could represent this?

Varied Fluency

- Use concrete objects to check and prove whether the calculations are correct.

$12 - 4 = 8$

$7 + 8 = 15$



- Can you use inverse operations to check $5 + 12 = 17$?

How many possible inverse calculations are there?

- Eva writes this calculation: $18 - 5 = 13$
Which of the following could she use to check her work?

$13 + 5$	$13 - 5$
$18 - 13$	$5 + 13$

Check Calculations

Reasoning and Problem Solving

Eva did the following calculation:

$$12 - 8 = 4$$

She checked it by using the inverse.

She did $12 + 8 = 20$ and said that her first calculation was wrong.

What advice would you give her?

It should have been $8 + 4 = 12$ or $4 + 8 = 12$

Teddy is checking Dora's work but doesn't do an inverse calculation.

These calculations can't be right.

$$24 + 6 = 84$$
$$25 - 23 = 12$$
$$18 - 3 = 21$$

How might he know?

What errors have been made in each calculation?

All of the calculations involve errors:

6 has been added to the tens instead of the ones.

25 and 23 are very close in value and therefore can't result in such a large difference.

18 and 3 have been added instead of subtracted.

Compare Number Sentences

Notes and Guidance

Children should be encouraged to examine number sentences to find missing values using structure rather than calculation.
Using numbers within 20 to explore mathematical relationships will give the children confidence and allow them to spot patterns because they are working within the context of familiar numbers.
Children should compare similar calculations using greater than, less than and equal to symbols.

Mathematical Talk

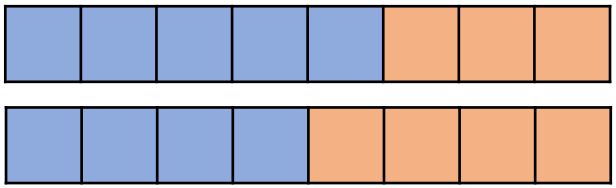
What other numbers make the same total?

Do we need to calculate the answer to work out the missing symbol?

Do you notice a pattern? What would come next?

Varied Fluency

- How can we use the following representation to prove that $5 + 3 = 4 + 4$?



- Fill in the circles with either $<$, $>$ or $=$

$6 + 4 \bigcirc 6 + 5$

$6 + 4 \bigcirc 3 + 6$

$11 - 4 \bigcirc 12 - 5$

$11 - 4 \bigcirc 12 - 4$

- Complete the missing numbers.

$5 + 3 = 6 + \_\_\_\_\_$

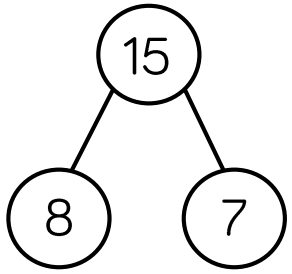
$5 + 3 = \_\_\_\_\_ + 6 = 7 + \_\_\_\_\_$

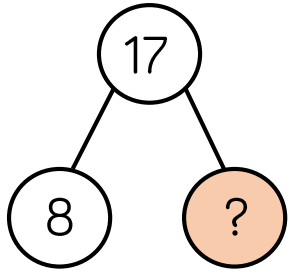
$\_\_\_\_\_ + 3 = \_\_\_\_\_ + 4 = 5 + 5$

Compare Number Sentences

Reasoning and Problem Solving

Rosie thinks she knows the missing number without calculating the answer.





Can you explain how this could be possible?

17 is two more than 15, so the missing number must be two more than 7

The missing number must be 9

Both missing numbers are less than 10

$$7 + \square < 7 + \square$$

How many different possible answers can you find?

Lots of different combinations, the left number has to be smaller than the right.

Possible answers:
1 and 2
1 and 3
1 and 4
1 and 5
1 and 6
1 and 7
1 and 8
1 and 9
2 and 3
Etc.

Related Facts

Notes and Guidance

Children should have an understanding of calculations with similar digits. For example, $2 + 5 = 7$, so $20 + 50 = 70$
This involves both addition and subtraction. It is important to highlight the correct vocabulary and help children to notice what is the same and what is different between numbers and calculations.
'Tens' and 'ones' should be used to aid understanding.
Using Base 10 can also help the children to see relationships.

Mathematical Talk

What is the same? What is different?

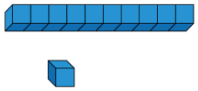
How does Base 10 help us to see the relationships between the different numbers and calculations?

What do you notice about the part-whole models?

Is there a relationship between the numbers that are represented?

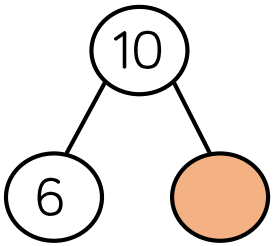
Varied Fluency

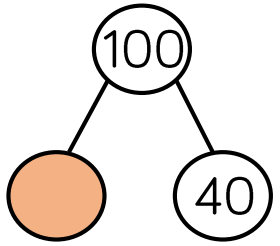
I have 3 blue pens and 4 black pens. Altogether I have 7 pens.
Tommy has 30 blue pens and 40 black pens. How many pens does he have in total?



Use concrete apparatus to show your thinking.

Complete the part-whole models below:





Find the missing numbers in the related facts.

$5 + 4 = 9$ $\quad$ $8 = 3 + 5$ $\quad$ $4 = 10 - 6$

$50 + 40 =$ _____ $\quad$ $80 = 30 +$ _____ $\quad$ $40 =$ _____ $- 60$

Related Facts

Reasoning and Problem Solving

Continue the pattern.

$$90 = 100 - 10$$
$$80 = 100 - 20$$
$$70 = 100 - 30$$

What are the similarities and difference between this pattern and the following one?

$$9 = 10 - 1$$
$$8 = 10 - 2$$
$$7 = 10 - 3$$

$60 = 100 - 40$
$50 = 100 - 30$
Etc.

The digits are the same but the place value changes.

Alex says,

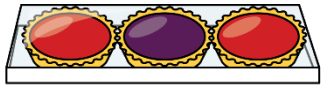
If I know $9 + 1 = 10$, I can work out $90 + \_\_\_ = 100$

Find the missing number and explain how Alex knows.

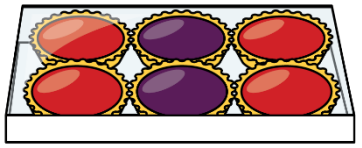
10

All the numbers are ten times greater.

Whitney has 3 jam tarts.



Tommy has 6 jam tarts.



Altogether they have 9 jam tarts.

$3 + 6 = 9$
So
$\_\_\_ + \_\_\_ = 90$

What if all of the red jam tarts are eaten?

What if all of the purple jam tarts are eaten?

$30 + 60 = 90$

If all of the red tarts are eaten then
$1 + 2 = 3$
so
$10 + 20 = 30$

If all of the purple tarts are eaten then
$2 + 4 = 6$
so
$20 + 40 = 60$

Bonds to 100 (Tens)

Notes and Guidance

Teachers should focus at this stage on multiples of 10 up to and within 100

Links should be made again between single digit bonds and tens bonds.

Using a 10 frame to represent 100 would be a useful resource to make this link.

Mathematical Talk

What does the word multiple mean?

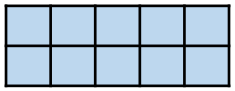
What does the blue represent? What does the yellow represent?

Why is it different to a normal 10 frame?

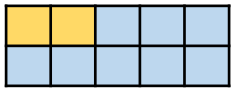
What patterns can you see? How does this help us to make up our own?

Varied Fluency

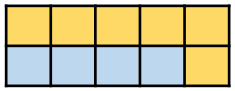
- Match the 10 frames to the sentences below:



One hundred equals eighty plus twenty



$100 = 100 + 0$



$40 + 60 = 100$

- Fill in the missing numbers. Use Base 10 to represent the numbers..

$2 + 6 = 8$ $\qquad$ $20 + 60 =$ _____

$2\_\_ + \_\_0 = 80$ $\qquad$ $80 = \_\_0 + 6\_\_$

- Continue the pattern

$90 = 100 - 10$
$80 = 100 - 20$

Can you make up a similar pattern starting with the numbers 60, 30 and 90?

Bonds to 100 (Tens)

Reasoning and Problem Solving

Eva thinks there are 10 different number bonds to 90 using multiples of 10
Amir thinks there are only 5

Who is correct?

Can you help the person who is wrong to understand their mistake?

Amir because
0 + 90 is the same as 90 + 0
Eva has repeated her answers – the multiples have been written the opposite way around.

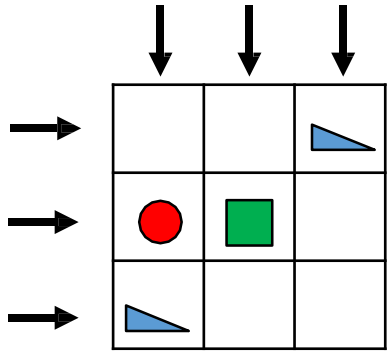
Using multiples of 10, how many number bonds are there for the following numbers?

20 30 40 50

What do you notice about the amount of bonds for each number?

If 80 has 5 bonds, predict how many 90 would have.

20 and 30 both have 2.
40 and 50 both have 3.
When the tens digit is odd it has the same number of bonds as the previous tens number. 90 would also have 5.

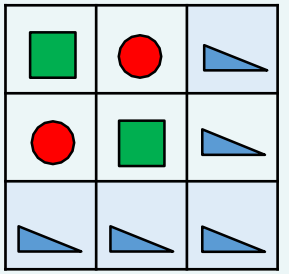


Squares are worth 10
Triangles are worth 20
Circles are worth 30

Can you complete the grid above so that all horizontal and vertical lines equal 60?

Can children create another pattern on an empty grid where each line equals 60?
How many possible ways are there to solve this?

Solution



Lots of possible solutions available.

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.

$1 + 4 + 2$ $\quad$ $4 + 2 + 1$

$2 + 4 + 1$ $\quad$ $4 + 1 + 2$

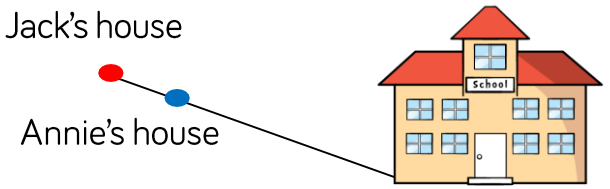
True, because they all equal 7 and addition is commutative.

These four calculations have the same answer.

$7 - 3 - 2$ $\quad$ $2 - 3 - 7$

$3 - 2 - 7$ $\quad$ $7 - 2 - 3$

False, because subtraction isn't commutative.



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?

1 km

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

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

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

4 km

10 More and 10 Less

Notes and Guidance

Teaching needs to focus on the importance of the tens digit.
Using a 100 square, explore with the children what happens to the numbers in the columns.
Draw attention to the idea that the tens digit changes while the ones digit remains the same.
Children will need to see how the number changes with concrete materials before moving onto more abstract ideas.

Mathematical Talk

What's the same? What's different?

Will you start with 35 or 55? Why?

When you look at a hundred square, what do you notice about the numbers that are ten more and ten less than 27?

Which direction will your finger move on a hundred square if you are finding ten more/ten less?

Varied Fluency

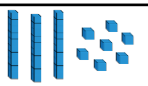
Continue the number tracks below.

10	20	30						

			35	45	55			

Using a 100 square, circle the number that is 10 more than 27
Circle the number that is 10 less than 27
Repeat in different colours for different numbers.
What do you notice?

Using concrete materials, complete the missing boxes.

10 less	Number	10 more
		
2	12	22
		
	37	

10 More and 10 Less

Reasoning and Problem Solving

SALE

The cost of each piece of fruit is reduced by 10 p.

What are the new prices?

Red Apple 5 p

Green Apple 12 p

Banana 25 p

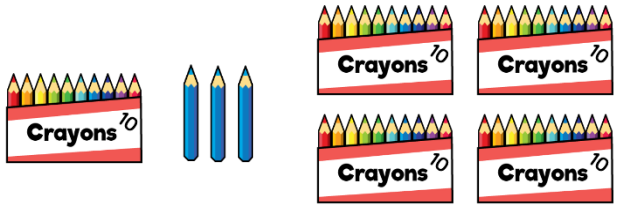
Lemon 58 p

Mo says,

I know that 10 more than 72 is 82 because I only have to look at the tens digit.

Is he correct?
Explain your reasoning.

Yes, because when you add ten you aren't adding ones.



Class 3 gives one of their full packets of crayons away.

How many crayons do they have left?

Explain your reasoning.

43

They will have four full packs left which is four tens, and three crayon which represents three ones.

Rosie is counting backwards in 10s.
She says forty-nine, thirty-nine, twenty-nine and then stops.
What numbers comes next and why?

19 because you take one ten away from 29, then 9

Add and Subtract 10s

Notes and Guidance

Children should make use of place value to add and subtract 10s from a given number within 100
The key teaching point again is the importance of the tens digit within the given numbers, and children should be encouraged to see the relationship.

For example $64 + 20 = 84$

Mathematical Talk

What is the number sentence that will help us to find the first missing number in the number track?

What is the same/different about the next number sentence?

Why is there a blank ones box?

Which column changes?

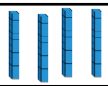
Which column stays the same?

Varied Fluency

Continue the number track by adding 20 each time.

23				

Use the place value charts and concrete materials to complete the calculations.

Tens	Ones
	
	

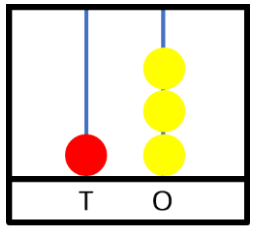
$$\begin{array}{r} 2\ 3 \\ +\ 4\ 0 \\ \hline \\ \hline \end{array}$$

Tens	Ones
	
	

$$\begin{array}{r} 5\ 6 \\ -\ 3\ 0 \\ \hline \\ \hline \end{array}$$

Add and Subtract 10s

Reasoning and Problem Solving



Tommy has three spare red beads.

What numbers could he make?
Explain your answer.

23

33

43

He doesn't have to use all of the beads.

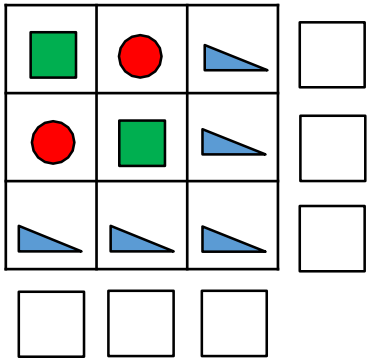
Here are Class 2's crayons.

They are given a new box of 10 each day for a week.

How many crayons do they have at the end of the week?

Discussion could be had about whether it's a full week or a school week.

Answers would be 96 or 76 respectively.



Circles represent 20
Triangles represent 10
Squares represent 50

What is the value of each row and column?

Rows

(top to bottom)

80

80

30

Columns

(left to right)

80

80

30

Add by Making 10

Notes and Guidance

Children add numbers within 20 using their knowledge of number bonds.
It is important that children work practically using ten frames and/or number lines to help them see how number bonds to 10 can help them calculate.
They will move towards using this as a mental strategy.

Mathematical Talk

How can you partition a number and use your number bonds to 10 to help you?

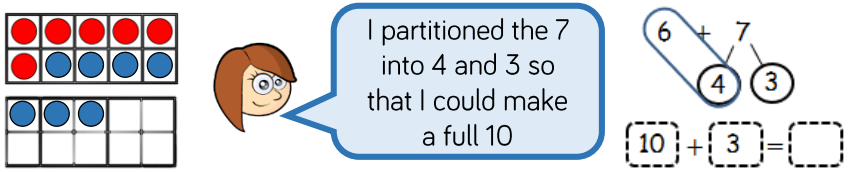
How does using the counters help you to see this strategy?

How does using a number line help you to see this strategy?

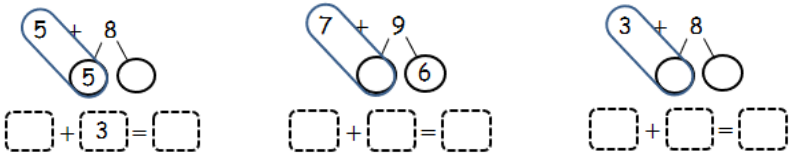
Varied Fluency

R

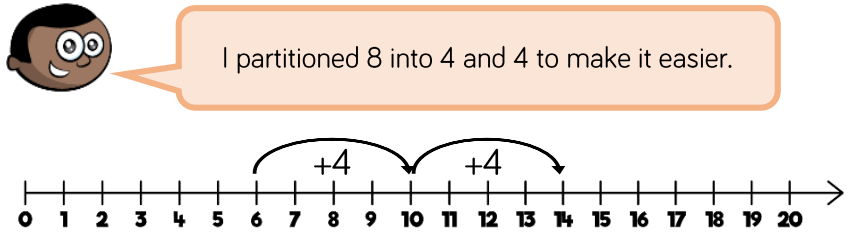
Rosie has used the 10 frames to calculate 6 + 7



Use Rosie's method to complete:



Mo has used a number line to calculate 6 + 8



Use Mo's method to calculate:

5 + 8 = ☐ 9 + 4 = ☐ 6 + 8 = ☐

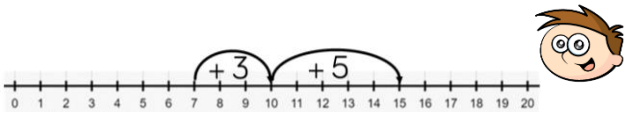
Add by Making 10

Reasoning and Problem Solving

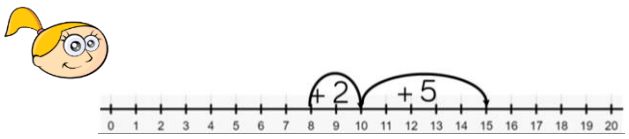
R

Teddy and Eva are adding together 7 and 8 using a number line.

Teddy shows it this way:



Eva shows it this way:



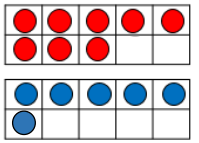
Who is correct?
Explain your answer.

They are both correct because addition is commutative and the answer to both calculations is 15

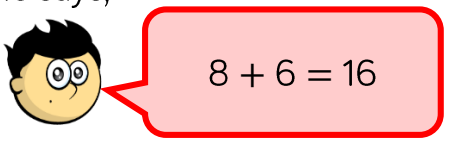
Teddy has started with 7 and partitioned the 8 into 3 and 5 to make 10

Eva has started with 8 and partitioned the 7 into 2 and 5 to make 10

Dexter uses ten frames to calculate eight plus six.



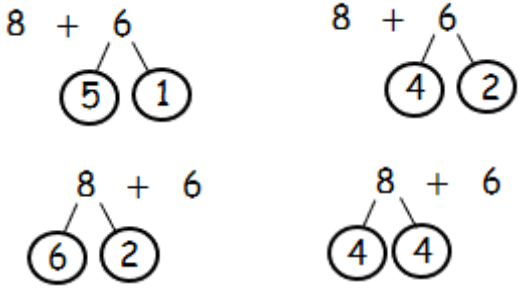
He says,



Do you agree?
Explain why.

Dexter is wrong because the answer should be 14. He should have filled the first ten frame before starting a second one.

Annie is calculating 8 + 6
Which of these methods is most helpful?
Why?



Partitioning the 6 into 4 and 2 is helpful as 8 and 2 make 10

Partitioning the 8 into 4 and 4 is helpful as 6 and 4 make 10

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?

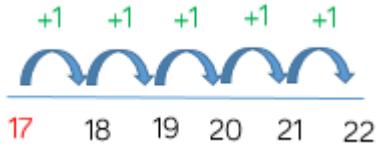
Can we exchange 10 ones for one ten?

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

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

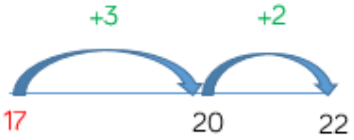
Varied Fluency

- 17 + 5 =

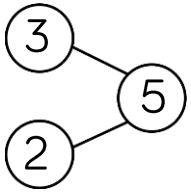


Can you put the larger number in your head and count on the smaller number? Start at 17 and count on 5

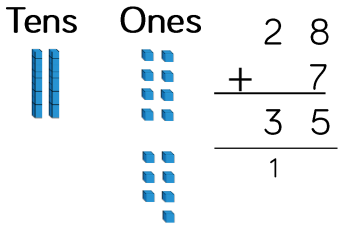
- Can we use number bonds to solve the addition more efficiently?



We can partition 5 into 3 and 2 and use this to bridge the 10



- Find the total of 28 and 7



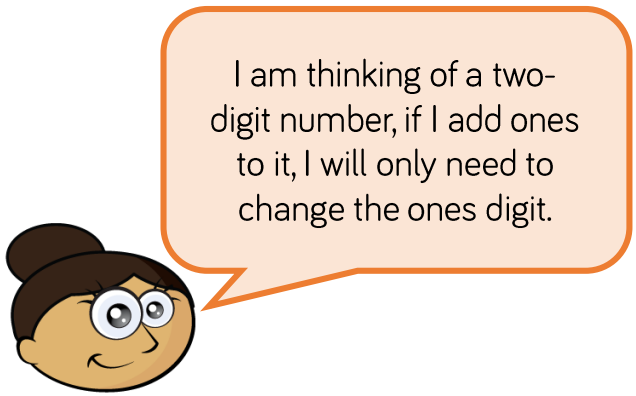
$$\begin{array}{r} 2\ 8 \\ +\quad 7 \\ \hline 3\ 5 \\ \hline 1 \end{array}$$

- 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?

Add 2-digits and 1-digit

Reasoning and Problem Solving

Always, Sometimes, Never



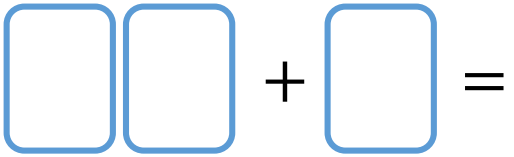
Explain your answer.

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.

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.

Subtraction – Crossing 10 (1)

Notes and Guidance

For the first time, children will be introduced to subtraction where they have to cross ten. This small step focuses on the strategy of partitioning to make ten.

Children should represent this using concrete manipulatives or pictorially to begin with. Ten frames and number lines are particularly useful to model the structure of this strategy.

Children will move towards using this as a mental strategy.

Mathematical Talk

How can you partition a number to help you subtract?

How does using the counters help you to see this strategy?

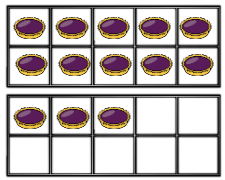
How does using a number line help you to see this strategy?

Can you think of another way to represent this problem?

Varied Fluency

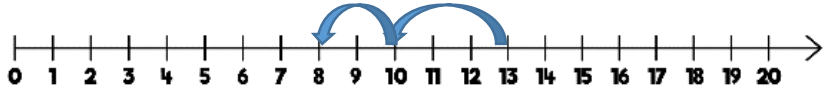
R

First there were 13 jam tarts

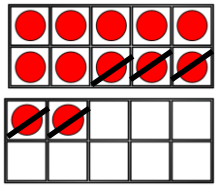


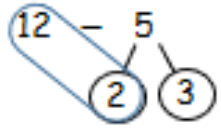
Then 5 were eaten

Now there are 8 jam tarts.



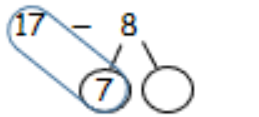
Rosie has used the ten frames to calculate 12 – 5



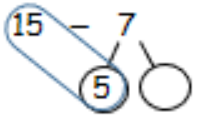


10 – 3 = 7

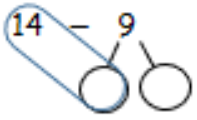
Use her method to complete:



10 – ☐ = ☐



☐ – ☐ = ☐



☐ – ☐ = ☐

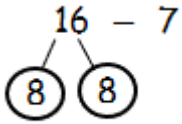
Subtraction – Crossing 10 (1)

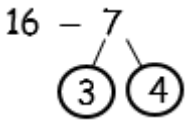
Reasoning and Problem Solving

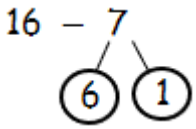
R

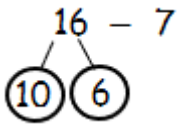
Rosie is calculating 16 – 7

Which of these methods is most helpful? Why?









Could you find a way to partition 16 to help you subtract 7?

Partitioning the 7 into 6 and 1 is useful as Rosie can subtract the 6 to make 10 then subtract the 1

If you partition 16 into 7 and 9, you can subtract 7

Teddy works out 15 – 6
This is Teddy's working out:

15 – 5 = 10 – 1 = 9

Why is Teddy's working out wrong?

Teddy has used the = sign incorrectly.
10 – 1 is not equal to 15 – 5
He should have written:
15 – 5 = 10
10 – 1 = 9

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

I can do this without working out any answers.

17 – 5	◯	12 – 5
14 – 4	◯	18 – 8
11 – 7	◯	11 – 4

Is Whitney correct? Explain how you know.

17 – 5 > 12 – 5

14 – 4 = 18 – 8

11 – 7 < 11 – 4

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?

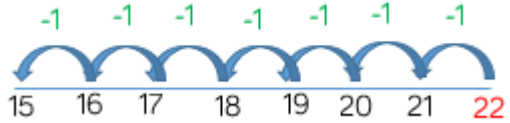
Have we got enough ones to subtract?

Can we exchange a ten for ten ones?

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

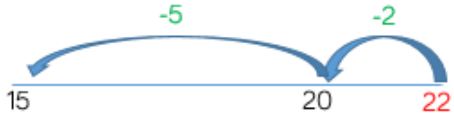
Varied Fluency

- 22 – 7 =

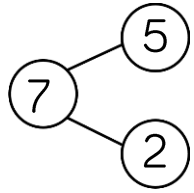


Can you put the larger number in your head and count back the smaller number? Start at 22 and count back 7

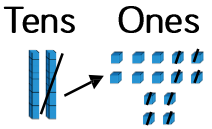
- Can we use number bonds to subtract more efficiently?



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



- Subtract 8 from 24



$$\begin{array}{r} {}^{1}\not{2}\,{}^{1}4 \\ -\quad 8 \\ \hline 1\ 6 \end{array}$$

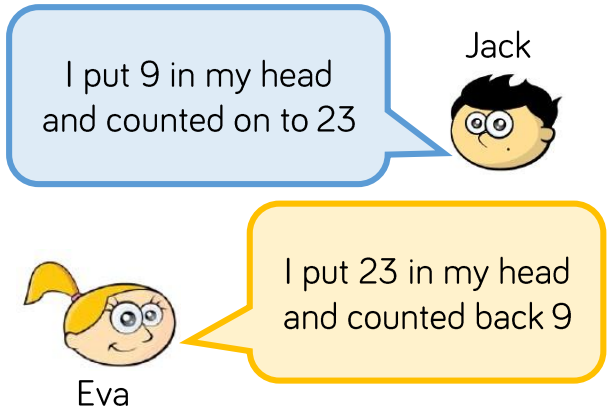
- Do we have enough ones to take 8 ones away?
- Exchange one ten for ten ones.
- Take away 8 ones.
- Can you write this using the column method?

Subtract 1-digit from 2-digits

Reasoning and Problem Solving

Jack and Eva are solving the subtraction 23 – 9

Here are their methods:



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?

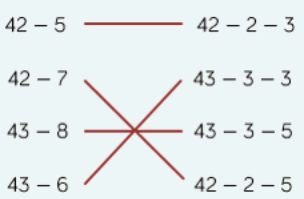
Explain your answer.

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.

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



Add 2-digit Numbers (1)

Notes and Guidance

This step is an important pre-requisite before children add two-digit numbers with an exchange.
Focus on the language of tens and ones and look at different methods to add the numbers including the column method.
It is important that teachers always show the children to start with the ones when adding using the column method.

Mathematical Talk

Can you partition the number into tens and ones?

Can you count the ones? Can you count the tens?

Can you show your addition by drawing the Base 10 to help?

How could you represent the problem?

Varied Fluency

- Find the sum of 34 and 23

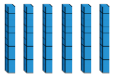
	Tens	Ones
		
+		

- 64 + 12 = _____

  4 ones + 2 ones = _____

  6 tens + 1 ten = _____

  _____ tens + _____ ones = _____

	Tens	Ones
		
+		

- Mo has 41 sweets. Whitney has 55 sweets.

  How many sweets do they have altogether?

Add 2-digit Numbers (1)

Reasoning and Problem Solving

Annie has 12 marbles.

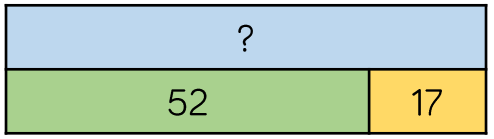
Ron has 13 marbles more than Annie.

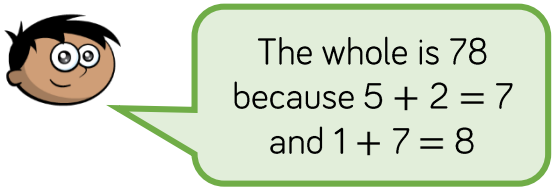
How many marbles do they have altogether?

Ron has 25 marbles.

Altogether they have 37 marbles.

Amir has been asked to complete the bar model.





Explain to Amir what he has done wrong. How could you help him work out the correct total?

Amir has found the digit totals and put the digits together to make 78

The correct answer is 69 and this could be shown by using Base 10 and a place value chart.

What digits could go in the boxes?

$\square 2 + \square 5 = 87$

Possible answers:
1 and 7
2 and 6
3 and 5
4 and 4
5 and 3
6 and 2
7 and 1

Interesting discussion could be had around is 1 and 7 different to 7 and 1?
Etc.

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 = _____

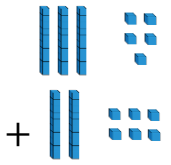
4 ones + 7 ones = _____

6 tens + 1 ten = _____

_____ tens + _____ ones = _____

$$\begin{array}{r} 64 \\ +\ 17 \\ \hline 11 \\ +\ 70 \\ \hline 81 \end{array}$$

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?

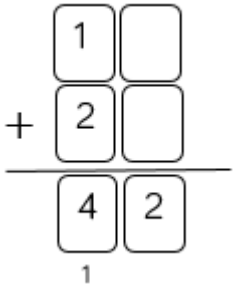
Class 3 has 37 pencils.
Class 4 has 43 pencils.

How many pencils do they have altogether?

Add 2-digit Numbers (2)

Reasoning and Problem Solving

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

Subtract with 2-digits (1)

Notes and Guidance

This step is an important step before children start to look at subtraction where they cross a tens boundary. Children need to use concrete materials but also draw images of the Base 10 so they can independently solve problems. Some children might think that they need to 'build' both numbers in the calculation, unpicking this misconception through modelling and discussion will help develop their understanding.

Mathematical Talk

Do we need to make both numbers in the subtraction before we take away?

Which number do we need to make? The larger number or the smaller?

What are the numbers worth? Tens or ones?

What happens if we have nothing left in a column? Which number do we write?

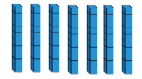
Varied Fluency

78 minus 34 = _____

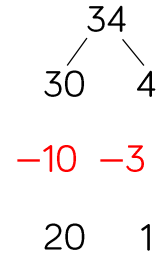
8 ones – 4 ones = _____

7 tens – 3 tens = _____

We have _____ tens and _____ ones.

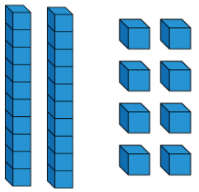
Tens	Ones
	

34 – 13 = _____



- Partition the number 34.
- Partition 13 and subtract the ones and the tens.
- Place the partitioned number back together.

Subtract 13 from 28



$$\begin{array}{r} 2\ 8 \\ -\ 1\ 3 \\ \hline 1\ 5 \end{array}$$

Subtract with 2-digits (1)

Reasoning and Problem Solving

Annie has 33 stickers.

Dexter has 54 stickers.

How many more stickers does Dexter have?

What method did you use to solve the problem?

Here the children are working out the difference.

Children might use subtraction to solve the problem or they might count on to find the difference.

Dexter has 21 more stickers than Annie.

Find the missing numbers.

$$\begin{array}{r} 6\,\square \\ -\ 2\,\square \\ \hline 4\ 2 \end{array}$$

Is this the only possible solution? Explain your answer.

Make the numbers using Base 10 to help you find your answer.

9 and 7

8 and 6

7 and 5

6 and 4

5 and 3

4 and 2

3 and 1

2 and 0

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.

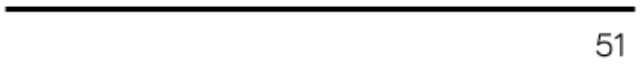
The skill of flexible partitioning is useful here when the children are calculating with exchanges.

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?

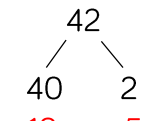
Varied Fluency

- Use the number line to subtract 12 from 51

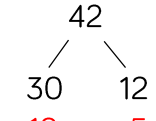


Can you subtract the ones first and then the tens?
Can you partition the ones to count back to the next ten and then subtract the tens?

- 42 – 15 =

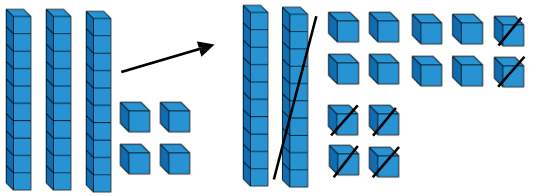


We can't subtract the ones. Can we partition differently?



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

- Take 16 away from 34

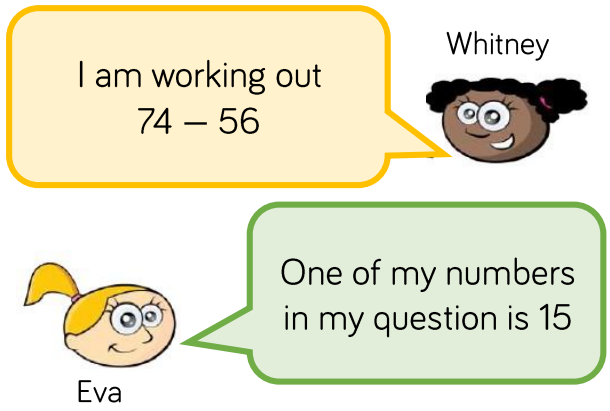


$$\begin{array}{r} {}^{2}\not{3}\,{}^{1}4 \\ -\ 1\ 6 \\ \hline 1\ 8 \end{array}$$

Subtract with 2-digits (2)

Reasoning and Problem Solving

Eva and Whitney are working out some subtractions.



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.

$45 - 17 > 14 + \_\_\_$

13

$26 + 15 < 60 - \_\_\_$

18

Explain your answer.

Find & Make Number Bonds

Notes and Guidance

Children see that working systematically helps them to find all the possible number bonds to 20
They will use their knowledge of number bonds to 10 to find number bonds to 20
Using examples such as, 7 + 3, 17 + 3 or 7 + 13 encourages children to see the link between bonds to 10 and bonds to 20 and reinforces their understanding of place value.

Mathematical Talk

What strategy could you use to make sure you find all the number bonds?

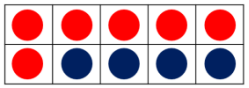
What number bond can we see? How does this help us find the number bond to 20?

How does knowing your number bonds to 10 help you to work out your number bonds to 20?

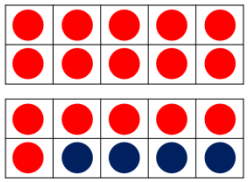
Varied Fluency

R

What number bond is represented in the pictures?

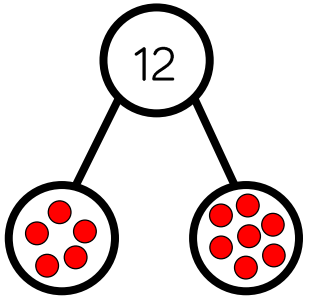


There are ___ red counters.
There are ___ blue counters.
Altogether there are ___ counters.
___ + ___ = ___ ___ + ___ = ___



There are ___ red counters.
There are ___ blue counters.
Altogether there are ___ counters.
___ + ___ = ___
___ + ___ = ___

Continue the pattern to find all the number bonds to 12
How do you know you have found them all?



12 = 12 + 0
12 = 11 + ___
12 = 10 + ___

Find & Make Number Bonds

Reasoning and Problem Solving

R

Use equipment to represent each of the calculations below.

What is the same?
What is different?

$$7 + 3 = 10$$

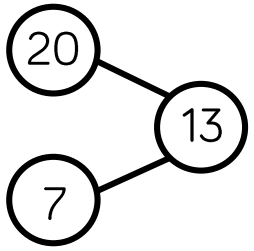
$$17 + 3 = 20$$

$$20 = 7 + 13$$

Explain your thinking.

Children may notice that the = is in a different place.
They might notice that the number of ones remains the same and that a ten has been added to create a number bond to 20
Mathematical equipment such as ten frames or Base 10 will make this clear.

Jack represents a number bond to 20 in the part whole model.



Can you spot his mistake?

Possible response: Jack has put 20 as a part but it should be a whole.

True or false?

There are double the amount of numbers bonds to 20 than there are number bonds to 10

Prove it – can you use a systematic approach?

False – there are 11 number bonds to 10 and 21 number bonds to 20 Children can show this in various ways.

Bonds to 100 (Tens and Ones)

Notes and Guidance

Here children build on their earlier work on number bonds to 100 with tens together with number bonds to 10 and 20

They use their new knowledge of exchange to find number bonds to 100 with tens and ones.

Using hundred squares, Base 10, bead strings etc. will help the children develop their understanding.

Mathematical Talk

How many more do we need to make 100?

How many tens are in 100?

If I have 35, do I need 7 tens and 5 ones to make 100? Explain why.

Can you make the number using Base 10?

Can you add more Base 10 to the number to make 100?

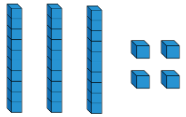
Varied Fluency

Use a 100 square. If:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

- 40 squares are shaded, how many are not shaded?
- 45 squares are shaded, how many are not shaded?
- 54 squares are shaded, how many are not shaded?

Tommy is making 100 with Base 10
How much more does he need if he has:

- 
- 5 tens and 3 ones
- 37

Children could place their Base 10 on top of a 100 piece to help them calculate.

$25 + \_\_\_ = 100$

$\_\_\_ + 69 = 100$

$100 - 84 = \_\_\_$

$100 - \_\_\_ = 11$

Bonds to 100 (Tens and Ones)

Reasoning and Problem Solving

Teddy has completed the missing number sentence.

$$46 + 64 = 100$$

Is Teddy correct?
Explain your answer.

Teddy is incorrect. He has seen number bonds to 10 but forgotten that he would need to exchange ten ones for one ten.
$46 + 64 = 110$

Each row and column adds up to 100.

Complete the grid.

45	45	
	35	
15		65

45	45	10
40	35	25
15	20	65

Complete the pattern.

$$15 + 85 = 100$$
$$20 + 80 = 100$$
$$25 + 75 = 100$$
$$30 + \_\_ = 100$$
$$\_\_ + \_\_ = 100$$

Can you explain the pattern?

$30 + 70 = 100$
$35 + 65 = 100$
The first numbers are going up in fives and the second numbers are going down in fives. All of the number sentences are number bonds to 100

Add Three 1-digit Numbers

Notes and Guidance

Children need to use their knowledge of commutativity to find the most efficient and quick way to add the three one-digit numbers.

They look for number bonds to 10 to help them add more efficiently.

Mathematical Talk

Can we change the order of the numbers to make the calculation easier?

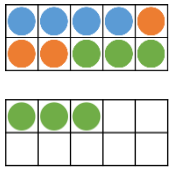
Why are we allowed to change the order of the numbers?

Which two numbers did you add first? Why?

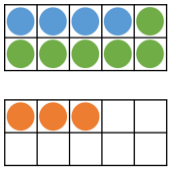
What if you added a different two numbers first, would your answer be the same?

Varied Fluency

Use ten frames and counters to add the numbers $4 + 3 + 6$



Can you add the numbers in a different way to find a number bond to 10?



$4 + 6 = 10$

$10 + 3 = 13$

Find the totals of each row and column.

5	4	2	
3	7	8	
5	7	3	

Use <, > or = to compare the number sentences.

$5 + 4 + 6 \bigcirc 6 + 5 + 4$

$7 + 3 + 8 \bigcirc 7 + 7 + 3$

$9 + 2 + 5 \bigcirc 8 + 3 + 5$

$8 + 4 + 2 \bigcirc 2 + 5 + 8$

Add Three 1-digit Numbers

Reasoning and Problem Solving

Always, Sometimes, Never

odd + odd + odd = odd

Use one-digit numbers to test if this is true e.g.

3 + 5 + 7

Always, children may recognise that two odds make an even so three odds make an odd.

Which numbers would you add together first in the following number sentences? Why would you add those first?

3 + 5 + 7 =

8 + 2 + 6 =

4 + 3 + 4 =

3 and 7 first – number bond to 10

8 and 2 first – number bond to 10

4 and 4 first – double a number.

Is there always an easier order to add three one-digit numbers?

No, e.g. 5 + 6 + 7

Take 3 consecutive one-digit numbers, e.g. 4, 5 and 6.

Add them together.

What do you notice?

Choose different groups of 3 consecutive one-digit numbers and see if there is a pattern.

1 + 2 + 3 = 6
2 + 3 + 4 = 9
3 + 4 + 5 = 12
4 + 5 + 6 = 15
5 + 6 + 7 = 18
6 + 7 + 8 = 21
7 + 8 + 9 = 24

If we order the groups, we can see that the totals go up by 3 each time. This is because we are adding one to each number each time so we are adding 3 extra altogether.