Spring Block 2

Addition and subtraction (within 20)

White Rose MATHS

Small steps

Step 1	Add by counting on within 20
Step 2	Add ones using number bonds
Step 3	Find and make number bonds to 20
Step 4	Doubles
Step 5	Near doubles
Step 6	Subtract ones using number bonds
Step 7	Subtraction – counting back
Step 8	Subtraction – finding the difference

Small steps

Step 9	Related facts
Step 10	Missing number problems

Add by counting on within 20

Notes and guidance

In this small step, children build on their learning from earlier in the year as they explore addition by counting on from a given number within 20

The use of ten frames and counters or cubes is particularly useful, together with bar models. Children should begin to understand that addition is commutative (although they do not need to formally know the word), and that it is more efficient to start from the greater number than the smaller number. For example, when working out 1 + 13, it is quicker to add 1 to 13 than to add 13 to 1. A number line is a particularly useful tool to exemplify this point, as children see the benefit of drawing just 1 jump rather than drawing 13 jumps.

It is important that children see that they are not just counting the total of two separate numbers or items; rather, they are adding to what they already have.

Things to look out for

- Children may count all the items, starting from 1, rather than counting on from one of the numbers in the addition.
- Children may always start from the first number in the addition, rather than starting from the greater number.

Key questions

- What number did you start with? Then what happened? Now what do you have?
- Is it quicker to add 4 to 9 or to add 9 to 4? Is the answer the same?
- How can you use a number line to count on from _____?
- How do the counters show the question?
- How can you use a bar model or a number line to show counting on?

Possible sentence stems

- First, I had _____

  Then I counted on _____

  Now I have _____
- To work out _____ + _____, I will count on from _____

National Curriculum links

- Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- Add and subtract 1-digit and 2-digit numbers to 20, including zero

Add by counting on within 20

Key learning

Show children how to play snakes and ladders.

Encourage them to count on using the numbers on the board. For example, if they start on 13 and roll a 4, they count "14, 15, 16, 17".

Put children into groups.

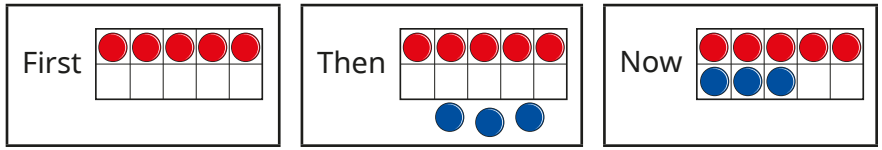
Point to yourself and begin counting. When you point to another group, they continue the count. Keep switching between groups.

Repeat with different starting numbers. This activity is great for creating rhythmical patterns and can be extended to more than one group of children.

Read *Mr Gumpy's Outing* by John Burningham.

Ask children to build a boat and to create their own "first, then, now" stories as different groups of characters climb aboard. Encourage children to count on as more children join the boat.

- Use ten frames to complete the number story.



First there were _____ cars in the car park.

Then _____ more cars parked in the car park.

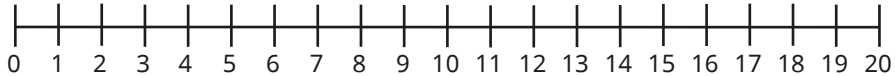
Now there are _____ cars in the car park.

- Use the bar model to help you solve the problem.

Ann has 13 marbles.
She gets 5 more marbles.
How many marbles does Ann have now?

- Dan starts at 9 and counts on 6

Show this on the number line and complete the number sentence.

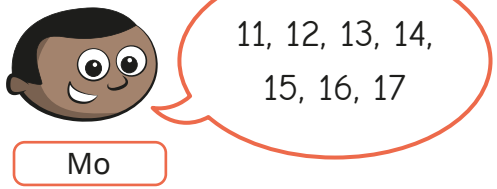


9 + 6 = _____

Add by counting on within 20

Reasoning and problem solving

Mo and Ron are counting on to work out 11 + 7

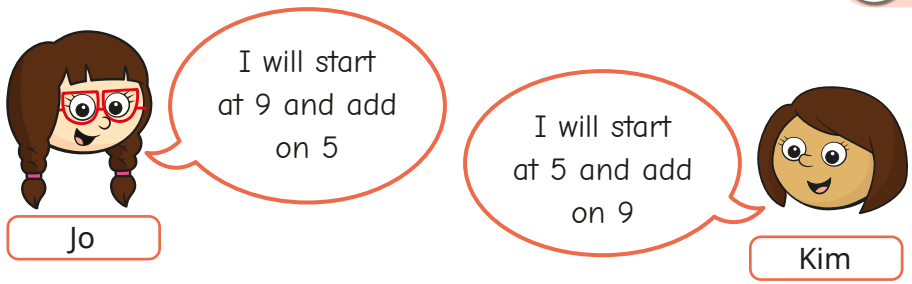


Who is correct?

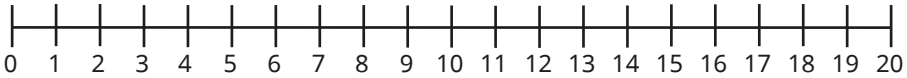
Use a number line to show your answer.

Ron

Jo and Kim are working out 5 + 9



Use a number line from 0 to 20



Show Jo and Kim's methods.

What do you notice?

Use Jo's method to work out 3 + 8

11

Add ones using number bonds

Notes and guidance

In this small step, children use number bonds and related facts when adding within 20, as an alternative to counting on. This is a more efficient method because, for example, if they know that 4 and 2 are a bond to 6, they can use this fact to see that 14 and 2 are a bond to 16, as are 4 and 12

Using counters and ten frames and base 10 enables children to see the links between related facts, noticing that, for example, 11 + 6 is 10 more than 1 + 6

Children can also explore missing number problems such as 5 + _____ = 17 using the knowledge that 5 and 2 are a number bond to 7

Things to look out for

- If children are not secure with number bonds within 10, they may make errors when trying to find the related facts within 20
- Children may not see that they can use a single number bond within 10 to find two different addition facts within 20, for example using 3 + 2 to work out both 13 + 2 and 12 + 3

Key questions

- What is the same and what is different about 4 and 14?
- If you know that 4 plus 2 is equal to 16, how can you use this to work out 14 plus 2?
- What do you notice about 14 + 2 and 12 + 4?
  How many tens are there in each addition?
  How many ones are there?
- What is the number bond for 5 to 7?
  How can you use this to help work out 15 + _____ = 17?
  What about 5 + _____ = 17?

Possible sentence stems

- _____ and _____ are a number bond to _____

  So _____ and _____ are a number bond to _____
- There are _____ ones altogether and _____ ten, so the total is _____

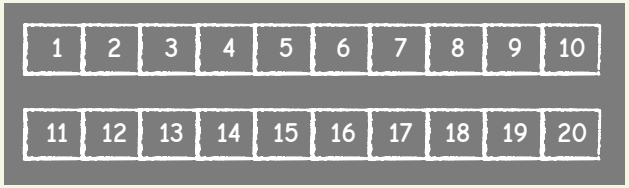
National Curriculum links

- Represent and use number bonds and related subtraction facts within 20
- Add and subtract 1-digit and 2-digit numbers to 20, including zero

Add ones using number bonds

Key learning

Draw two number tracks on the playground.



Ask one child to stand on 1 and another child to stand on 11

Roll a dice and ask both children to hop along their track the number rolled.

What do they notice about where they have landed?

Repeat for other starting numbers, ensuring that totals cannot go beyond 10 or 20, depending on the number track.

In pairs, provide children with three ten frames.

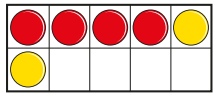
Ask one child to make a number between 0 and 4 and the other child to make the number that is 10 more, for example 3 and 13

Roll a dice and ask each child to add that number of counters to their ten frames.

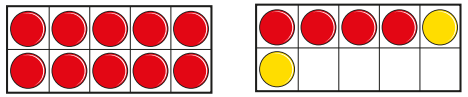
What do they notice about their answers?

Ask children to write number sentences for their additions.

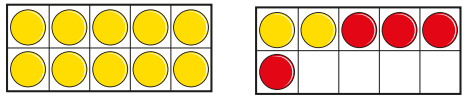
- Complete the additions.



4 + 2 = _____

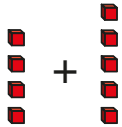


14 + 2 = _____

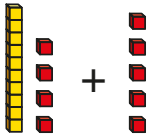


12 + 4 = _____

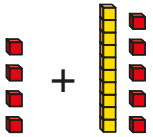
- Complete the additions.



4 + 5 = _____



14 + 5 = _____



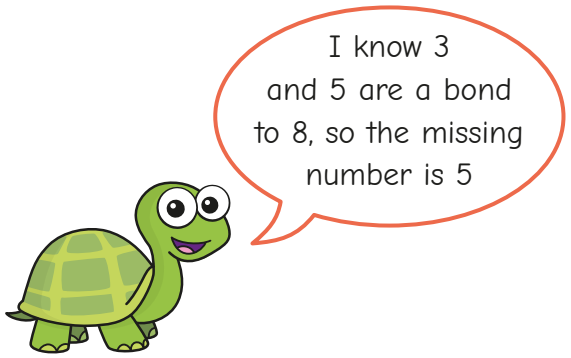
4 + 15 = _____

Add ones using number bonds

Reasoning and problem solving

Tiny is working out the missing number.

$3 + \square = 18$



Do you agree with Tiny?

Why?

Work out the missing numbers.

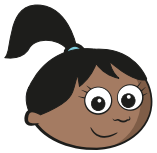
1 + _____ = 6 _____ + 3 = 9

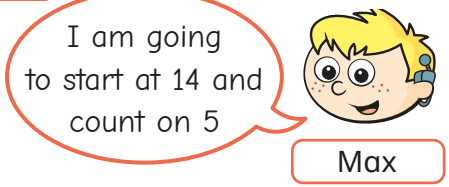
11 + _____ = 16 _____ + 3 = 19

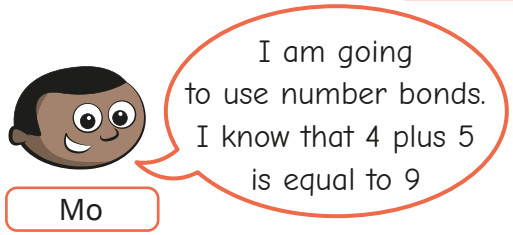
No

5, 5, 6, 16

Sam, Max and Mo are working out 5 + 14







Use each method to work out the answer.

Whose method do you prefer? Why?

19

Find and make number bonds to 20

Notes and guidance

In this small step, children explore number bonds to 20. They have already learnt about number bonds to 10 and should be confident with these. It is essential that children are fluent in their number bonds as they are used frequently throughout the curriculum.

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

Representations such as ten frames, counters, Rekenreks and part-whole models, among others, can be used to support children's understanding.

Things to look out for

- Children may add a 10 to both numbers, for example 14 + 16 = 20
- Children may miscalculate if they are using counting on as a strategy for working out the number bond. Using equipment such as ten frames can help with this.

Key questions

- How many more do you need to make 20?
- How does knowing the number bonds to 10 help you to work out the number bonds to 20?
- What is the same and what is different about 4 + 6 = 10 and 14 + 6 = 20?
- How do you know that you have found all the number bonds?

Possible sentence stems

- There are _____ red counters and _____ yellow counters.

  There are _____ counters altogether.

  This means that _____ and _____ are a bond to _____

  _____ + _____ = _____
- I know that _____ + _____ = 10, so _____ + _____ = 20

National Curriculum links

- Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- Represent and use number bonds and related subtraction facts within 20

Find and make number bonds to 20

Key learning

Provide pots labelled with numbers 1–20 and a selection of natural objects.

Ask children to count the correct number of items into each pot.

Can they find 2 pots that have 20 items in total?

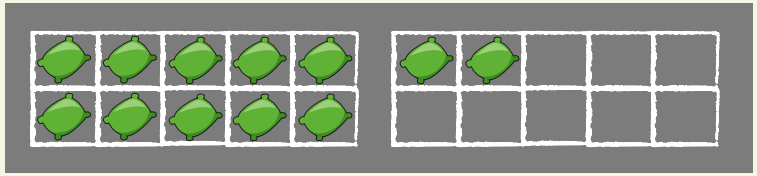
Is there more than one way to do it?

Ask children to draw what they have found.

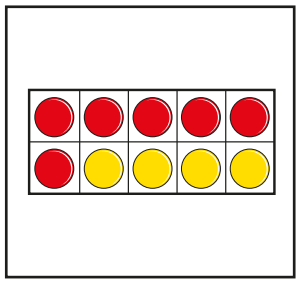
Chalk two large ten frames onto the playground. Tell the children you have hidden 20 beanbags and that they need to find them!

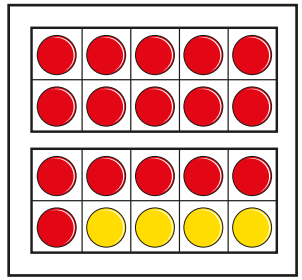
As the children find the beanbags, they put them into the ten frames.

Prompt children to use the ten frames to help them see how many they have found and how many are still hidden.



- Complete the sentences for each picture.





There are _____ red counters.

There are _____ yellow counters.

There are _____ counters altogether.

_____ + _____ = _____

- Continue the pattern to find all the number bonds to 20

20 = 20 + 0

20 = 19 + 1

20 = 18 + 2

20 = 17 + 3

How do you know that you have found them all?

Find and make number bonds to 20

Reasoning and problem solving

Use counters to show each addition.

7 + 3 = 10

17 + 3 = 20

20 = 7 + 13

What is the same?

What is different?

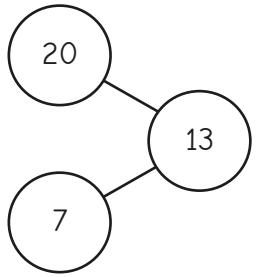
Talk about it with a partner.

multiple possible answers, e.g.

The = is in a different place.

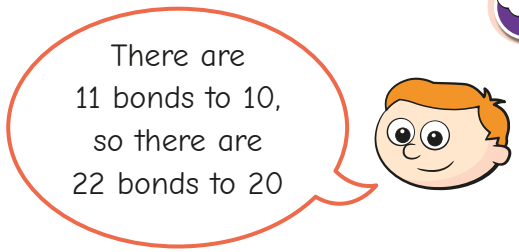
The number of ones remains the same and a ten has been added to create a number bond to 20

Kay shows a number bond to 20 in a part-whole model.



What mistake has Kay made?

Kay has put 20 as a part, but it should be the whole.



Do you agree with Ron?

Why?

No

Doubles

Notes and guidance

In this small step, children learn about doubles, with a focus on adding the two equal quantities together as opposed to multiplying by 2

Give children opportunities to build doubles using real objects and mathematical equipment. Building numbers using the pair-wise patterns on ten frames helps them to see the doubles. Mirrors and barrier games are a fun way for children to see doubles as they build and begin to explore symmetry. Encourage children to say the doubles as they build them, for example "Double 2 is 4"

Provide examples of doubles and non-doubles for children to sort and explain why they have sorted in the way they have. Dominoes are a great resource for this activity.

At this point, children only explore doubles up to double 10

Things to look out for

- Children may make mistakes when adding.
- Some children may think that double 2 is 22 or double 3 is 33, because they can see the number twice.
- Children may find doubles beyond double 5 more challenging as they cross 10

Key questions

- How can you sort these pictures into doubles and not doubles?
- How do you know that this shows a double?
- How can you make double _____?
- How can you show the double differently?
- If double 2 is 4, what do you think double 3 is?
- What is the greatest double you can roll on a normal dice?
- What is 12 the double of?

Possible sentence stems

- _____ + _____ = _____, so double _____ is _____
- Double _____ is _____
- _____ is the double of _____

National Curriculum links

- Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- Add and subtract 1-digit and 2-digit numbers to 20, including zero

Doubles

Key learning

Read *Double the Ducks* by Stuart J. Murphy.

In groups, ask children to think of their own doubling story and act it out. You could give each group the following starting point.

> A farm has 3 horses, 4 sheep, 7 cows and 1 goat.

Tell children to take turns rolling two dice.

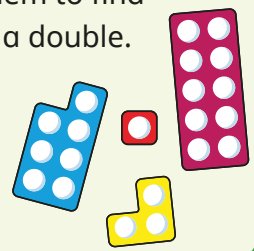
They score a point each time they roll a double.

The first to reach 3 points wins the game.

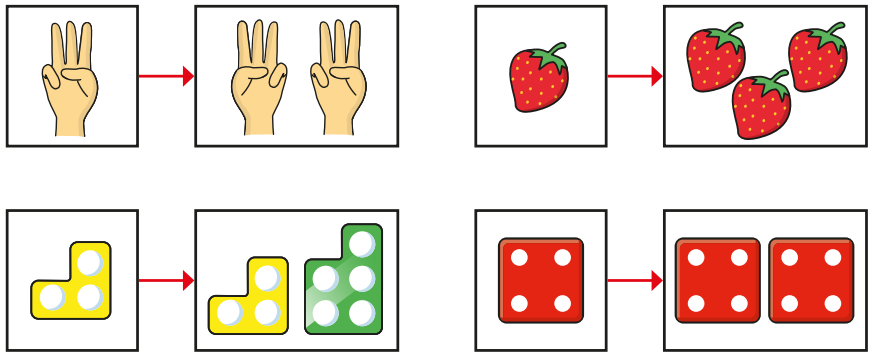
Hide number pieces outside.

Give each child a number piece. Ask them to find another one that is the same to make a double.

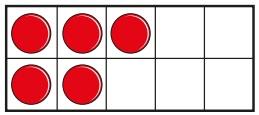
Ask them to say the double they have found, for example "Double 5 is 10"



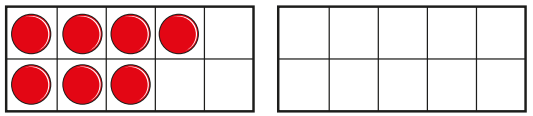
- Which pictures show doubles?



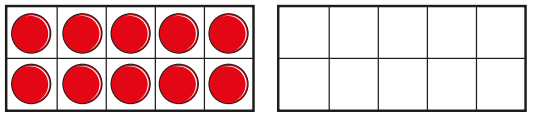
- Draw counters to work out the doubles.



Double 5 is _____



Double 7 is _____



Double 10 is _____

Doubles

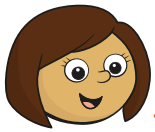
Reasoning and problem solving

Ben has some cakes.

He doubles the number of cakes.

Here are Ben's cakes now.

How many cakes did Ben start with?



Ben had 4 cakes at the start.

Kim

Ben had 16 cakes at the start.

Jo

Who do you agree with?

Why?

Kim

Double each number.

Complete the table.

Number	Double
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

What patterns can you see?

2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Near doubles

Notes and guidance

Building on the previous step, in this small step children use doubles to help work out near doubles. For example, they can use the double fact that 6 + 6 = 12 to work out 6 + 7 by adding 1 more. They should see that this is a more efficient method than counting on.

As in the previous step, building numbers in a pair-wise pattern on ten frames can help children visualise that to work out 3 + 4, they can do 3 + 3 plus 1 more.

Children can also explore finding near doubles through subtraction, for example 3 + 4 is equal to 4 + 4 minus 1. This can be useful for children who are more confident with certain doubles than others. For example, if a child is not confident with doubling 7, they may struggle with 7 + 8, but if they can double 8, they can use this fact instead.

Things to look out for

- Children may be more confident with doubles less than 10, such as double 4, and require extra support with doubles that go beyond 10
- Children may not be able to quickly recall 1 more or 1 less than any number within 20

Key questions

- What does double _____ mean?
- What is double _____?
- What is 1 more than _____?
- If _____ is 1 more than _____, how can you use this to work out _____ + _____?
- If _____ is 1 less than _____, how can you use this to work out _____ + _____?

Possible sentence stems

- _____ is 1 more than _____, so I can work out double _____ and then add 1
- Double _____ plus 1 is equal to _____
- _____ is 1 less than _____, so I can work out double _____ and then subtract 1

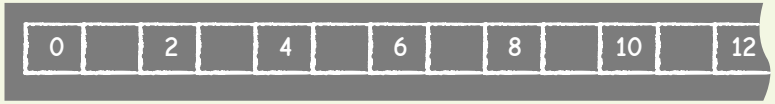
National Curriculum links

- Add and subtract 1-digit and 2-digit numbers to 20, including zero

Near doubles

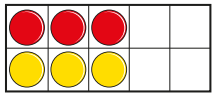
Key learning

Draw a number track from 0 to 20 in chalk on the playground. Only show the even numbers.

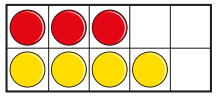


Ask children to stand on a number and then to write either 1 more or 1 less than their number in the adjacent box.

- What additions are shown?



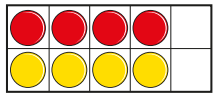
_____ + _____



_____ + _____

  - What do you notice about the number of red counters in each ten frame?
  - What do you notice about the number of yellow counters in each ten frame?
  - What do you notice about the total number of counters in each ten frame?

- What double is shown on the ten frame?



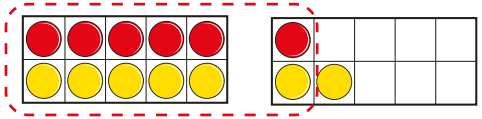
Add one more red counter to the ten frame.

What addition is shown now?

Complete the sentence.

_____ + _____ is equal to double _____ plus 1

- Use the counters and ten frames to complete the sentence.



6 + 7 = double _____ plus _____

- Use counters and ten frames to show that:
  - 2 + 3 = double 2 plus 1
  - 9 + 8 = double 8 plus 1

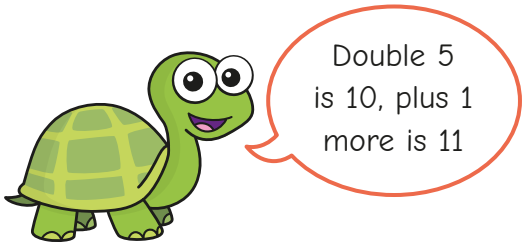
- Use doubles to work out the near doubles.

5 + 6	8 + 7	5 + 4	9 + 8

Near doubles

Reasoning and problem solving

Tiny uses doubles to work out 5 + 4



What mistake has Tiny made?

What is the correct answer?

9

Write <, > or = to complete the number sentences.

double 6 ◯ 6 + 7

double 9 ◯ 9 + 8

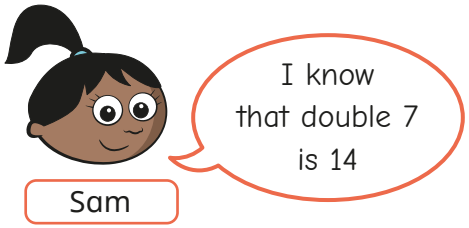
9 + 8 ◯ double 8

<

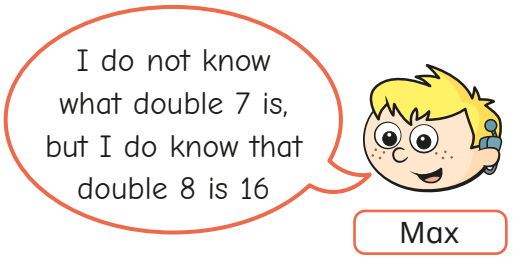
>

>

Sam and Max are working out 8 + 7



How can Sam use this fact to work out 8 + 7?



How can Max use this fact to work out 8 + 7?

Use counters to help you.

add 1

subtract 1

Subtract ones using number bonds

Notes and guidance

In this small step, children begin subtracting within 20. Earlier in the year, children subtracted within 10 by counting back and using number lines. They now subtract within 20 using their knowledge of number bonds. For example, if they know the number bond 7 – 5 = 2, then they know that 17 – 5 = 12

By completing these calculations side by side using ten frames, counters, part-whole models or base 10, children see that the second subtraction will have an answer that is 10 greater than the first subtraction.

At this stage, none of the subtractions cross 10, so children can focus on using their number bond knowledge rather than counting back, which is covered in the next step.

Things to look out for

- Children may be unsure of the number bond facts within 10
- Children may not see the link between 4 – 1 = 3 and 14 – 1 = 13
- Children may incorrectly use their number bond knowledge, for example 14 – 1 = 3

Key questions

- What are _____ and _____ a number bond to?
- What is the same and what is different about 5 and 15?
- If you know that 7 subtract 2 is equal to 5, how can you use this to work out 17 – 2?
- What do you notice about 17 – 2 and 17 – 4? How many tens are there in each subtraction? How many ones are there?
- What is the number bond for 5 to 8?
  How can you use this to help work out 18 – 5?

Possible sentence stems

- The number bond for _____ to _____ is _____
  So the number bond for _____ to _____ is _____
- There will be _____ ones and _____ ten, so the answer is _____

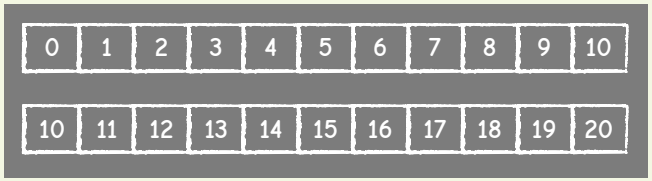
National Curriculum links

- Represent and use number bonds and related subtraction facts within 20
- Add and subtract 1-digit and 2-digit numbers to 20, including zero

Subtract ones using number bonds

Key learning

Draw two number tracks on the playground.



Ask one child to stand on 10 and another on 20

Roll a dice and ask both children to hop back along their track the number rolled. What do they notice about where they have landed?

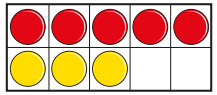
Repeat for other starting numbers, ensuring that the answer does not go below 0 or 10, respectively.

Provide pairs of children with three ten frames and some counters. Ask one child to make a number between 6 and 10 and the other to make the number that is 10 more.

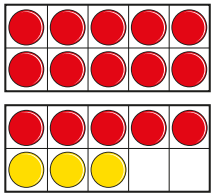
Roll a dice and ask each child to subtract the counters from their ten frames. What do they notice about their answers?

Ask them to write number sentences that match their subtractions.

- Complete the subtractions.



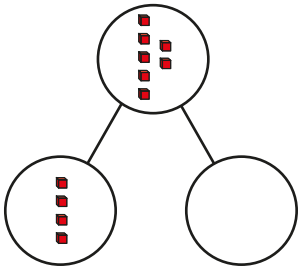
8 – 3 = _____

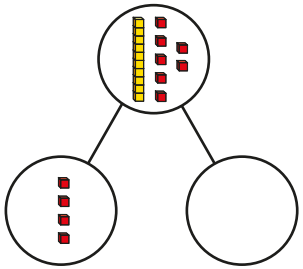


18 – 3 = _____

What do you notice?

- Complete the part-whole models.





Write a subtraction number sentence for each part-whole model.

What do you notice?

- Use number bonds to work out the subtractions.

14 – 2	18 – 5	19 – 3	15 – 4

Subtract ones using number bonds

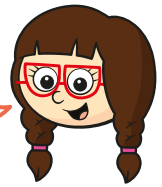
Reasoning and problem solving

Ron and Jo are working out 16 – 5

I will count back 5 places.

Ron

I know that 6 – 5 = 1, so 16 – 5 = 11

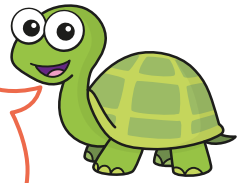


Jo

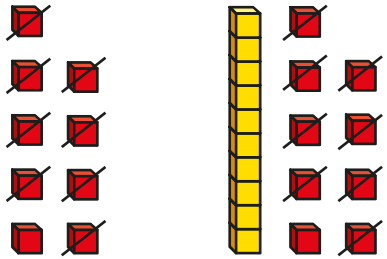
Whose method do you prefer? Why?

Children need to justify their preferred method.

Tiny is working out 19 – 8



I know that 9 – 8 = 1 and 19 is 10 greater than 9, so 19 – 8 will be 10 greater than 1



Do you agree with Tiny?

Talk about it with a partner.

Yes

Subtraction – counting back

Notes and guidance

In this small step, children build on the language of subtraction, recognising the subtraction symbol from earlier learning and using it within 20

Children use the counting back strategy for numbers within 20, including subtractions that cross 10. The use of zero is important, so children know that when nothing is taken away, the start number remains the same, or when the whole group is taken away, there will be nothing left. Crossing out and using a number line are particularly useful for counting back to work out subtractions.

This can also be linked with "first, then, now" stories.

Things to look out for

- When counting back, children may include the start number. For example, when working out 15 – 4, they may count "15, 14, 13, 12".
- Children may write calculations the wrong way around if they do not understand the importance of order when subtracting, thinking that it is the same as addition, where the order does not matter. For example, they may write 4 – 15 but still give the answer 11

Key questions

- How many objects were there at first?
  Then what happened to the objects?
  How many objects are there now?
- How does using counters help you?
- How does using a number line help you?
- Can you think of another way to show the problem?

Possible sentence stems

- First there were _____

  Then _____ were taken away.

  Now, there are _____
- _____ subtract _____ is equal to _____

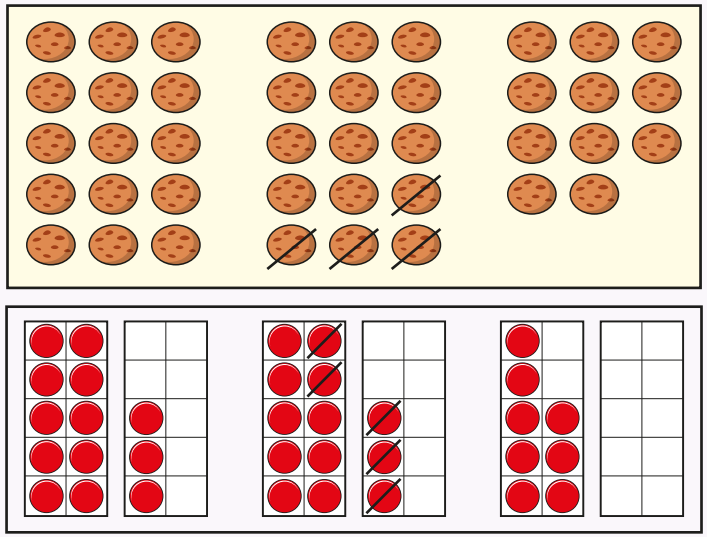
National Curriculum links

- Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- Add and subtract 1-digit and 2-digit numbers to 20, including zero

Subtraction – counting back

Key learning

Show children the pictures.



Ask children to tell a "first, then, now" story for each picture and to write the matching number sentence.

Ask each child to fill 2 ten frames with 20 items.

Children take turns to roll a dice and remove the corresponding number of items. The winner is the first person to reach exactly zero.

- First there were 14 sheep.

  Then they all ran away.

  How many sheep are left?

  Use ten frames and counters to work it out.

  Complete the number sentence.

  _____ – _____ = _____

- Tiny has 13 stars for being helpful!

  Tiny gives 4 stars to Fay.

  How many stars does Tiny have left?

- Max uses a number line to work out 20 – 7

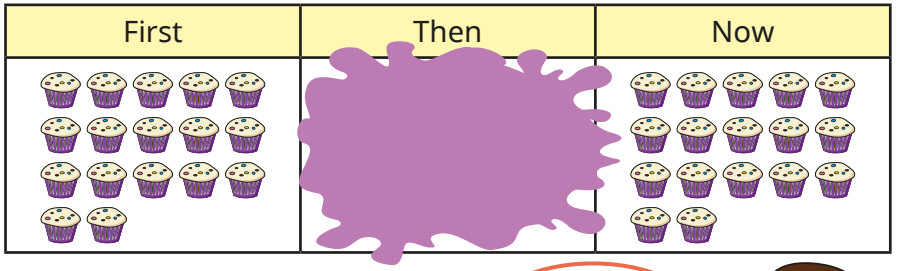
  Use a number line to work out the subtractions.

  ▶ 20 – 8 ▶ 18 – 9 ▶ 19 – 4

Subtraction – counting back

Reasoning and problem solving

Mo, Kim and Ron are working out what subtraction is shown.

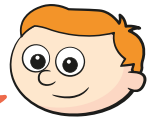


I think it is
17 – 0 = 17

Mo

I think it is
17 – 17 = 0

Kim



I think it is
0 – 17 = 17

Ron

Who is correct?

How do you know?

Mo

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

17 – 5 ◯ 12 – 5

14 – 4 ◯ 18 – 8

11 – 7 ◯ 11 – 4

I can do these without working out any answers.

Is Jo correct?

How do you know?

>

=

<

Yes

Subtraction – finding the difference

Notes and guidance

In this small step, children formally learn about finding the difference for the first time and explore it as a form of subtraction.

Children often struggle with this concept as they are not required to physically take away or count back a specified amount as they have previously experienced. Instead, they are making comparisons between two amounts. In some cases the question will be worded as "How many more ...?" Up until now, they have only encountered the word "more" when thinking about addition.

Children can use their skills of counting back and counting on to help them find the difference. Alternatively, they can make both amounts and visually see how many more or less a number is.

Things to look out for

- Children may add instead of subtracting.
- Children may include the start number when counting back.
- Children may misinterpret the word "difference" in a mathematical context, for example describing the difference in appearance of the numbers.

Key questions

- Who has more? How do you know? How many more does _____ have?
- What does "difference" mean?
- What strategy can you use to find the difference?
- What pictures/objects can you use to show this?
- How can you complete the sentences?
- How do the counters/bar models help you to subtract?
- Which method will you use to show your thinking? Why?
- Did you count forwards or backwards? Why?

Possible sentence stems

- The difference between _____ and _____ is _____
- When finding the difference, I can ...
- _____ is the difference between _____ and _____

National Curriculum links

- Read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- Add and subtract 1-digit and 2-digit numbers to 20, including zero

Subtraction – finding the difference

Key learning

Take the class into the playground. Ask the boys and the girls to stand in separate lines next to each other. Make sure they are lined up in pairs.

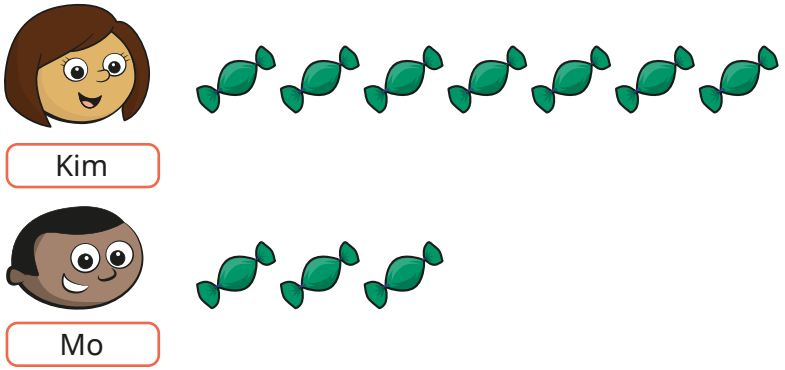
Ask what the difference is between the number of boys and the number of girls?

Repeat the activity with different criteria, for example children collecting either sticks or pebbles.

- How many more cakes does Sam have than Max?

Sam has _____ more cakes than Max.

- Kim has 7 sweets and Mo has 3 sweets.

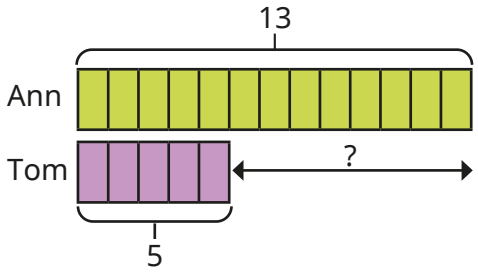


How many more sweets does Kim have than Mo?

How many fewer sweets does Mo have than Kim?

- Ann has 13 marbles.

Tom has 5 marbles.



How many more marbles does Ann have than Tom?

Subtraction – finding the difference

Reasoning and problem solving

Two numbers have a difference of 4

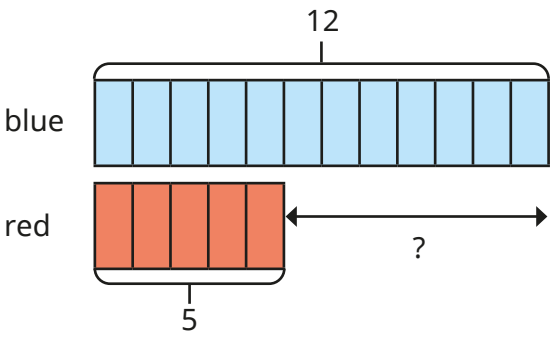
The greater number is less than 15

The smaller number is more than 6

What could the two numbers be?

14 and 10, 13 and 9, 12 and 8, 11 and 7

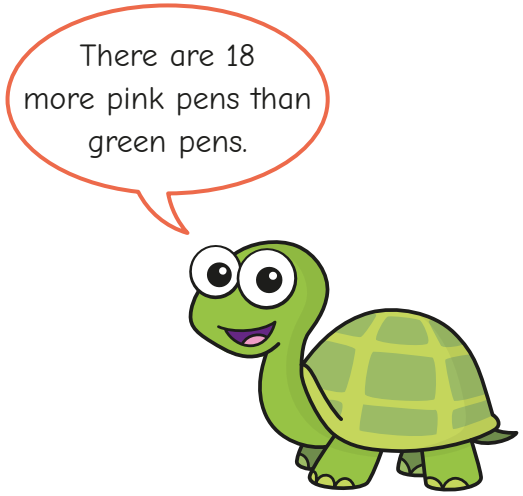
Think of a subtraction problem to match the bar model.



multiple possible answers

There are 11 pink pens and 7 green pens in a pot.

How many more pink pens are there than green pens?



What mistake has Tiny made?

Draw a picture to show the correct answer.

Tiny has added the numbers instead of subtracting them.

Related facts

Notes and guidance

Now that children have spent some time exploring addition and subtraction separately, in this small step they look at how they relate to each other, considering the addition and subtraction fact families for numbers within 20

Children use both concrete resources and pictures to find links between the addition and subtraction sentences. Highlight that addition and subtraction are inverse operations. As well as finding the four related facts, children can write the sentences with the "=" at either the end or the start.

Throughout this step, the idea of commutativity should be reinforced, and children should be able to verbalise that addition can be done in any order, whereas subtraction cannot. It is not necessary for children to use the word "commutative" at this stage.

Things to look out for

- Children may work out subtractions correctly, but write them incorrectly, for example 7 – 12 = 5
- Children may think that by writing "=" in a different place they have written a different fact, for example 3 + 5 = 8 and 3 = 5 + 8

Key questions

- What is the same and what is different?
- What addition sentences can you write?
  What subtraction sentences can you write?
  Can you write any of them another way?
- If you know that 12 + 1 = 13, what else do you know?
- Can you see any patterns?
- If you know that 15 – 3 = 12, why can you not say 3 – 15 = 12?
  Use counters to show this.

Possible sentence stems

- _____ can be done in any order.
- _____ cannot be done in any order.
- If I know that _____ + _____ = _____, then I also know that _____ – _____ = _____

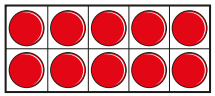
National Curriculum links

- Represent and use number bonds and related subtraction facts within 20
- Add and subtract 1-digit and 2-digit numbers to 20, including zero

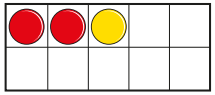
Related facts

Key learning

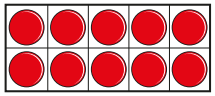
- Complete the addition and subtraction sentences for each picture.



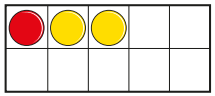
12 + 1 = _____



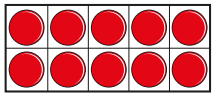
13 – 1 = _____



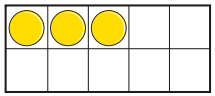
11 + _____ = 13



13 – _____ = _____



_____ + _____ = _____



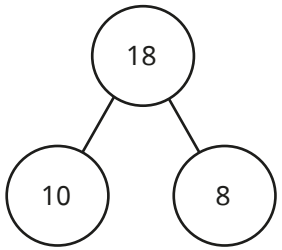
_____ – _____ = _____

What do you notice about the additions and subtractions?

- Write a subtraction fact for each addition fact.

10 + 4 = 14	19 + 1 = 20	0 + 17 = 17

- Complete the fact family for the part-whole model.



_____ + _____ = 18

_____ + _____ = 18

18 – _____ = _____

18 – _____ = _____

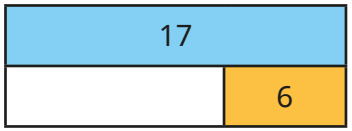
_____ = _____ + _____

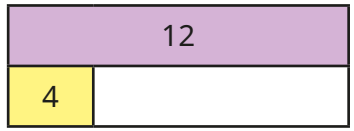
_____ = _____ + _____

_____ = _____ – _____

_____ = _____ – _____

- Complete the bar models.





Write the fact family for each bar model.

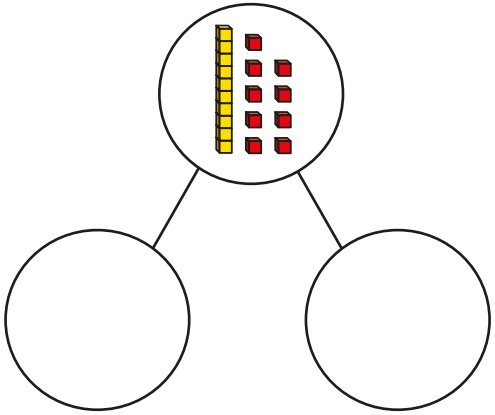
Use the numbers 8, 7 and 15 to draw your own bar model.

Write the fact family for your bar model.

Related facts

Reasoning and problem solving

Use the cards to write addition and subtraction sentences to match the part-whole model.



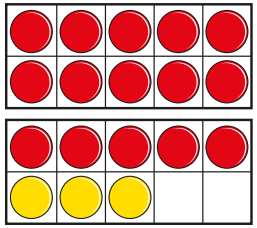
nine	add
ten	subtract
nineteen	is equal to

multiple possible answers, e.g.

nine add ten is equal to nineteen

nine is equal to nineteen subtract ten

Which number sentences match the ten frames?



15 + 3 = 18	15 – 3 = 18
3 + 18 = 15	18 – 15 = 3
18 + 3 = 15	18 – 3 = 15
18 = 3 + 15	15 – 18 = 3

How do you know?

15 + 3 = 18

18 – 15 = 3

18 – 3 = 15

18 = 3 + 15

Missing number problems

Notes and guidance

In this final small step, children explore missing number problems. They use the idea of inverse operations to see that if they start with a number and add 2 to it, then to "undo" that they need to subtract 2. Bar models and part-whole models are useful representations for this.

"First, then, now" stories can be particularly helpful for children to act out the problems and visualise what is happening. Use of counters and ten frames, as well as number lines, supports children in their understanding of a missing number problem, helping them to discuss what the numbers in a problem represent.

With the missing number problem 3 + _____ = 5, a common mistake is to add 3 and 5 and get 3 + 8 = 5. Children need to spot that this does not make sense, as 8 is greater than 5

Things to look out for

- Children may just look at the numbers and operation rather than thinking about the missing number element of the problem.
- Children may find it more challenging when number sentences are written in the form 4 = _____ – 2 rather than _____ – 2 = 4

Key questions

- If I add/subtract _____ counters to/from the ten frame, how can you undo what I have done?
- How many counters do you need to add to/subtract from _____ to get _____?
- If you know the whole and a part, how can you find the other part?
- Should the missing number be greater than or less than _____? How do you know?

Possible sentence stems

- First there were …
  Then …
  Now there are …
- If _____ is the whole and _____ is a part, then the other part must be _____

National Curriculum links

- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9

Missing number problems

Key learning

Give children 8 counters and a ten frame.

Ask them to act out the "first, then, now" stories.

First there were 3 frogs in the pond.
Then some more frogs jumped into the pond.
Now there are 8 frogs in the pond.

How many frogs jumped into the pond?

First there were 8 children sitting at the table.
Then some children went away.
Now there are 6 children sitting at the table.

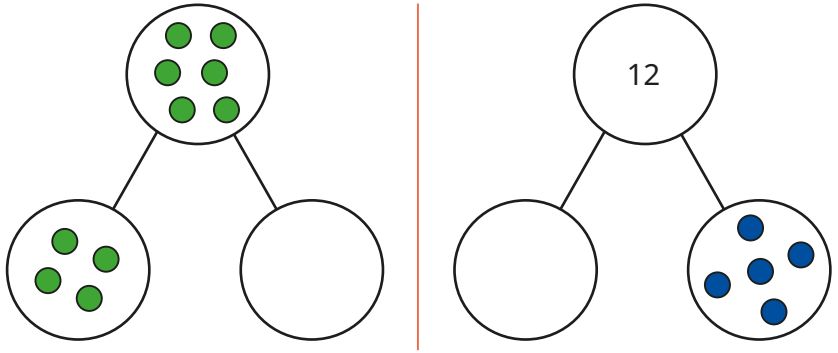
How many children went away?

- First there were 12 birds in a tree.
  Then some of the birds flew away.
  Now there are 10 birds in the tree.

  How many birds flew away?

  12 – _____ = 10

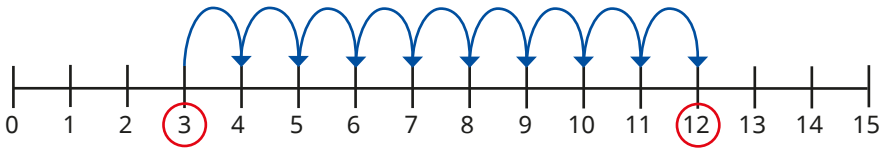
- Complete the part-whole models and number sentences.



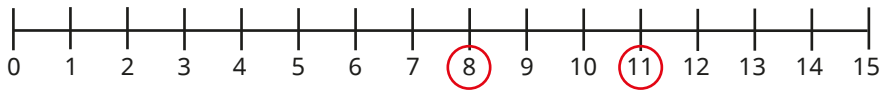
4 + _____ = 6

_____ + 5 = 12

- Use the number lines to find the missing numbers.
  - 3 + _____ = 12



  - 11 – _____ = 8



Missing number problems

Reasoning and problem solving

Jo is working out the missing number.

$5 + \square = 11$

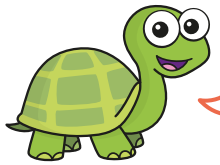
The answer is 16

What mistake has Jo made?

What is the missing number?

6

Tiny is thinking of a number.



When I add 5 to my number, I get 13

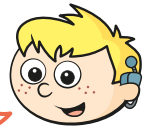
What number is Tiny thinking of?

8

Max and Sam are working out the missing number.

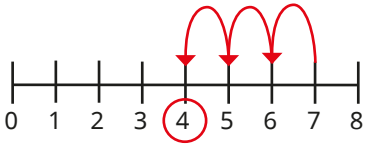
$4 = \square - 3$

I know that 4 minus 3 is equal to 1, so the missing number is 1

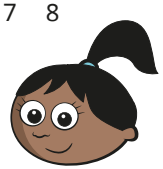


Max

Sam draws a number line to help.



The missing number is 7



Sam

Who do you agree with?

Why?

Sam