Spring
Scheme of learning
Year 1

White Rose MATHS

#MathsEveryoneCan

Spring Block 1

Place value (within 20)

White Rose MATHS

Small steps

Step 1	Count within 20
Step 2	Understand 10
Step 3	Understand 11, 12 and 13
Step 4	Understand 14, 15 and 16
Step 5	Understand 17, 18 and 19
Step 6	Understand 20
Step 7	1 more and 1 less
Step 8	The number line to 20

Small steps

Step 9	Use a number line to 20
Step 10	Estimate on a number line to 20
Step 11	Compare numbers to 20
Step 12	Order numbers to 20

Count within 20

Notes and guidance

In the Autumn term, children learnt the numbers to 10. In this small step, they extend that learning to count to 20

Provide regular opportunities for children to verbally count to 20, for example counting how many children are present or how many beanbags there are in a bucket. Children can find counting through the teen numbers difficult, as the number names do not have the same regular 1 to 9 pattern that they hear once they count beyond 20. Use concrete resources to support children to see the "10-and-a-bit" structure of teen numbers.

Number tracks can support children in counting on and back to 20. "I count, you count" activities allow children to practise continuing the count from different starting points.

Things to look out for

- Children may find the numbers 11, 12, 13 and 15 confusing, as they cannot hear the 1, 2, 3 and 5 within them.
- Children may find writing teen numbers tricky, in particular reversing the digits. For example, when saying 16, they hear the 6 first, so may write 61

Key questions

- What number comes after _____?
- What number comes before _____?
- Which numbers sound different? Why?
- Which numbers after 10 do not include "teen"?
- How can you count 20 cubes/counters/pencils/glue sticks?
- What songs do you know that count to 20?

Possible sentence stems

- The number that comes after _____ is _____
- The number that comes before _____ is _____
- There are _____ cubes.

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Count within 20

Key learning

Read *1 to 20 Animals Aplenty* by Katie Viggers.

Show the pages from the book with the text hidden and ask children to count the animals on each page. Challenge them to work out the hidden rhyme.

For this game, you need a 1–3 dice and a pebble.

Draw a large number track from 0 to 20 on the playground and place a pebble on number 10

Player 1 aims to get to 20

They roll the dice and move the pebble that number of places towards 20, counting out loud, for example 11, 12, 13

Player 2 aims to get to zero.

They roll the dice and move the pebble that number of places towards zero, counting out loud, for example 12, 11, 10

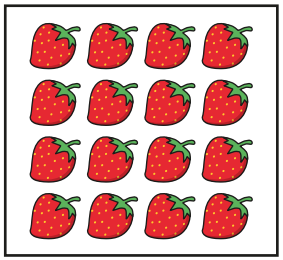
The winner is the first player to reach their target number.

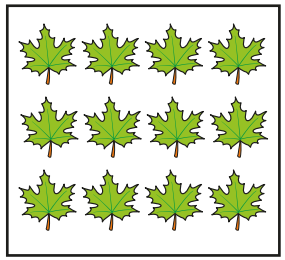
Put children into three groups.

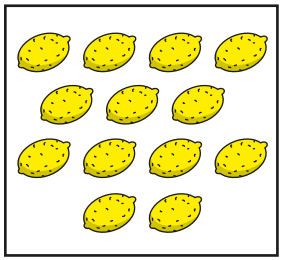
Point to a group and ask them to begin counting from 1. When you point to another group, they should continue the count. Keep switching between groups.

To add challenge, point up when you want the children to count on from the last number counted and point down for them to count back.

- Match the pictures to the numbers on the number track.







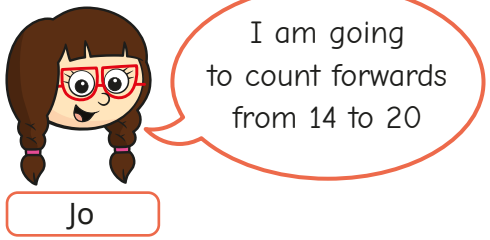
11	12	13	14	15	16	17	18	19	20

Count within 20

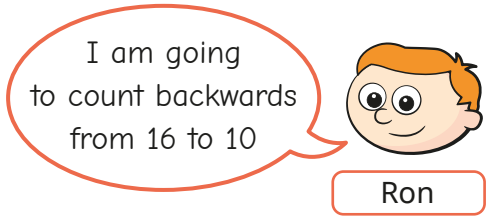
Reasoning and problem solving

Here are some number cards.

15	13	19	12	17



Which of the numbers will Jo say?

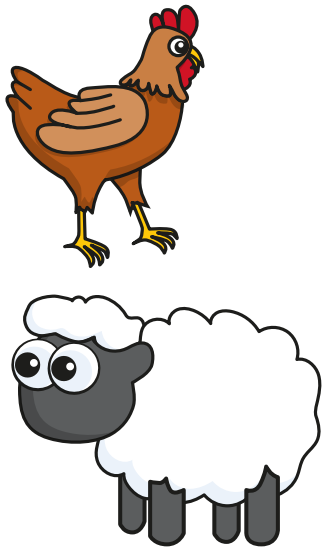


Which of the numbers will Ron say?

15, 19, 17

15, 13, 12

Mr Lee keeps hens and sheep.



He counts 14 legs altogether.

How many hens and sheep could Mr Lee have?

Compare answers with a partner.

2 hens and 3 sheep

3 hens and 2 sheep

5 hens and 1 sheep

Understand 10

Notes and guidance

In this small step, children develop their understanding of 10. A deep understanding of 10 will set children up well for future learning.

Use ten frames, bead strings and towers of cubes to draw attention to the fact that 10 ones and 1 ten are equivalent. Ten frames, bead strings and regular patterns, such as those on a dice, can support children to instantly recognise (subitise) 10 without needing to count.

Spend time looking at 10 in different ways, particularly ways where the 10 can be fixed or broken apart, for example a bundle of 10 straws. Children could then move on to seeing 10 as one base 10 piece that cannot be broken apart, although the individual ones are still obvious.

Things to look out for

- Children may struggle to understand that 1 ten is made up of 10 ones. Ensure that they explore this in a variety of ways.
- Where 10 is represented using a single piece of equipment, for example a single base 10 piece, children may struggle to recognise the 10 ones as they cannot physically break the representation apart.

Key questions

- How many ways can you make 10?
- How do you know that you have made 10?
- Is 10 greater than 9 or less than 9?
- How many ones make 10?
- If you have one full ten frame, what number have you got?
- What is this piece of base 10 worth? How do you know?

Possible sentence stems

- The ten frame is full, so I know that I have made _____
- There are _____ ones in 10
- There are _____ ones in _____ ten.

National Curriculum links

- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- Count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s

Understand 10

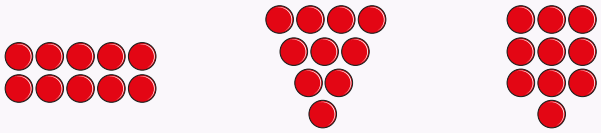
Key learning

Give one child 10 single cubes and another child a tower of 10 cubes. Ask which is more. Use the cubes to demonstrate that 10 ones and 1 ten are equivalent.

Repeat with 10 loose counters and 10 counters on a ten frame.

Show children 10 counters arranged in different ways.

How do they see the 10 each time?



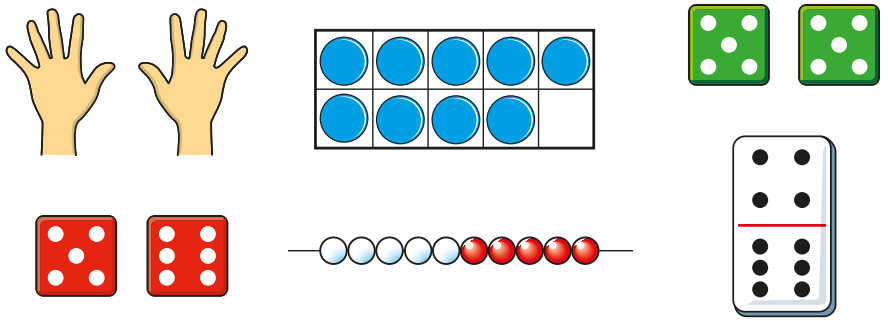
Ask children to count out 10 counters and arrange them in different ways.

What else do they notice about the composition of 10?

Ask children to show 10 in as many different ways as they can, this time using different representations.

Can they find a way to represent 10 that no one else has thought of?

- Which pictures show 10?



Provide a variety of sets of different-sized objects, ensuring that some sets have 10 items and some do not.

Ask children to fill ten frames to help them to sort the sets into "10" and "not 10".

Challenge them to explain how to change the sets that are not 10 into 10

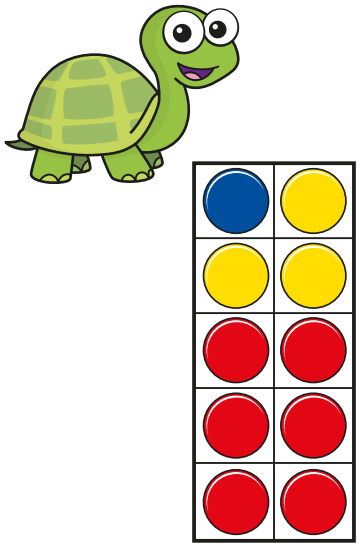
Give each child a tower of cubes from 1 to 9. Ask them to get into pairs so that each pair of children can combine their cubes to make 10

A similar activity can be done using number pieces.

Understand 10

Reasoning and problem solving

Tiny has made 10 using three different-coloured counters on a ten frame.



Make 10 using three different-coloured counters on a ten frame.

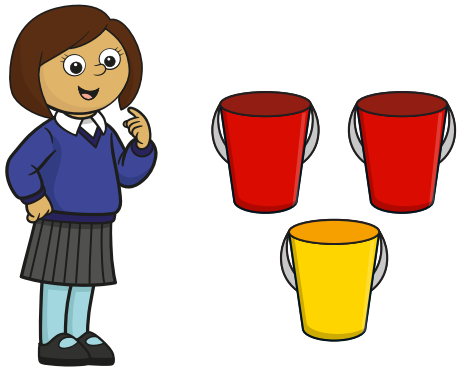
How many ways can you find?

multiple possible answers, e.g.

8, 1, 1

7, 2, 1

Kim has two red buckets and one yellow bucket.



She has 10 shells.

Kim puts her shells into the buckets.

The red buckets have the same number of shells inside.

How many shells could there be in each of Kim's buckets?

What do you notice about the number of shells in the yellow bucket?

0 + 0 + 10

1 + 1 + 8

2 + 2 + 6

3 + 3 + 4

4 + 4 + 2

5 + 5 + 0

Understand 11, 12 and 13

Notes and guidance

In this small step, children develop their understanding of 11, 12 and 13 as 1 ten and some ones, or "10-and-a-bit".

Start by showing children 10 on a ten frame and explore with them how to use a second ten frame to extend the number represented to 11, 12 and 13

Encourage them to make 11, 12 and 13 using a range of resources that make the "10-and-a-bit" structure clear. Ten frames, number pieces, towers of cubes, Rekenreks and bead strings all support children to see the full ten and part of the next ten to support their place value understanding. This understanding is crucial to future work on addition and subtraction.

Time should be taken to ensure that children understand the difference between the digits in the numbers, making links between the tens and ones in the representation and the numeral.

Things to look out for

- Children may find the numbers 11, 12 and 13 confusing, as they cannot hear the 1, 2 or 3 within the number word.
- Children may write, for example, 103 instead of 13, because they can see 10 and 3 in their representation.

Key questions

- How can you show me 11 in three different ways?
- How much more than 10 is 12?
- How can you write the numbers 11, 12 and 13?
- Can you see 11/12/13 anywhere in the classroom?
- Does anyone have a brother or sister who is 11, 12 or 13?
- How many ones are there in 13?
- What is the same and what is different about 11, 12 and 13?

Possible sentence stems

- 11 has _____ ten and _____ one.
- 12 has _____ ten and _____ ones.
- 13 has _____ ten and _____ ones.

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Read and write numbers from 1 to 20 in numerals and words

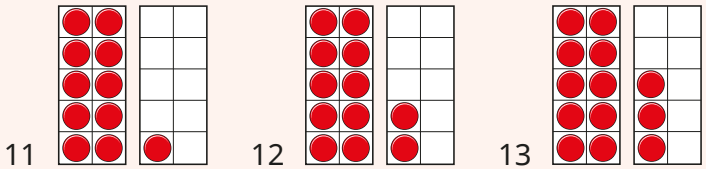
Understand 11, 12 and 13

Key learning

Show children 10 counters on a ten frame.

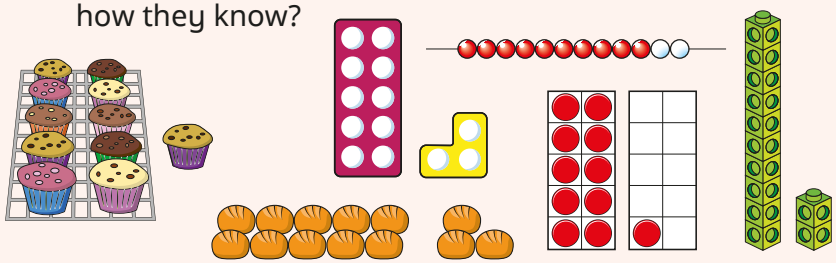
Ask how many there will be if you add one more counter. Discuss whether you can fit 11 counters on a ten frame. Build 11, emphasising 1 full ten and 1 more, linking this to how we write the numeral 11

Repeat for 12 and 13

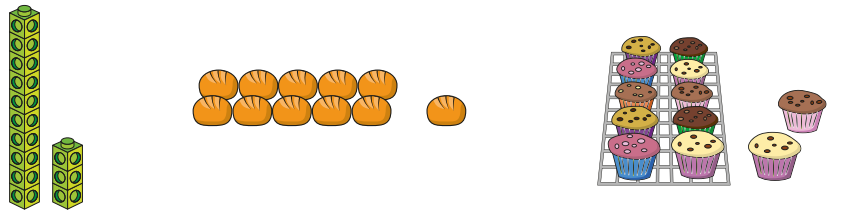


Quickly show a picture of 11, 12 or 13, making sure that the "10-and-a-bit" structure is clear. Then hide the picture.

Ask children which number they saw. Can they explain how they know?

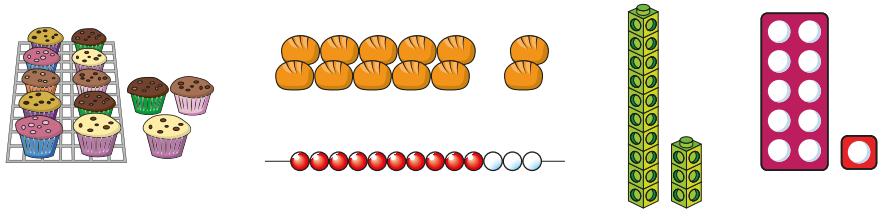


- Match the pictures to the numbers.



11	12	13

- Which pictures show 13?



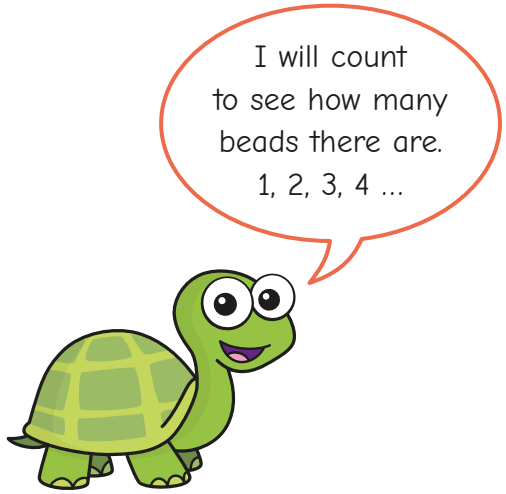
- Match the numerals to the number words.

12	13	11
eleven	thirteen	twelve

Understand 11, 12 and 13

Reasoning and problem solving

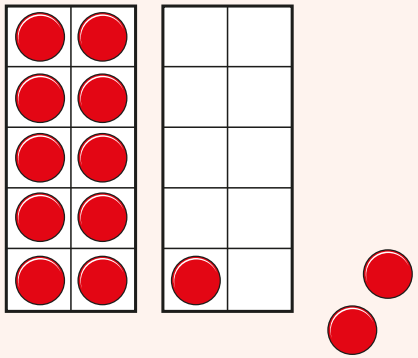
Here are some beads on a bead string.



Does Tiny need to count the beads?

How do you know?

No



Show children 11 on ten frames. Hide the ten frames and say that you are adding 1 more.

Ask how many there will be now.

Can children draw the new number?

Do their drawings match the hidden frames?

Repeat, adding or subtracting 1 or 2 counters each time to move between 10 and 13

Ask children what they notice.

Discuss answers as a class.

Understand 14, 15 and 16

Notes and guidance

In this small step, children extend the learning of the previous step by looking at 14, 15 and 16

Children practise matching numbers to representations using cards showing 14, 15 and 16 in words and numerals alongside representations of each number. As with the previous step, encourage children to make 14, 15 and 16 using a range of resources that make the "10-and-a-bit" structure clear. Ten frames, number pieces, towers of cubes, Rekenreks and bead strings all support children to see the full ten and part of the next ten to support their place value understanding. This understanding is crucial to future work on addition and subtraction.

Children should be challenged to explore the differences and similarities between these numbers and 11, 12 and 13. They also use part-whole models, giving them an informal introduction to partitioning.

Things to look out for

- Children may reverse the digits, for example writing 41 instead of 14, because they say the 4 before "teen".
- Children may write, for example, 106 instead of 16, because they can see the 10 and the 6

Key questions

- How can you show me 14/15/16 in three different ways?
- How much more than 10 is 14/15/16?
- How can you write the numbers 14, 15 and 16?
- Can you see 14/15/16 anywhere in the classroom?
- Does anyone have a brother or sister who is 14, 15 or 16?
- How many ones are there in 16?
- What is the same and what is different about 14, 15 and 16?

Possible sentence stems

- 14 has _____ ten and _____ ones.
- 15 has _____ ten and _____ ones.
- 16 has _____ ten and _____ ones.

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Read and write numbers from 1 to 20 in numerals and words

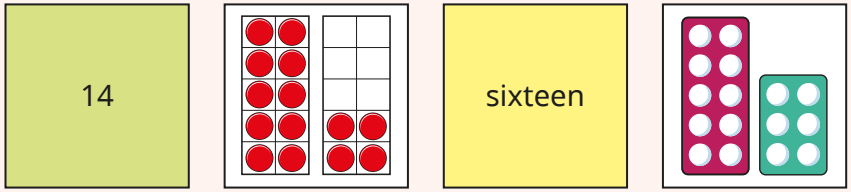
Understand 14, 15 and 16

Key learning

Use a set of cards with each card showing a numeral, word or representation for 14, 15 or 16

Give each child a card. Ask them to find a partner with the same number.

Can they find a different partner with the same number?



Use a set of cards with each card showing a numeral, word or representation for 14, 15 or 16

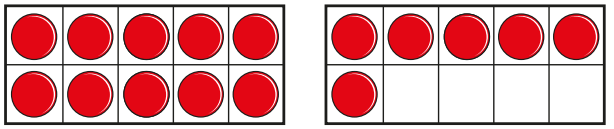
Use two 14, two 15 and two 16 cards. Shuffle the cards and take one away. Ask what number the missing card will represent.

Repeat using a mix of numerals, representations and words.

The cards can also be used to play a matching pairs game.

Place all the cards face down. Children take turns to turn over two cards. If they find a pair with the same number, they keep them. If not, they turn them back over for the next player's turn.

- Write the number shown on the ten frames in numerals and words.

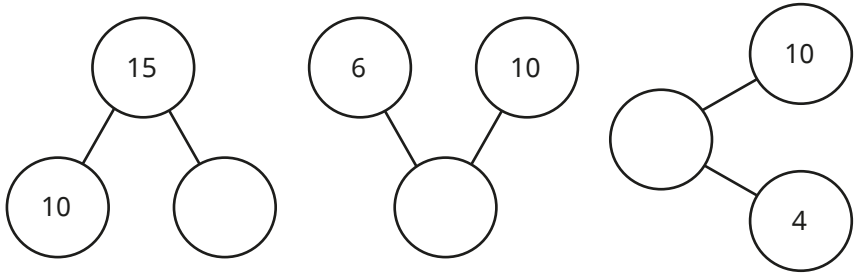


Use ten frames to show fifteen and fourteen.

- Complete the table.

Numerals	Word	Picture
14		
		
	sixteen	

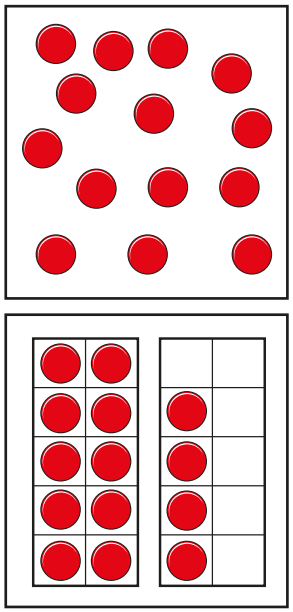
- Complete the part-whole models.



Understand 14, 15 and 16

Reasoning and problem solving

Ron uses counters to make two numbers.



What is the same? What is different?

Which group of counters is easier to count?

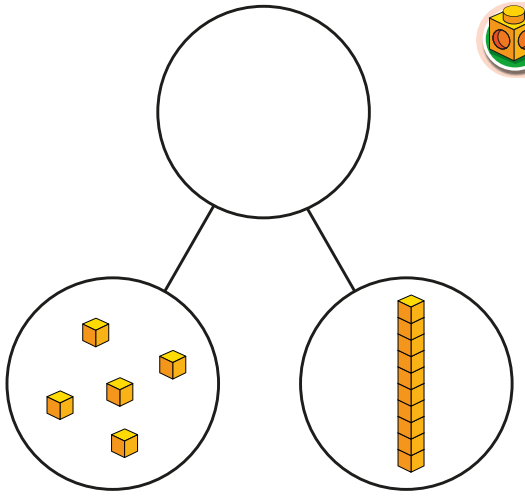
Why?

same: Both groups have 14 counters.

different: The way they are arranged

the second group

Tiny makes a part-whole model.



What mistake has Tiny made?

Tiny has 1 full ten and 5 more cubes. The number is 15

Understand 17, 18 and 19

Notes and guidance

In this small step, children extend the learning of the previous two steps by looking at 17, 18 and 19

Children explore 17, 18 and 19 shown on ten frames, expressing them as 1 ten and a number of ones. Encourage children to notice the "10-and-a bit" structure to help them subitise as they have done previously.

Children practise matching numbers to representations using cards showing 17, 18 and 19 in words and numerals alongside representations of each number. Ten frames, number pieces, towers of cubes, Rekenreks and bead strings continue to support children to see the full ten and part of the next ten to support their place value understanding. This understanding is crucial to future work on addition and subtraction.

Now that children are looking at the later teen numbers, encourage them to see the number of empty spaces in the second ten frame in order to quickly identify 17, 18 and 19

Things to look out for

- Children may reverse the digits, for example writing 71 instead of 17, because they say the 7 before "teen".
- Children may write, for example, 108 instead of 18, because they can see 10 and 8

Key questions

- How can you show me 17/18/19 in three different ways?
- How much more than 10 is 17/18/19?
- How can you write the numbers 17, 18 and 19?
- Can you see 17/18/19 anywhere in the classroom?
- How many ones are there in 19?
- What is the same and what is different about 17, 18 and 19?
- When you make 18 on a ten frame, how many spaces are empty?

Possible sentence stems

- 17 has _____ ten and _____ ones.
- 18 has _____ ten and _____ ones.
- 19 has _____ ten and _____ ones.
- There are _____ empty spaces on the ten frame.

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Read and write numbers from 1 to 20 in numerals and words

Understand 17, 18 and 19

Key learning

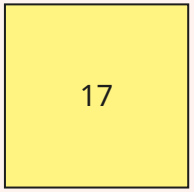
Show children 17 on ten frames.

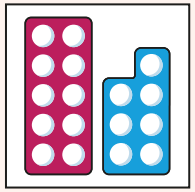
What do they notice about 17?

Ask children to use counters and ten frames to make 18 and 19 and to talk to a partner about what they notice.

Play Snap using a set of cards with each card showing a numeral, word or representation for 17, 18 or 19

When children shout "Snap!", ask them to explain why the numbers are the same.





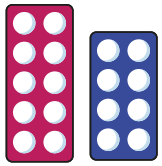
Ask children to write three numbers between 10 and 20

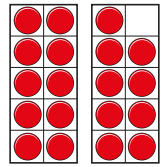
Show them a number (varying the representations).

If they have written that number, they cross it out.

The first child to cross out all three of their numbers wins the game.

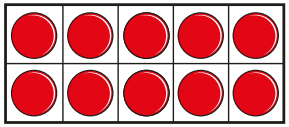
- Match the pictures to the numbers.

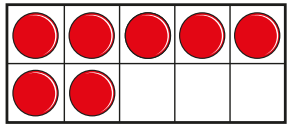




nineteen | eighteen | seventeen

- Use the ten frames to complete the sentence.





17 has _____ ten and _____ ones.

Use ten frames to show 18 and 19

- Complete the number tracks.

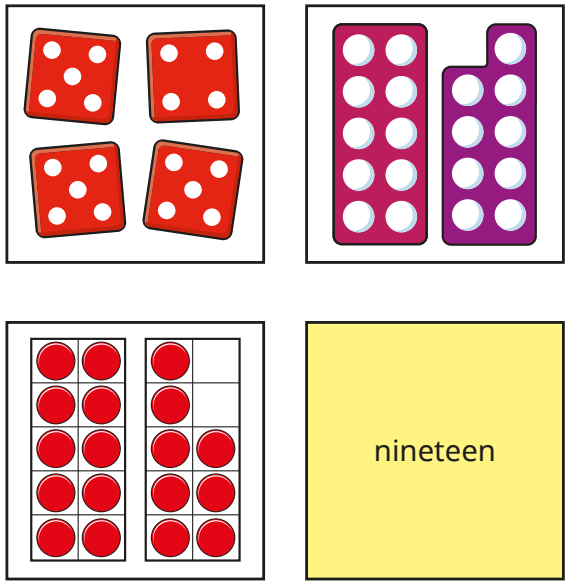
10	11	12	13		15	16			19	20

20		18		16	15	14		12	11	10

Understand 17, 18 and 19

Reasoning and problem solving

Which one does not belong?



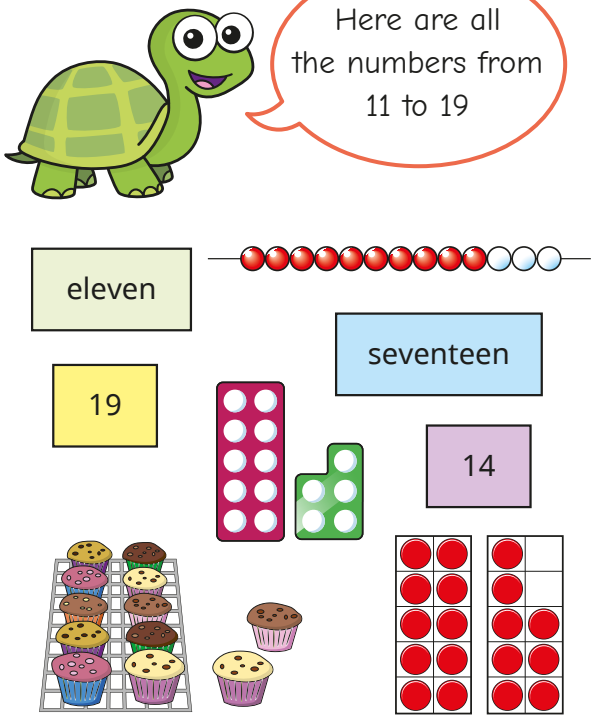
Is there more than one answer?

multiple possible answers, e.g.

The ten frames show 18 and all the rest show 19

The dice is the only number with four parts.

Nineteen is the only word.



Is Tiny correct?

How do you know?

No

16 is missing.

Understand 20

Notes and guidance

In this small step, children apply what they have learnt about 10, to develop an understanding of 20. A deep understanding of 20 will set children up well for future learning.

Use ten frames, bead strings and towers of cubes to draw attention to the fact that 2 tens are equivalent to 20. Spend time looking at 20 in different ways, particularly ways where each ten can be fixed or broken apart, for example bundles of straws. Children could then move on to seeing 20 as two base 10 pieces that cannot be broken apart, although the individual ones are still obvious.

Things to look out for

- Children may struggle to understand that 20 is made up of 2 tens or 20 ones. Ensure that they explore this in a variety of ways.
- Where 20 is represented using two single pieces of equipment, for example 2 base 10 pieces, children may struggle to recognise the 10 ones in each ten as they cannot physically break the representation apart.
- Children may not understand that when counting, 20 comes after 19, and time should spend focusing on this.

Key questions

- How many ways can you make 20?
- How do you know that you have made 20?
- Is 20 greater than 19 or less than 19?
- How many ones make 20?
- How many tens make 20?
- If you have two full ten frames, what number have you got?
- How many pieces of base 10 do you need to make 20?

Possible sentence stems

- Two ten frames are full, so I know that I have made _____
- There are _____ ones in 20
- There are _____ tens in 20

National Curriculum links

- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- Count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s

Understand 20

Key learning

Hide small objects outside and provide two ten frames for each group of children.

The groups race to find 20 objects and fill their ten frames. Prompt children to tell you how many objects they have found and how many more they need to make 20

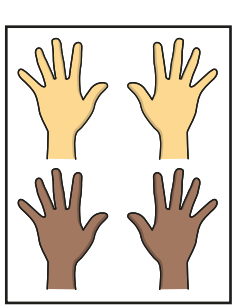
Show representations of numbers and ask children to decide if the number shown is 20 or not 20, explaining how they know.

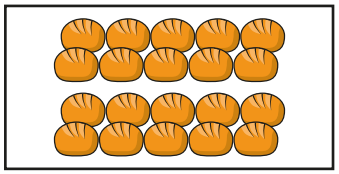
Read *One is a Snail, Ten is a Crab* by April Pulley Sayre and Jeff Sayre.

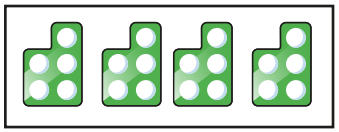
Remind children that 20 is 2 crabs.

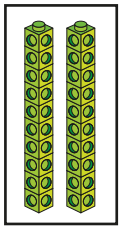
Ask children to find different ways of making 20 using the animals in the book.

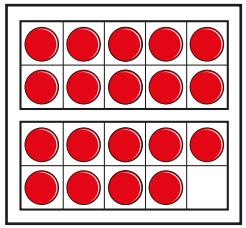
- Which pictures show 20?











Children can play this game in pairs or small groups.

They need a number track from 0 to 20, a 1–3 dice and some counters.

They start from zero and take turns to roll the dice and count on the corresponding number of jumps. For example, if Tom is on 6 and rolls a 3, he counts 7, 8, 9 as he moves his counter along the track.

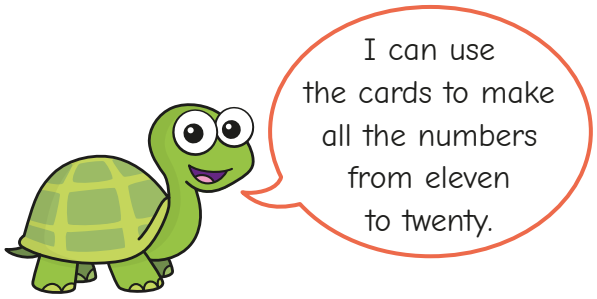
The first child to reach exactly 20 wins.

Understand 20

Reasoning and problem solving

Tiny has these digit cards.

1	2	3	4	5
6	7	8	9	



Do you agree with Tiny?

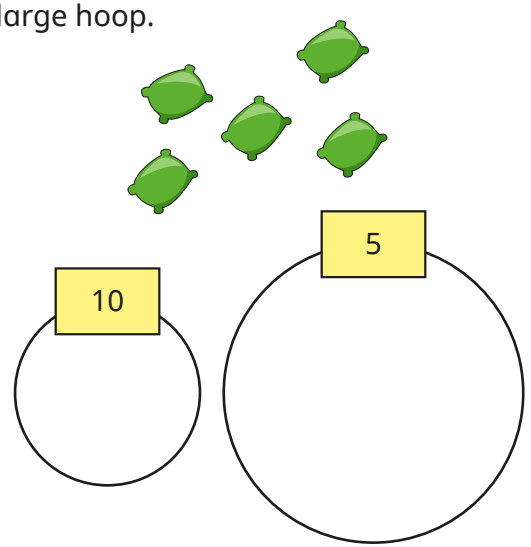
Why?

No

Ann is throwing beanbags into two hoops.

She scores 10 for a beanbag in the small hoop.

She scores 5 for a beanbag in the large hoop.



How can Ann score 20?

How many ways can you find?

10 and 10

5, 5, 5 and 5

10, 5 and 5

1 more and 1 less

Notes and guidance

In this small step, children apply their counting skills to find 1 more and 1 less than any number within 20

Children have already looked at this concept for numbers within 10, so while the focus here is on numbers from 11 to 20, other numbers within 20 can also be covered. Ensure that examples involving zero are used, for example 1 less than 1 is zero and 1 more than zero is 1. Children have already encountered the language of "more" and "less", but this may need reinforcing. Using real-life examples, such as "1 more grape", will help children with their understanding of the vocabulary.

Representations such as ten frames are useful for showing 1 more and 1 less. Towers of cubes are particularly useful for clearly showing the 1 more pattern of consecutive numbers. Using a number track alongside concrete resources can help children develop a secure understanding of the concept. Children practise finding 1 more and 1 less using both representations and numerals.

Things to look out for

- Children who are not are fully secure with counting and one-to-one correspondence may struggle with 1 more and 1 less.

Key questions

- How can you show the number _____?
- How can you find 1 more?
  How does this change the number?
  Which digit changes?
- How can you find 1 less?
  How does this change the number?
- What is the same and what is different about finding 1 more and finding 1 less?
- When you are finding 1 more or 1 less, which digit changes? Is it always the same digit?

Possible sentence stems

- _____ is 1 more than _____
- _____ is 1 less than _____
- 1 more than _____ is _____
- 1 less than _____ is _____

National Curriculum links

- Given a number, identify 1 more and 1 less

1 more and 1 less

Key learning

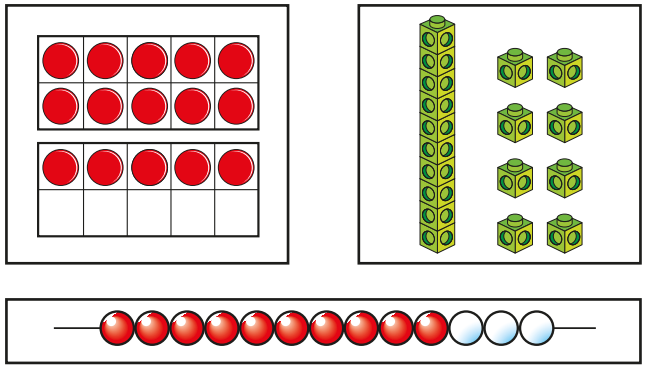
Reread *1 to 20 Animals Aplenty* by Katie Viggers.

Draw children's attention to the 1 more pattern in the book. Build towers of cubes to represent the animals on each page and to show the 1 more step pattern.

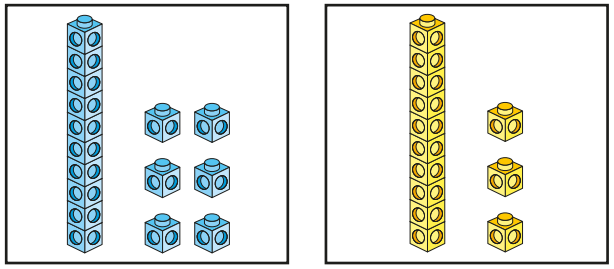
Look at the 11 to 20 counting pattern on the last page of *1 to 20 Animals Aplenty*.

Ask children to build or draw their own 11 to 20 step patterns. This could be done using resources outside or chalked onto the playground.

- Make 1 more and 1 less than each number.

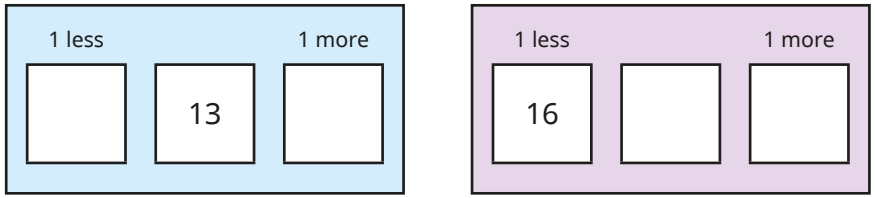


- Use cubes to make 1 more and 1 less than the numbers.



- Write numbers to fill in the boxes.

  Use base 10 to help you.



- Use the number track to help you complete the sentences.

11	12	13	14	15	16	17	18	19	20

- _____ is 1 more than 13
- 13 is 1 more than _____
- _____ is 1 less than 19
- 19 is 1 less than _____

1 more and 1 less

Reasoning and problem solving

Dan is 1 year older than his sister.

Dan's sister is 1 year older than Dan's brother.

Dan's brother is 13

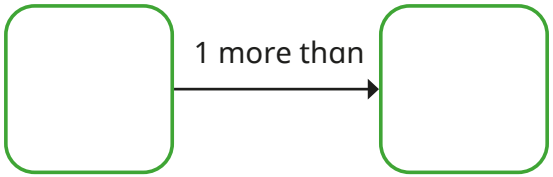
How old is Dan's sister?

How old is Dan?

14 years old

15 years old

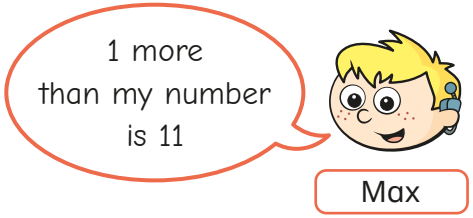
Use the numbers from 11 to 20 to fill in the boxes.



How many ways can you find?

multiple possible answers, e.g.
18, 17
12, 11

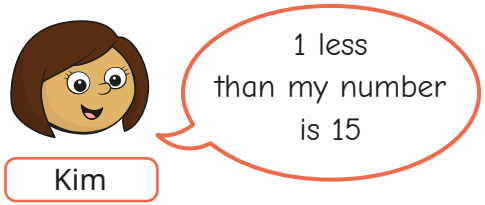
Max thinks of a number.



What is Max's number?

How do you know?

Kim thinks of a number.



What is Kim's number?

How do you know?

10

16

The number line to 20

Notes and guidance

Children learnt about the number line to 10 in the Autumn term. In this small step, they extend the number line to 20

All the number lines in this step count in 1s. Children can use number lines to practise and consolidate the skills learnt so far in this block. They recap counting from 0 to 20 forwards when labelling a number line and practise counting backwards when reading from right to left. A number line is a great opportunity to count from zero, as children do not do this when counting physical things. They use a variety of number lines all counting in 1s, but with different start and end point values.

Things to look out for

- When labelling a number line, children may write the numbers in between divisions, as they do on number tracks, rather than on divisions.
- Children may assume that all number lines start at zero.
- Children may think that numbers on a number line can either increase or decrease from left to right, as on number tracks.

Key questions

- How can you label the number line? How do you know where to put the numbers?
- What does each mark on the number line represent?
- Where does the number line start/end?
- How can you use a number line to decide which number is greater?
- How much is each jump on the number line?

Possible sentence stems

- The first number on the number line is _____
- The last number on the number line is _____

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

The number line to 20

Key learning

Get children to pace out a 0–20 number line in the playground, counting each step from zero. Use chalk to label the numbers.

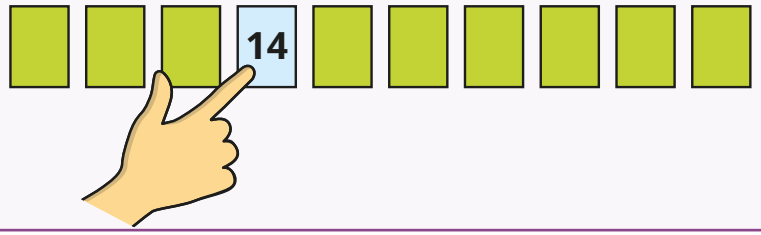
Ask children to find any given number on the number line. Is the number nearer to zero or nearer to 20? How do they know?

Ask them to explain how they know which number is halfway between zero and 20

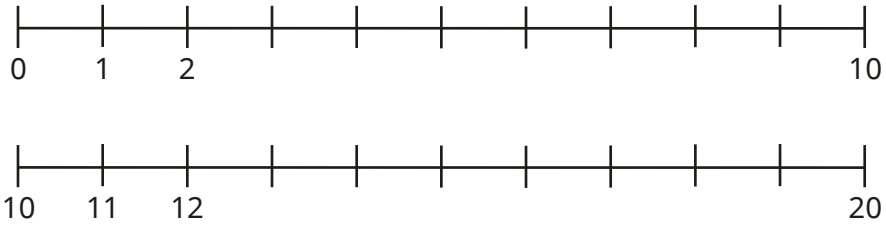
Put a set of number cards from 11 to 20 face down in order.

Challenge children to point to any card and tell them that you will use your X-ray vision to tell them the number on the card!

Can children work out the secret of your success?

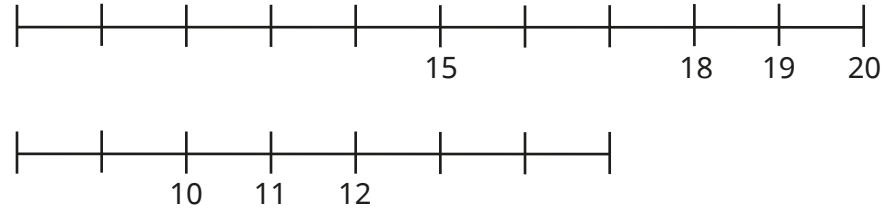


- Complete the number lines.



What is the same about the number lines? What is different?

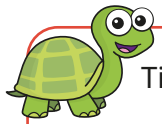
- Complete the number lines.



- Use a number line from 0 to 20
  - Circle the number 13
  - Circle the number 20

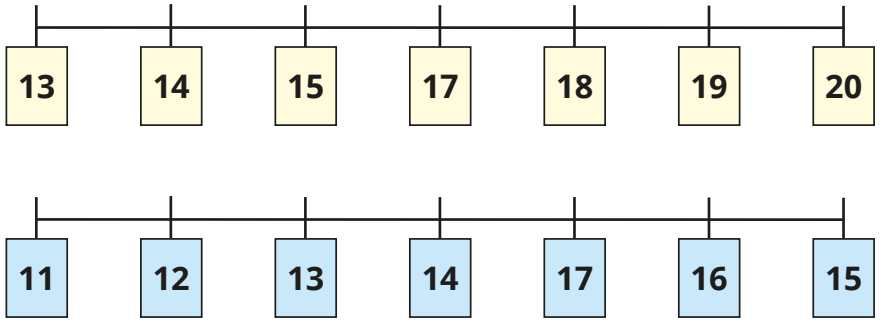
The number line to 20

Reasoning and problem solving



Tiny has put number cards on two number lines.

Spot the mistake in each number line.

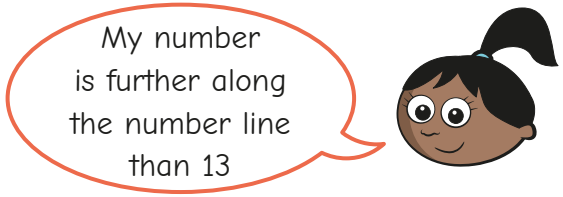


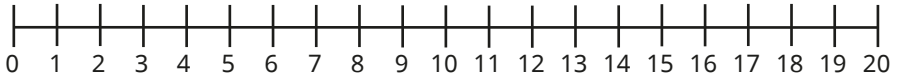
Draw a number line with a mistake for a partner to spot.

16 is missing.

15 and 17 are the wrong way round.

Sam is thinking of a number.





What could Sam's number be?

Compare answers with a partner.

any number greater than 13 and less than or equal to 20

Use a number line to 20

Notes and guidance

In this small step, children build on their understanding of the number line to 20

All the number lines in this step count in 1s. Children continue to use the number line to practise and consolidate the skills learnt so far in this block.

Children see that 1 more is the next number along the number line, while 1 less is the previous number. They identify all the numbers lying between two given numbers and work out and label numbers on partially labelled number lines.

Things to look out for

- When labelling a number line, children may write the numbers in between divisions, as they do on number tracks, rather than on divisions.
- When completing a partially labelled number line, children may assume that the number line starts at 1, not zero, or they may try to guess the numbers, rather than count to check.

Key questions

- How can you label the number line? How do you know where to put the numbers?
- What does each mark on the number line represent?
- Where does the number line start/end?
- How do you find 1 more/less on a number line?
- What does each jump on the number line represent?

Possible sentence stems

- The first number on the number line is _____
- The last number on the number line is _____
- To find 1 more/less, I need to ...

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Use a number line to 20

Key learning

Use chalk to draw a large 0–20 number line on the playground.

Ask a child to start at 9 and jump to 17, one division at a time. Which numbers do they land on?

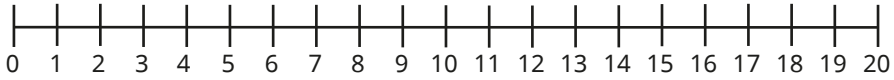
Can children find 1 more and 1 less than 15?

Can they find all the numbers that are greater than 11? Less than 14?

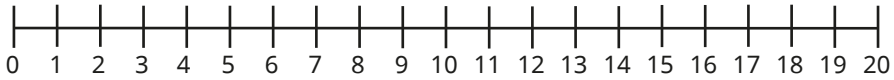
Can they find all the numbers in between 12 and 18?

- Ann counts from 8 to 15

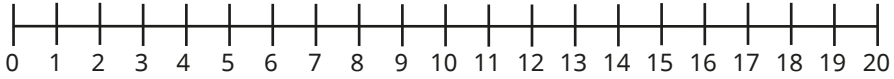
  Circle all the numbers that she will say.



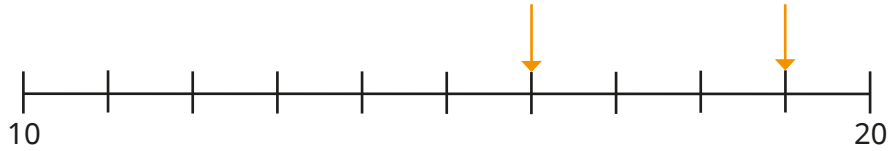
- Circle all the numbers that are greater than 7



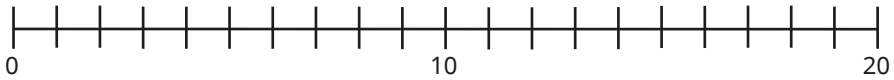
- Circle all the numbers that are less than 13



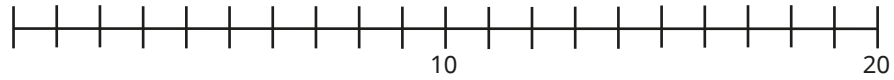
- What numbers are the arrows pointing to?



- Label 15, 12 and 9 on the number line.



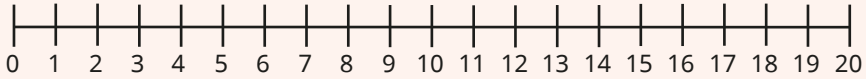
Label 7, 17 and 19 on the number line.



Use a number line to 20

Reasoning and problem solving

Ask children to pick a number on the number line.



Can they tell you how many jumps there are from zero to their number? How many jumps are there from their number to 20? Is their number closer to zero or closer to 20?

Repeat with different numbers.

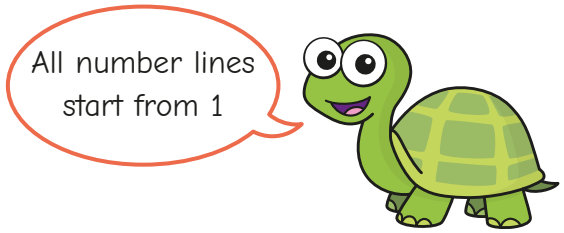
Ask children what they notice about the two sets of jumps each time.

multiple possible answers, e.g. 15

15 jumps from zero to 15

5 jumps from 15 to 20

The two sets of jumps always total 20

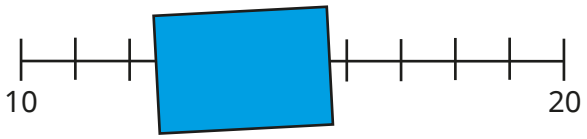


Do you agree with Tiny?

Why?

No

Which numbers are hidden by the card?



13, 14, 15

Estimate on a number line to 20

Notes and guidance

In this small step, children are asked to estimate for the first time. This is a new word for children to learn. Previously, they may have been asked to "guess" and make predictions.

When children are beginning to estimate on a number line, take time to explore the halfway point. Where do they think halfway is? How do they know? What informal measurements could they use to check? (For example, steps in the playground.)

Some children may initially struggle to estimate. Conversations with other children are vital to develop understanding. Some children may find not having an exact answer difficult and need time to grasp the idea of estimating.

Children need to be confident using a number line before being able to estimate. For example, if they are estimating where 4 is on a blank number line from zero to 10, they need to be able to reason that it will be less than halfway.

Things to look out for

- Some children may be reluctant to estimate in case they get it wrong. Introduce estimation in a fun, game-like way so that children feel comfortable having a go and discussing their reasons.

Key questions

- What does "estimate" mean?
- Can you find halfway?
- What number is halfway on the number line?
  Is 7 more or less than the number?
- Will halfway on the number line always be 5?
  What if the number line starts at zero and ends at 20?
  What number is halfway now?
- Can you explain your thinking?
- Where is 15 on the number line? How do you know?

Possible sentence stems

- _____ is halfway along the number line.
- _____ is closer to _____ than _____

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Estimate on a number line to 20

Key learning

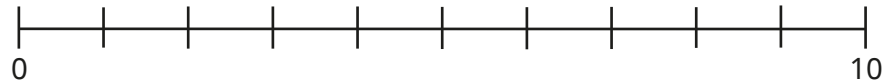
Use chalk to draw a number line on the playground. Label one end zero and the other end 10

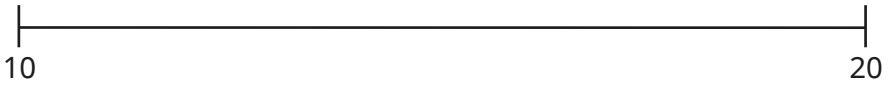
Give a child a number card and ask them to position themselves on the number line. Repeat for other numbers. Encourage children to explain their reasoning. For example, 5 is halfway along the line and 6 is a little bit past halfway.

Discuss what changes if the number line is zero to 20. Which number will be halfway? Where will 5 and 15 be? Where will 12 come?

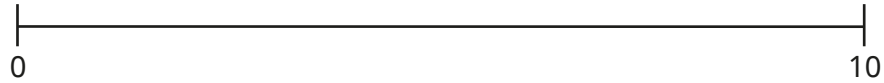
- Use the number line from 0 to 10 to help you estimate.

  Where do 13 and 19 belong on the number line from 10 to 20?

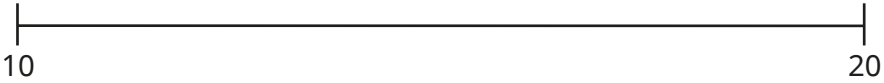




- Estimate where 4 belongs on the number line.

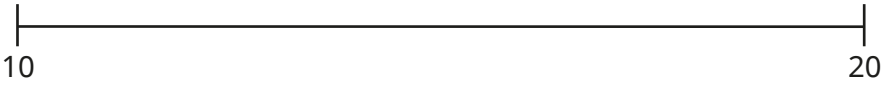


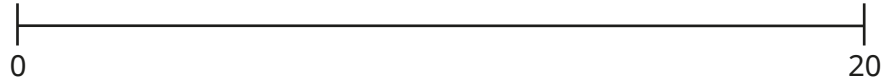
Estimate where 14 belongs on the number line.



What is the same? What is different?

- Estimate where 15 belongs on each number line.





What is the same? What is different?

- Draw and label number lines from 0 to 10 and 0 to 20

  Which numbers will you mark on your lines first?

Estimate on a number line to 20

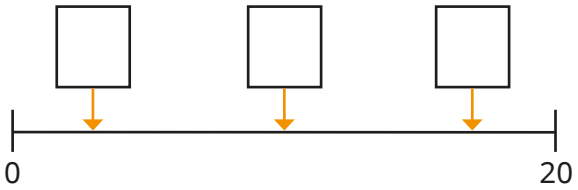
Reasoning and problem solving

What could the missing number be?

How do you know?

18

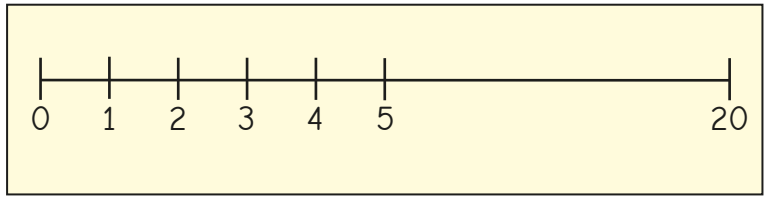
What could the missing numbers be?

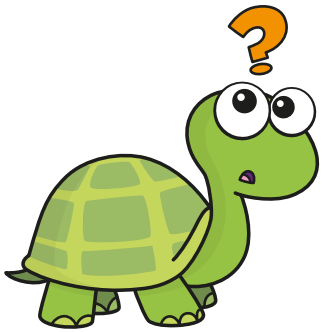


How do you know?

3, 10, 17

Tiny is trying to draw a number line from 0 to 20





What is wrong with Tiny's number line?

How would you draw the number line?

Tiny will not have enough room for all the numbers to 20

Compare numbers to 20

Notes and guidance

In this small step, children build on their understanding of comparing numbers from the Autumn term to compare pairs of numbers up to and including 20

Children can use their knowledge of counting to support them. For example, because they say 16 after 15, they know that 16 is greater than 15. They can also use their knowledge of representing numbers using objects to help them identify which number in a pair is greater or less than the other. Ten frames and number lines are useful representations to support children when comparing numbers.

Both the inequality symbols and the language of "greater than", "less than" and "equal to" are used throughout. It is important that children see examples of all the symbols, to reinforce their meaning. Children also compare numbers written as words.

Things to look out for

- Children may think that, for example, 7 is greater than 15 because 7 is greater than 5
- Children may find it more difficult to compare numbers to zero as it is harder to visualise.

Key questions

- When you count from zero, which of the numbers do you say first?
- Which number is further along the number line?
- Which number is greater? How do you know?
- Which is the smaller number? How do you know?
- What does each symbol mean?
- Can you tell me a number that is less/greater than _____?

Possible sentence stems

- _____ is less/greater than _____
- _____ is equal to _____
- _____ </>/= _____

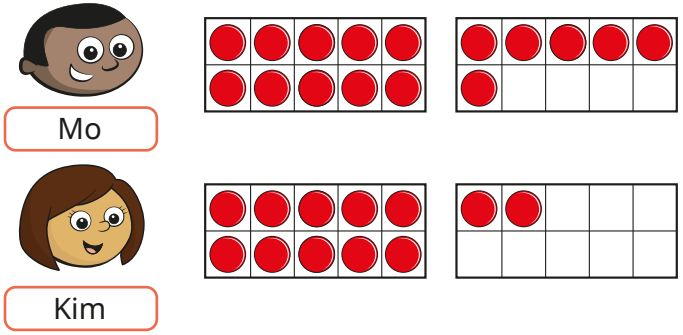
National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

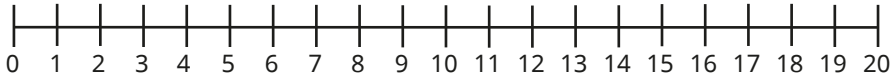
Compare numbers to 20

Key learning

- Mo and Kim have each made a number.



  - What number has Mo made?
  - What number has Kim made?
  - Who has made the greater number?

- 

  - Circle 13 and 19 on the number line.
  - Write **less** or **greater** to compare the numbers.

    13 is _____ than 19 19 is _____ than 13
  - Write < or > to compare the numbers.

    13 ◯ 19 19 ◯ 13

- Write the missing phrase.

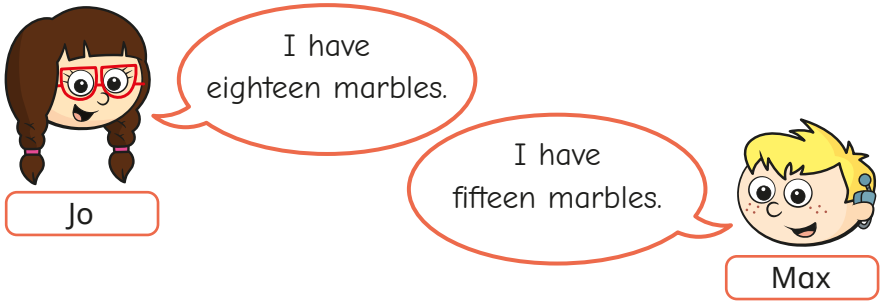
less than	greater than	equal to

  - 11 is _____ 15
  - 13 is _____ 9
  - Eleven is _____ 16
  - Twenty is _____ 0
  - 12 is _____ twelve.
  - 10 is _____ 20

- Write <, > or = to compare the numbers.

  14 ◯ 9 19 ◯ 20 13 ◯ 12

- Jo and Max have some marbles.



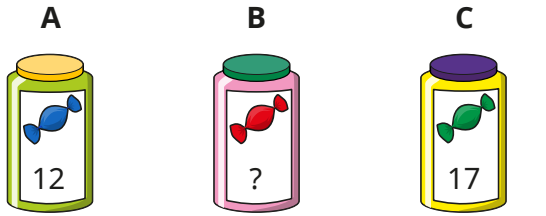
  Who has more marbles?

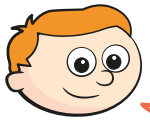
  How do you know?

Compare numbers to 20

Reasoning and problem solving

Ron and Sam have three jars of sweets.

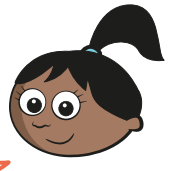




There are more sweets in jar B than in jar A.

Ron

There are fewer sweets in jar B than in jar C.



Sam

How many sweets could there be in jar B?

Compare answers with a partner.

13, 14, 15, 16

What could the missing numbers be?

☐ is greater than 15, but less than 20

☐ is less than eighteen, but greater than twelve.

Compare answers with a partner.

16, 17, 18, 19

13, 14, 15, 16, 17

Give each child a Rekenrek.

Tell children a number between 0 and 20 and ask them to make a number that is greater/less than your number.

How do they know that it is greater/less?

multiple possible answers

Order numbers to 20

Notes and guidance

Now that children are confident in counting and comparing numbers to 20, in this small step they move on to ordering sets of three numbers.

Expose children to different methods for ordering such as comparing two groups initially and lining groups up. Children should use the language they used in the previous step as well as "greatest", "smallest", "most" and "fewest".

Children need to apply their knowledge of tens and ones to help them work abstractly. For example, when ordering 8, 17 and 14 children should recognise that 8 is the only number that does not have 1 ten, therefore 8 is the smallest of the three numbers.

Things to look out for

- Children may compare the ones in a number without considering the tens and so think that 8 is greater than 15, because 8 is greater than 5
- Children may struggle with descending order, and think that numbers can only be ordered from smallest to greatest.

Key questions

- How did you compare the groups?
- How do you know that group _____ has the most/fewest?
- How do you know that group _____ is the greatest/smallest?
- How can you show the numbers using cubes or counters?
- Do you need to start with the smallest or the greatest number?
- Which number is the greatest/smallest? How do you know?
- Do all the numbers have tens? How does this help?

Possible sentence stems

- _____ has _____ ten and _____ ones.
- _____ ones is greater/less than _____ ones, so _____ is greater/less than _____
- The greatest/smallest number is _____

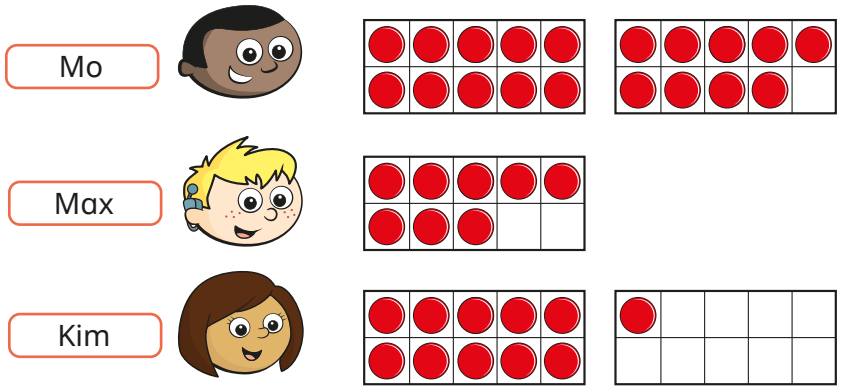
National Curriculum links

- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Order numbers to 20

Key learning

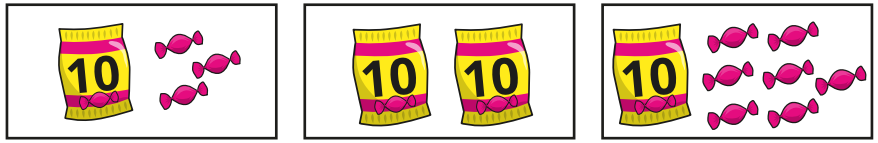
- Mo, Max and Kim use counters to make numbers.



  - What numbers have they made?
  - Who has made the greatest number? How do you know?
  - Who has made the smallest number? How do you know?
  - Write the numbers in order.

    Start with the smallest number.

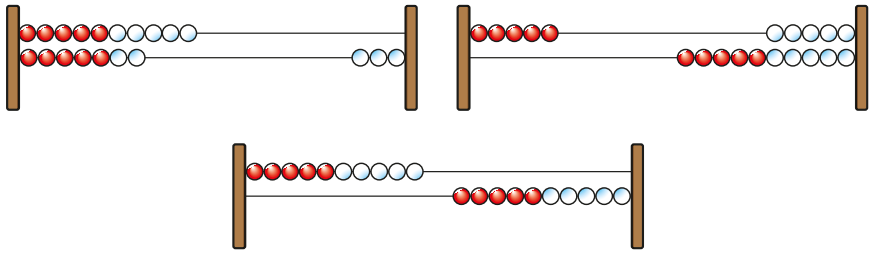
- Here are three groups of sweets.



  Put the groups in order.

  Start with the one that has the most sweets.

- Mrs Smith has made three numbers on Rekenreks.



  - What numbers has Mrs Smith made?
  - Write the numbers in order.

    Start with the greatest number.

- Complete the sentences for each set of numbers.

  _____ is the greatest number.

  _____ is the smallest number.

13, 18, 15	20, 17, 11
12, 5, 7	nineteen, zero, fifteen

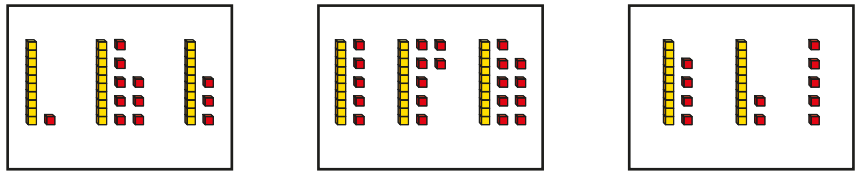
Write each set of numbers in order, from greatest to smallest.

Order numbers to 20

Reasoning and problem solving

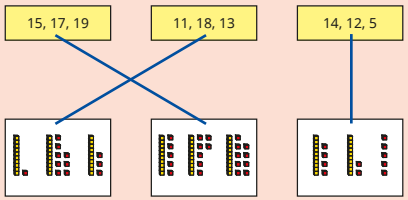
Match the labels to the pictures.

15, 17, 19	11, 18, 13	14, 12, 5



Order the numbers in each set from smallest to greatest.

Order all the numbers from greatest to smallest.



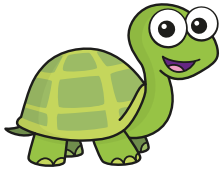
15, 17, 19

11, 13, 18

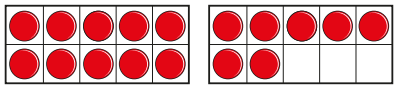
5, 12, 14

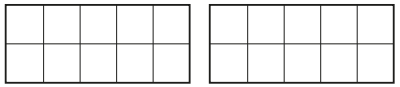
5, 11, 12, 13, 14, 15, 17, 18, 19

Tiny is making numbers in order from greatest to smallest.

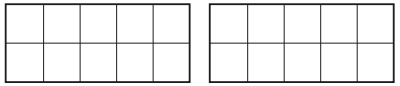


greatest





smallest



Draw counters to show the numbers Tiny could have made.

Is there more than one answer?

multiple possible answers, e.g.

17, 14, 13

17, 8, 0

Children could also add counters to the first set of ten frames, which gives even more possible answers.

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.

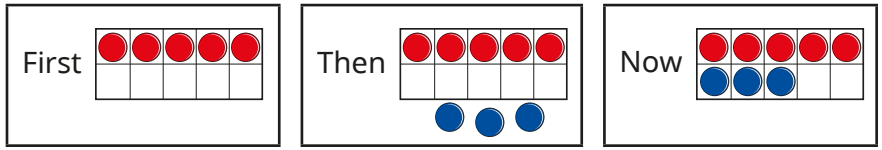
Point to yourself and begin counting. When you point to another group, they continue the count. Keep switching between groups.

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.

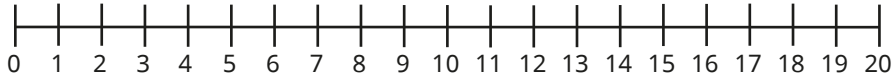
Now there are _____ cars in the car park.

- 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.

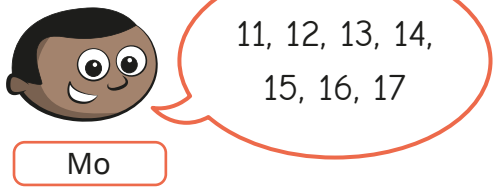


9 + 6 = _____

Add by counting on within 20

Reasoning and problem solving

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

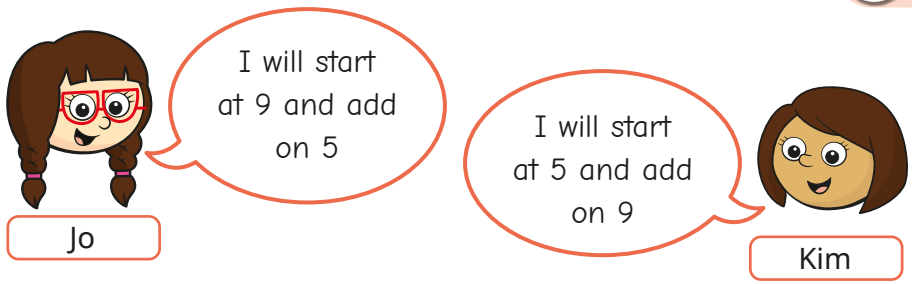


Who is correct?

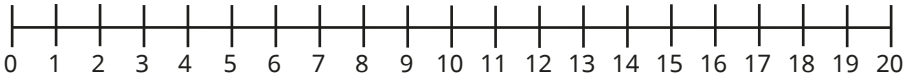
Use a number line to show your answer.

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 _____

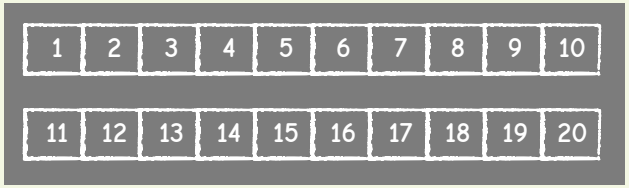
National Curriculum links

- 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.

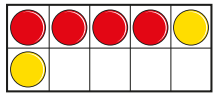
Ask one child to make a number between 0 and 4 and the other child to make the number that is 10 more, for example 3 and 13

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

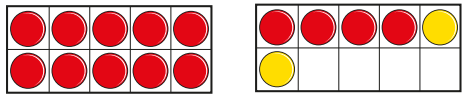
What do they notice about their answers?

Ask children to write number sentences for their additions.

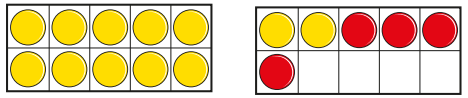
- Complete the additions.



4 + 2 = _____

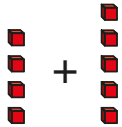


14 + 2 = _____

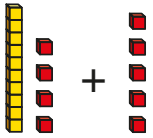


12 + 4 = _____

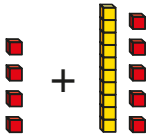
- Complete the additions.



4 + 5 = _____



14 + 5 = _____



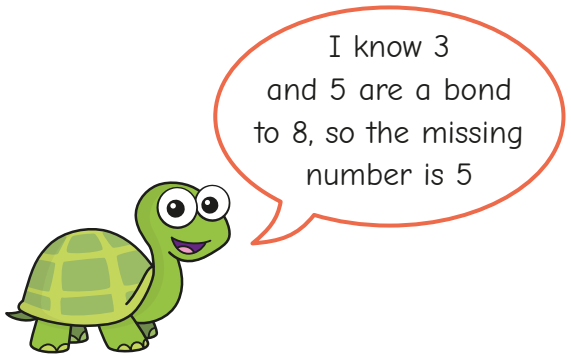
4 + 15 = _____

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.

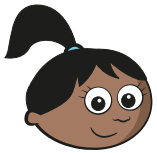
1 + _____ = 6 _____ + 3 = 9

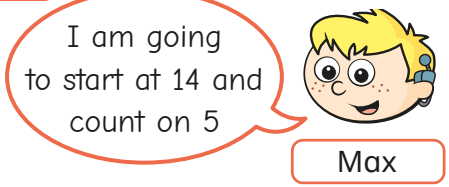
11 + _____ = 16 _____ + 3 = 19

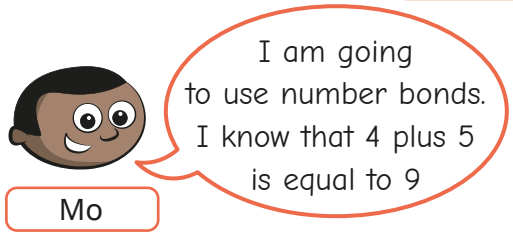
No

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?

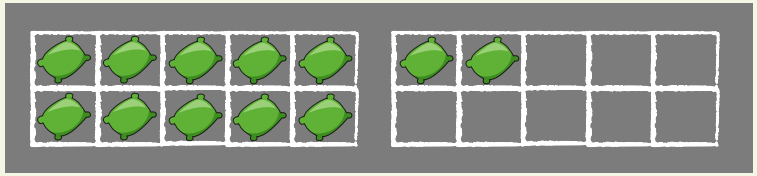
Is there more than one way to do it?

Ask children to draw what they have found.

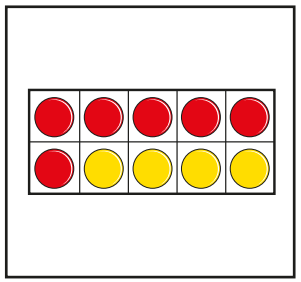
Chalk two large ten frames onto the playground. Tell the children you have hidden 20 beanbags and that they need to find them!

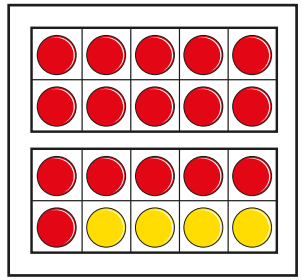
As the children find the beanbags, they put them into the ten frames.

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?

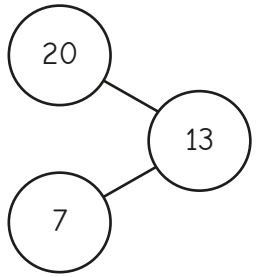
Talk about it with a partner.

multiple possible answers, e.g.

The = is in a different place.

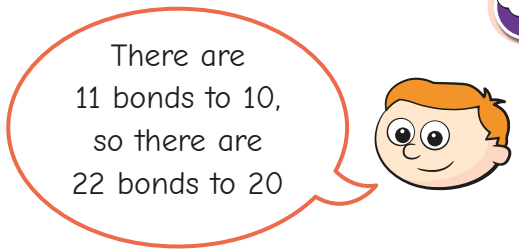
The number of ones remains the same and a ten has been added to create a number bond to 20

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.

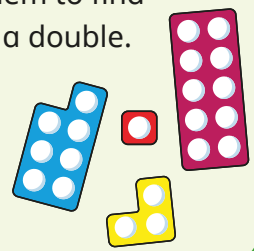
They score a point each time they roll a double.

The first to reach 3 points wins the game.

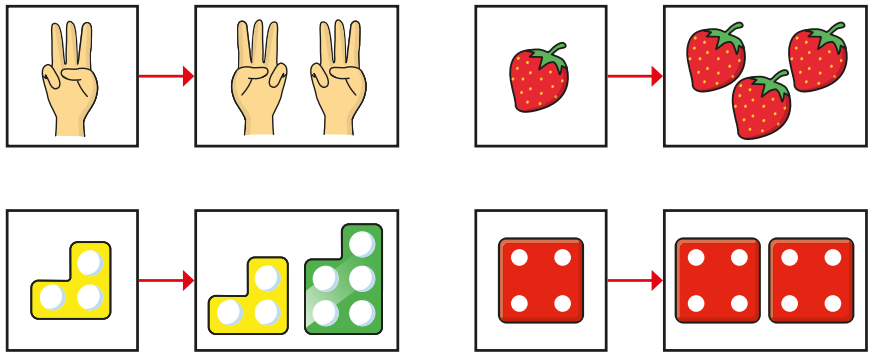
Hide number pieces outside.

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

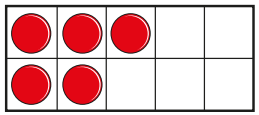
Ask them to say the double they have found, for example "Double 5 is 10"



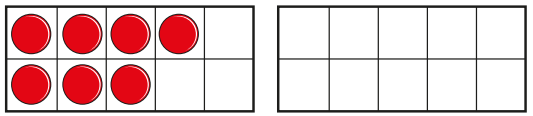
- Which pictures show doubles?



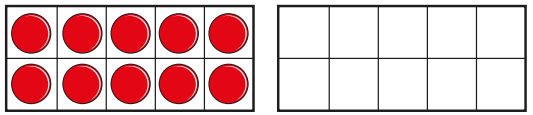
- Draw counters to work out the doubles.



Double 5 is _____



Double 7 is _____



Double 10 is _____

Doubles

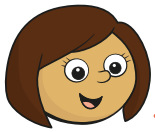
Reasoning and problem solving

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

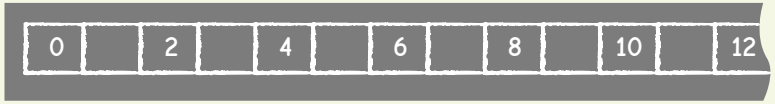
National Curriculum links

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

Near doubles

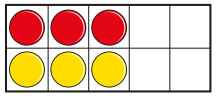
Key learning

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

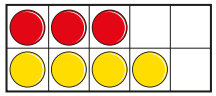


Ask children to stand on a number and then to write either 1 more or 1 less than their number in the adjacent box.

- What additions are shown?



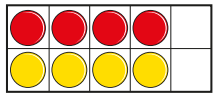
_____ + _____



_____ + _____

  - 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?



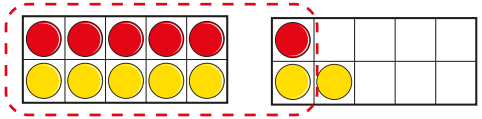
Add one more red counter to the ten frame.

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

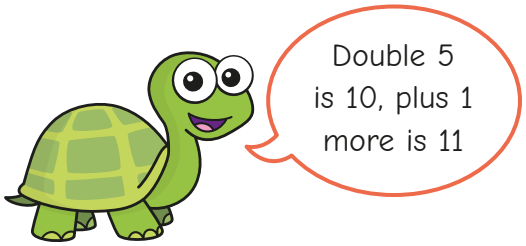
- Use doubles to work out the near doubles.

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

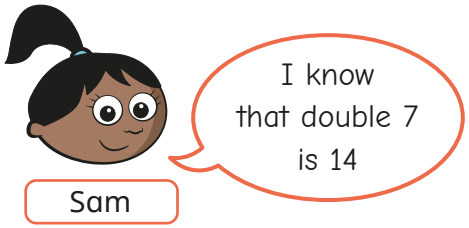
9 + 8 ◯ double 8

<

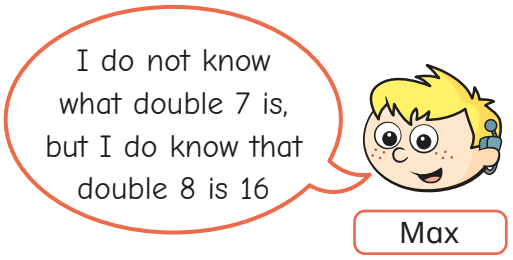
>

>

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 _____

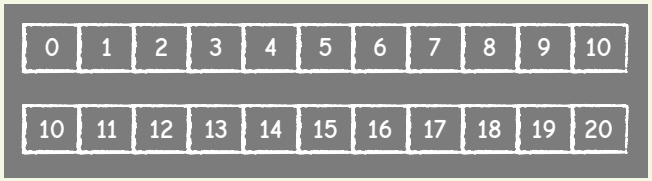
National Curriculum links

- 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?

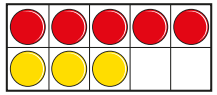
Repeat for other starting numbers, ensuring that the answer does not go below 0 or 10, respectively.

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.

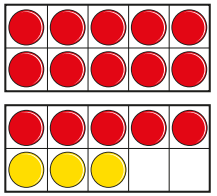
Roll a dice and ask each child to subtract the counters from their ten frames. What do they notice about their answers?

Ask them to write number sentences that match their subtractions.

- Complete the subtractions.



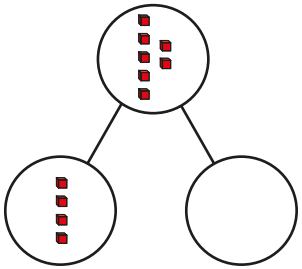
8 – 3 = _____

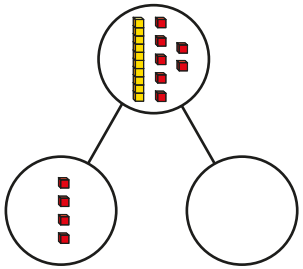


18 – 3 = _____

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

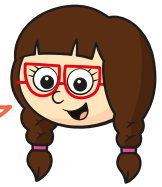
Reasoning and problem solving

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

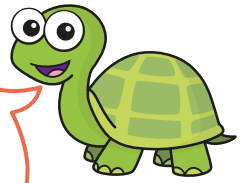


Jo

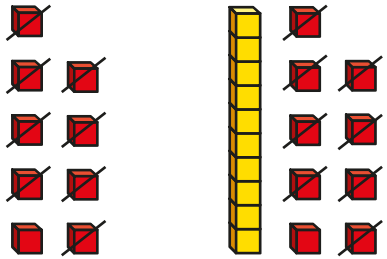
Whose method do you prefer? Why?

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 _____

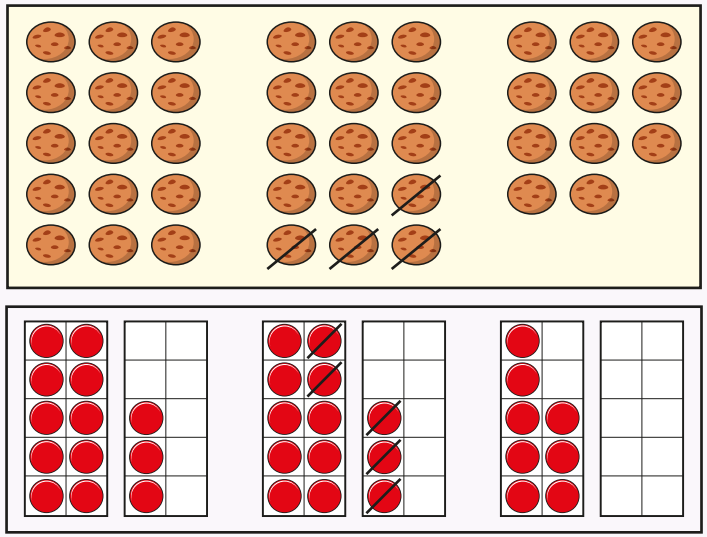
National Curriculum links

- 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

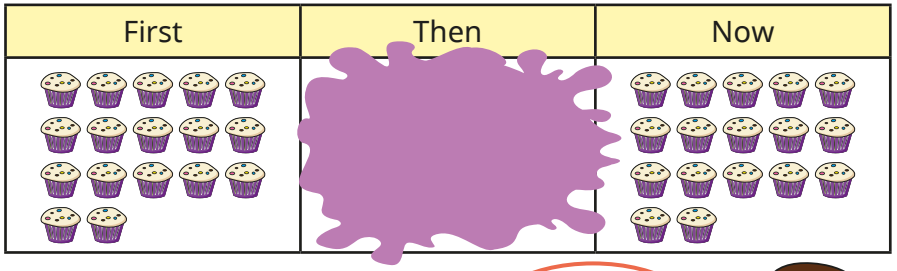
  Use a number line to work out the subtractions.

  ▶ 20 – 8 ▶ 18 – 9 ▶ 19 – 4

Subtraction – counting back

Reasoning and problem solving

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

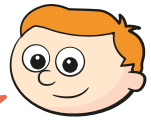


I think it is
17 – 0 = 17

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.

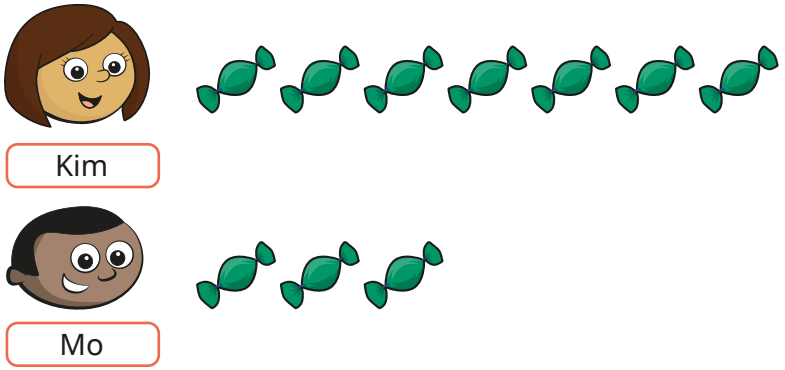
Ask what the difference is between the number of boys and the number of girls?

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.

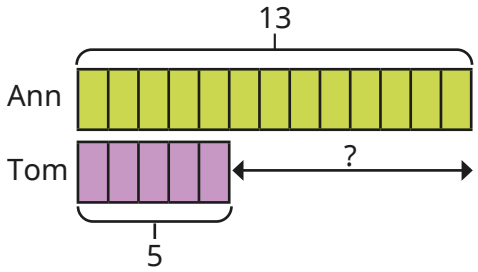


How many more sweets does Kim have than Mo?

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

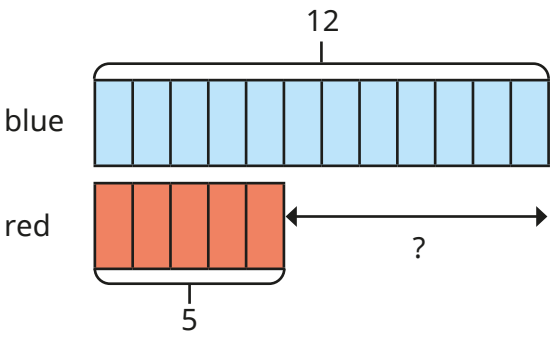
The greater number is less than 15

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

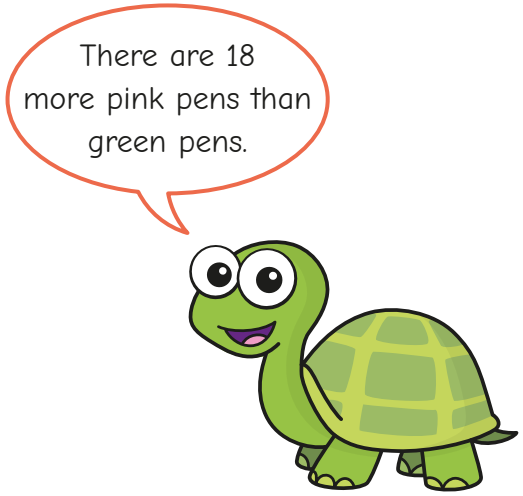
Think of a subtraction problem to match the bar model.



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 _____ – _____ = _____

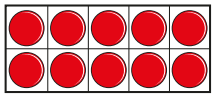
National Curriculum links

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

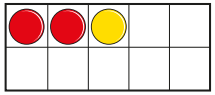
Related facts

Key learning

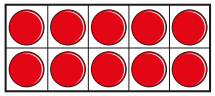
- Complete the addition and subtraction sentences for each picture.



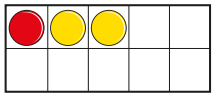
12 + 1 = _____



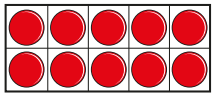
13 – 1 = _____



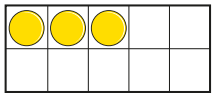
11 + _____ = 13



13 – _____ = _____



_____ + _____ = _____



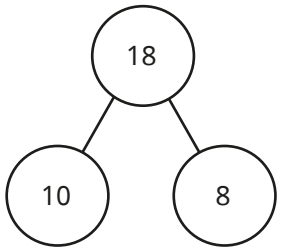
_____ – _____ = _____

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 – _____ = _____

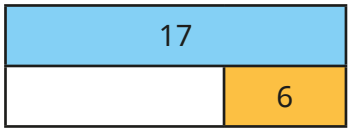
_____ = _____ + _____

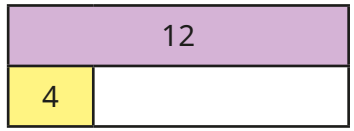
_____ = _____ + _____

_____ = _____ – _____

_____ = _____ – _____

- Complete the bar models.





Write the fact family for each bar model.

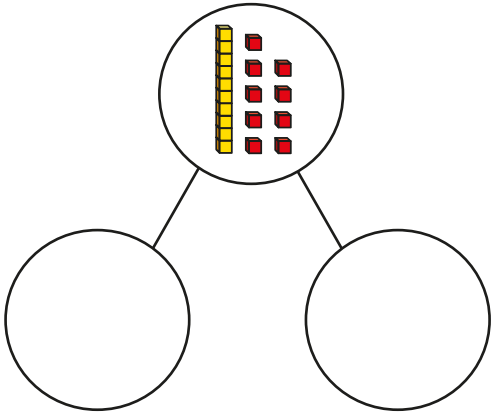
Use the numbers 8, 7 and 15 to draw your own bar model.

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.



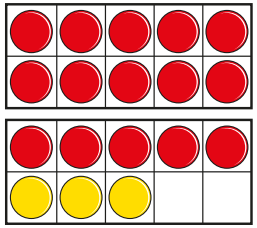
nine	add
ten	subtract
nineteen	is equal to

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.

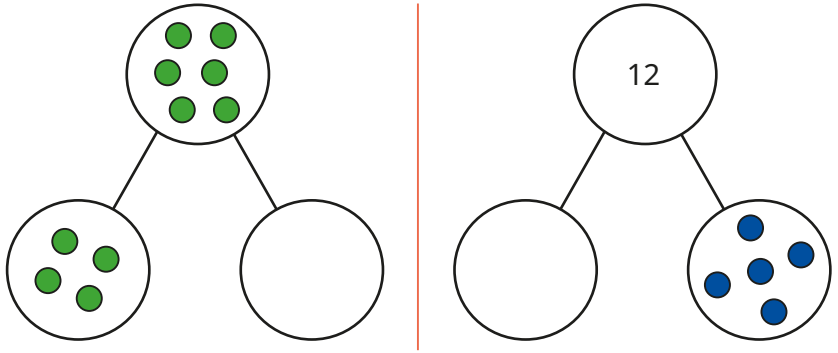
How many children went away?

- 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

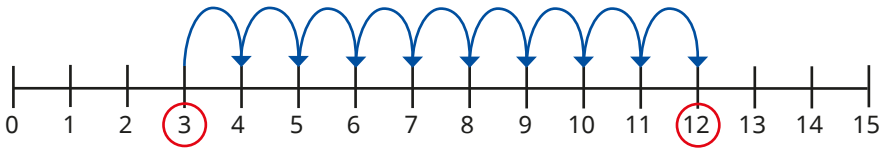
- Complete the part-whole models and number sentences.



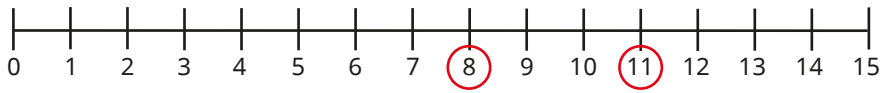
4 + _____ = 6

_____ + 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.

$5 + \square = 11$

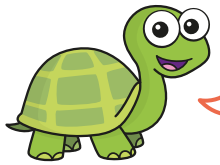
The answer is 16

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

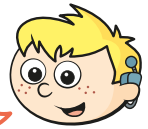
What number is Tiny thinking of?

8

Max and Sam are working out the missing number.

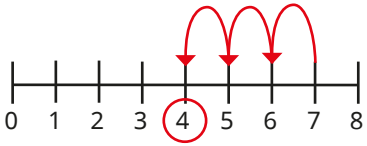
$4 = \square - 3$

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

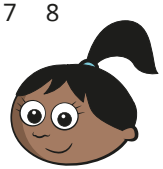


Max

Sam draws a number line to help.



The missing number is 7



Sam

Who do you agree with?

Why?

Sam

Spring Block 3

Place value (within 50)

White Rose MATHS

Small steps

Step 1	Count from 20 to 50
Step 2	20, 30, 40 and 50
Step 3	Count by making groups of tens
Step 4	Groups of tens and ones
Step 5	Partition into tens and ones
Step 6	The number line to 50
Step 7	Estimate on a number line to 50
Step 8	1 more, 1 less

Count from 20 to 50

Notes and guidance

In this small step, children count forwards and backwards between 20 and 50

Chanting games, such as "I count, you count", give children the opportunity to count from different starting points alongside their peers.

Number tracks and half-hundred squares are useful representations to support children counting up to 50. When counting on a half-hundred square, ensure that they recognise the convention of moving to the next row after reaching a multiple of 10

Things to look out for

- As children have become familiar with teen numbers, they may use these interchangeably with multiples of 10, for example saying "thirteen" instead of "thirty".
- When counting backwards from a multiple of 10, children may start going forwards again, for example 42, 41, 40, 41
- Children may reverse the digits of 2-digit numbers, for example writing "41" as "14".

Key questions

- What number comes next?
- What number comes after _____?
- Will you say the number _____ when counting from _____ to _____?
- What numbers sound similar?
- What number comes before _____?

Possible sentence stems

- The number that comes after _____ is _____
- The number that comes before _____ is _____
- I will/will not say the number _____, because ...

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Count from 20 to 50

Key learning

Divide children into groups.

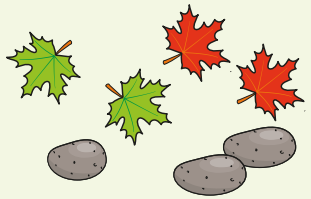
As you point to a group, they begin counting from 1. When you point to another group, they continue the count. Keep switching between groups.

To increase the challenge, point upwards when you want children to count on from the last number counted and point down for them to count back.

Using a puppet, model counting forwards or backwards from 20 to 50 with deliberate mistakes, such as saying "fourteen" instead of "forty" or not continuing in the correct direction after counting a multiple of 10

Ask children to help the puppet to count correctly.

Encourage children to collect more than 20 natural objects. Discuss how lining the objects up can make them easier to count.



Put children in pairs and give them a half-hundred square.

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

Ask children to take it in turns to count forwards or backwards from a given number.

While one child counts aloud, their partner checks by moving their finger on the half-hundred square. They then swap roles.

- Complete the number tracks.

40	41	42	43							

32	31	30								

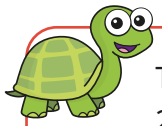
Count from 20 to 50

Reasoning and problem solving

Complete the number track.

				19	20	21			

15, 16, 17, 18, 22, 23, 24



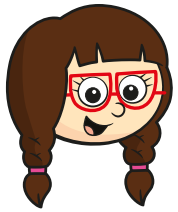
Tiny counts up from 24 to 40

Which of the numbers will Tiny say?

49 **29** **19** **39**

29, 39

Jo is counting.



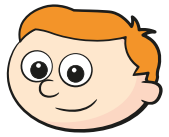
28, 29, 30, 13, 32

What mistake has she made?

Jo has reversed the digits when writing 31

Ron is counting back from 43

43, 42, 41, 40, 41, 42



What mistake has Ron made?

He has started counting forwards after counting 40

20, 30, 40 and 50

Notes and guidance

In this small step, children develop their understanding of multiples of 10 up to 50

Recap learning from Spring Block 1 about the equivalence of 10 ones and 1 ten using representations such as a ten frame or a bundle of 10 straws.

There are several representations that can be used in this step to highlight how many tens are in each number, for example ten frames, base 10, bead strings and towers of cubes. Give children practical opportunities to explore each number in different ways using a range of concrete resources. Children could move on to seeing e.g. 20 as two base 10 pieces that cannot be broken apart, although the individual ones are still obvious.

Things to look out for

- Children may count groups of 10 as discrete objects rather than groups of objects, for example counting 4 packs of 10 pencils as "4 pencils".
- Children may not recognise that 40 is greater than 39, because they are looking at the digit in the ones place value position instead of the tens.

Key questions

- Is this a group of ten? How do you know?
- How many ways can you make _____?
- How many ones make 30?
- How many tens make 30?
- If you have 3 full ten frames, what number have you made?
- How many base 10 pieces make 50?

Possible sentence stems

- _____ ten frames are full, so I know that I have made _____
- There are _____ ones in _____
- There are _____ tens in _____

National Curriculum links

- Count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

20, 30, 40 and 50

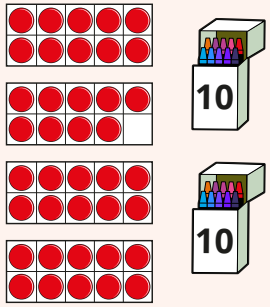
Key learning

Hide small objects outside and provide 5 ten frames for each group.

Each group collects objects to fill their ten frames. Prompt children to tell you how many they have found and how many groups of ten they have.

Show children representations of numbers, some of which show multiples of 10 and some of which do not.

Ask them to decide if the number shown is a multiple of 10 and to explain how they know.



Read the book *One is a Snail, Ten is a Crab* by April Pulley Sayre and Jeff Sayre.

30 is 3 crabs or 10 people and 1 crab. Ask children why 3 crabs make 30

Children could draw crabs to show each multiple of 10

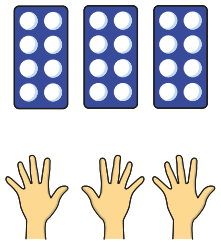
Put children into groups and give each group 5 ten frames.

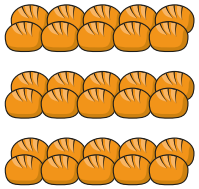
Children take turns to roll a 6-sided dice. They put the corresponding number of counters on the ten frames. The first group to reach 50 (5 full ten frames) wins.

- Complete the table and continue the pattern.

Base 10	Number	How many tens?
		1 ten
	20	2 tens
		

- Which pictures show 30?

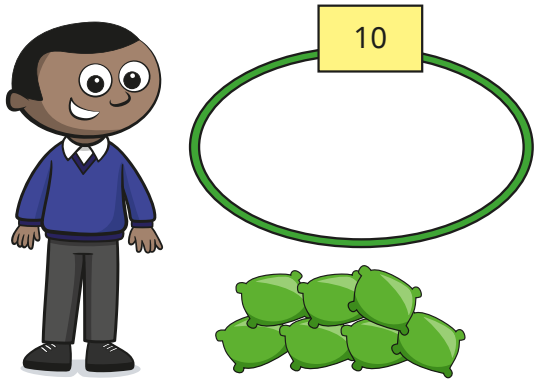




20, 30, 40 and 50

Reasoning and problem solving

Mo is playing a game.



He scores 10 points for every bean bag that lands in the hoop.

He scores 50 points in total.

How many bean bags does Mo get in the hoop?

Ben scores 10 fewer points than Mo.

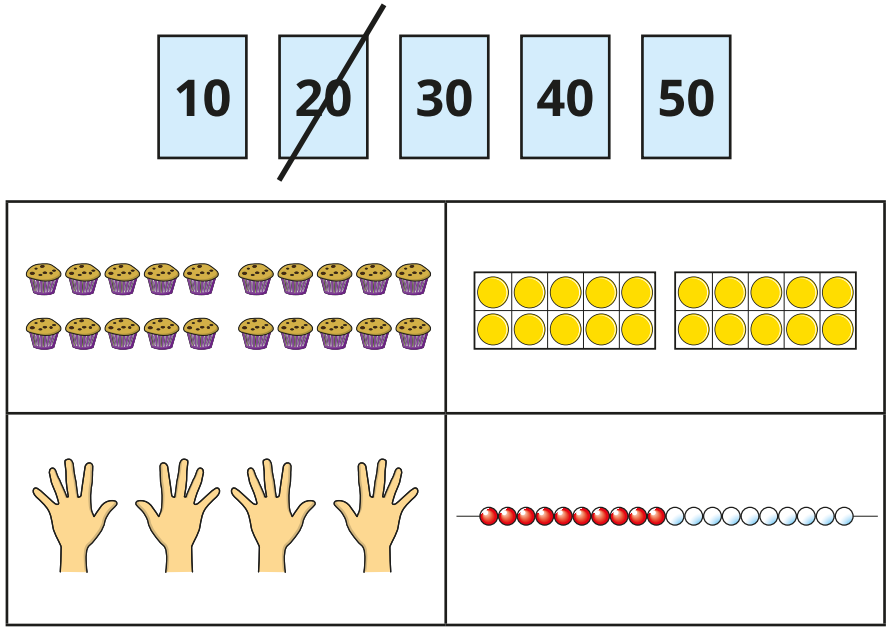
How many points does Ben score?

5

40

How many ways can you show each number?

One has been done for you.



multiple possible answers

Count by making groups of tens

Notes and guidance

In this small step, children learn how to count objects more efficiently by grouping into tens and ones.

Children should spend time practically counting groups of ten from objects such as counters, cubes and straws. Building towers of 10 cubes or bundling 10 straws will reinforce the concept of 1 ten being equal to 10 ones.

After grouping objects into tens practically, children practise counting pictures of objects and circling each group of ten.

It is important that children recognise that a 2-digit number is formed by counting the number of groups of ten for the first digit and the ones left over as the second digit.

Things to look out for

- Children may not correctly group objects into tens.
- Children may reverse the digits in a 2-digit number.
- Children may not generalise that the group of 10 objects is equal to 1 ten, which can lead to them counting, for example, 3 bundles of 10 straws and 4 extra straws as 7
- Children may write 2-digit numbers incorrectly.
  For example, if there are 3 tens and 4 ones, they may write this as 304 rather than 34

Key questions

- How many _____ are there?
- How did you count them?
- Is there an easier way to count the objects?
- How can you make sure you do not miscount any objects?
- How could you use a ten frame to help you count groups of ten?
- How many ones are there in 10?
- How many groups of ten are there and how many more?

Possible sentence stems

- _____ ones = _____ ten(s)
- There are _____ groups of 10 and _____ more.
  There are _____ in total.

National Curriculum links

- Count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Count by making groups of tens

Key learning

Using a puppet, model counting a large number of objects, such as 36 cubes.

Lose count or double count cubes to show the inefficiency of counting in ones.

Ask children if they can think of a better way to count.

Model counting 10 cubes and putting them in a group.

Continue grouping the rest of the cubes into tens.

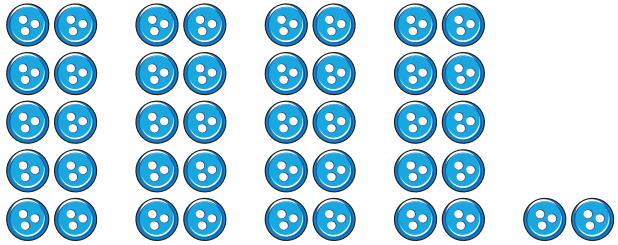
Give children a large number of objects.

Ask them to count by grouping into tens and ones.

Draw attention to different ways the children have grouped the sets of 10 objects, such as stacking, making arrays, putting into piles.

Discuss whether this affects the value of the 10 objects.

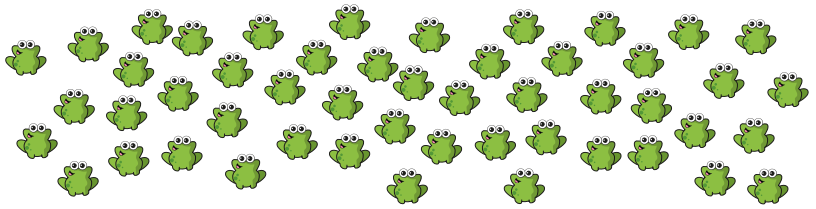
- Complete the sentences.



There are _____ groups of ten buttons and _____ buttons.

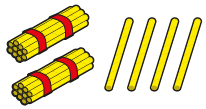
There are _____ buttons in total.

- Circle groups of 10 to count how many frogs there are.

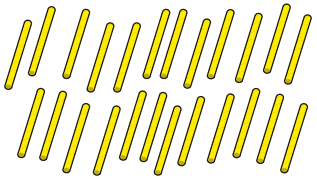


- Ann and Fay are counting straws.

Ann



Fay

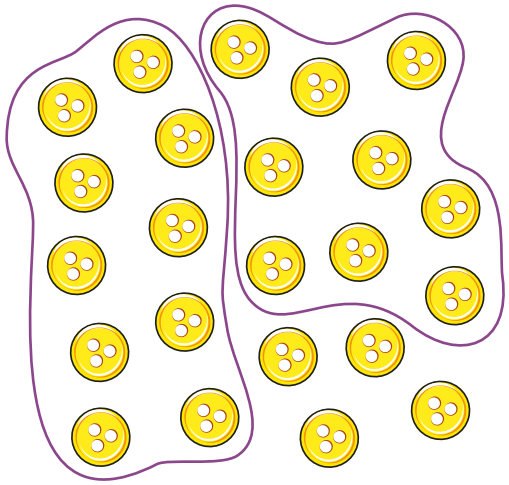


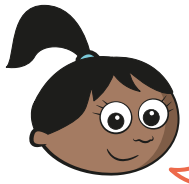
What is the same? What is different?

Count by making groups of tens

Reasoning and problem solving

Sam counts by grouping 10 buttons.





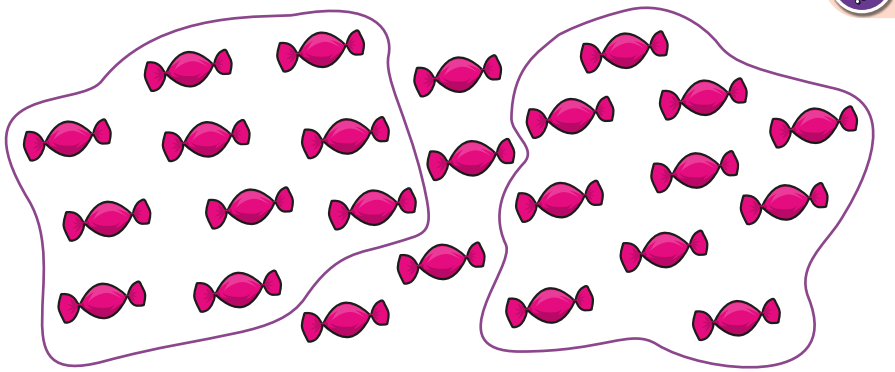
I have 2 tens and 4 ones, so I have 24 buttons.

What mistake has Sam made?

How many buttons are there?

23

Max is counting sweets.



I have 2 groups of 10 sweets and 4 sweets, so I have 42 sweets.

What mistake has Max made?

How many sweets does Max have?

24

Groups of tens and ones

Notes and guidance

This small step consolidates children's place value understanding of tens and ones.

Children continue to describe a number by the number of tens and ones the number is made from. Learning from the previous step is extended, as the representations of the tens and ones are not always in place value order.

Children need to count the number of groups of 10 and then the ones to find the total. All the representations still show that 10 ones make 1 ten, and children could still count individual ones to find the total. However, this is not efficient, so if children are still doing this, encourage them to recognise the groups of 10. Using base 10 is useful, as it gives children no option other than to count tens and ones, since they cannot split the ten apart.

Things to look out for

- Children may count the number of objects, rather than consider what each object represents.
- Children may reverse the digits of the 2-digit number, particularly if the representation is not organised in place value order.

Key questions

- How many _____ are there? How do you know?
- How many groups of ten are there? How many more are there?
- How many ones are there in 10?
- How many tens are there? How many ones?
- How many _____ are there in each pack/box?

Possible sentence stems

- There are _____ groups of 10 objects and _____ more objects.
  There are _____ objects in total.
- I have _____ tens and _____ ones.
  I have _____

National Curriculum links

- Count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Groups of tens and ones

Key learning

Show children 37 on ten frames.

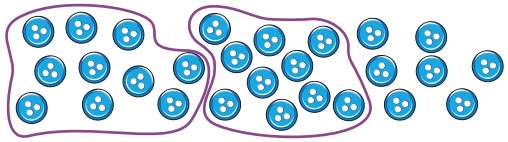
What do they notice about 37?

Get children to say out loud, "37 has 3 tens and 7 ones."

Ask children to build 38 and 39 and talk to a partner about what they notice.

Explore other numbers to 50, getting children to verbalise how many tens and ones make up the number.

- How many buttons are there?



There are _____ groups of 10 buttons and _____ more buttons.

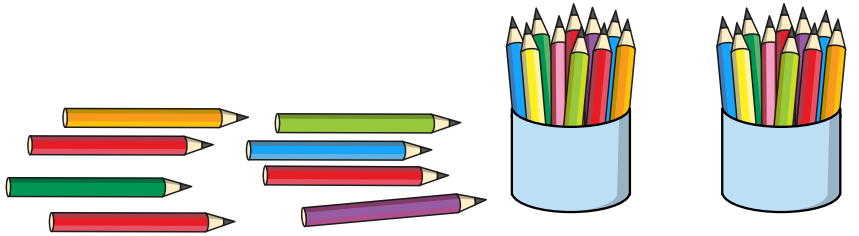
There are _____ buttons in total.

- How many flowers are there?

There are _____ groups of 10 flowers and _____ more flower.

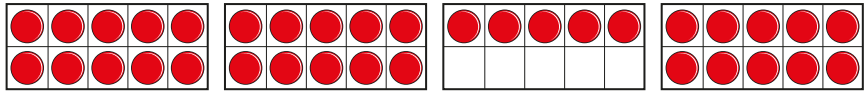
There are _____ flowers in total.

- Kay counts pencils by grouping them in tens.



How many pencils are there?

- How many counters are there?



Ask children to make a number up to 50 using base 10, without showing their partner.

Children should tell their partner how many tens and ones their number has.

Then their partner draws the number.

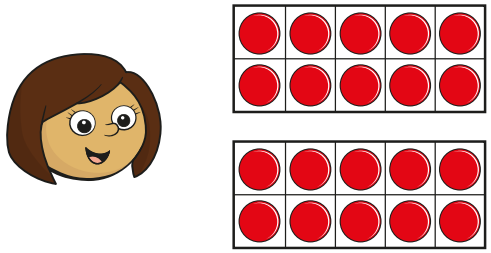
They check to see whether the drawing matches their number.

Groups of tens and ones

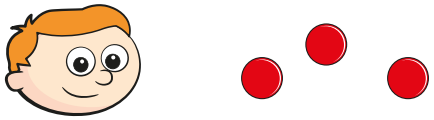
Reasoning and problem solving

Kim and Ron are making the same number.

Kim's number has these tens.



Ron's number has these ones.



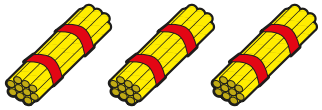
What number are Kim and Ron making?

How do you know?

23

Dan counts straws by grouping them in tens.

He has grouped as many tens as he can.



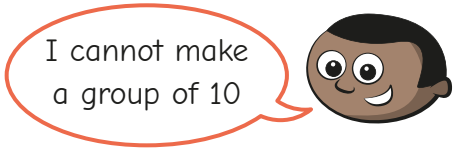
He has some ones left.

How many straws could Dan have in total?

between 31 and 39

Mo has some cubes.

He wants to count them by making tens.



How many cubes might Mo have?

between 1 and 9

Partition into tens and ones

Notes and guidance

In this small step, children develop their understanding of place value for 2-digit numbers as they begin to partition numbers to 50. They have already explored how many tens and ones make a number and they now use a part-whole model to partition a number into tens and ones.

Children first investigate partitioning with representations, followed by numbers. It is important that they see that the whole can be partitioned into tens and ones or ones and tens. The value of the whole and each part does not change in either order.

At this stage, children do not need to describe the part-whole model as an addition number sentence.

Things to look out for

- Children may partition a number into its digits, rather than considering the value of each digit, for example stating that 32 is made up of 3 and 2
- When the parts of a part-whole model are "the wrong way round", children may interpret the whole incorrectly.
- Where part-whole models are presented in different orientations, children may not correctly identify the whole.

Key questions

- How many tens are there? How many ones are there? What is the number?
- What is the whole?
  What are the parts?
- Does it matter which way round you draw the parts?

Possible sentence stems

- There are _____ tens.
  There are _____ ones.
  The number is _____
- _____ is the whole.
  _____ is a part and _____ is a part.

National Curriculum links

- Count, read and write numbers to 100 in numerals; count in multiples of 2s, 5s and 10s
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Partition into tens and ones

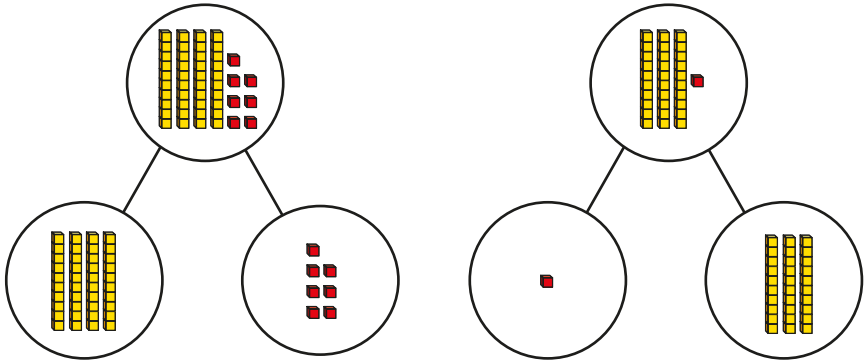
Key learning

Read *Count to 100* by Felicity Brooks.

Give children a picture of up to 50 birds.

Can they partition the birds into tens and ones?

- Complete the sentences to describe each part-whole model.



- _____ is a part and _____ is a part.

  _____ is the whole.

- There are _____ tens.

  There are _____ ones.

  The number is _____

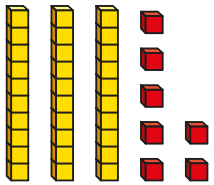
What do you notice?

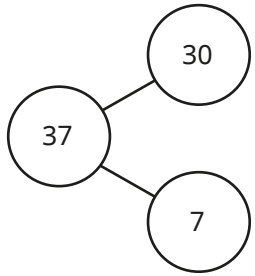
Ask children to use base 10 to make the number 32 and then to use a part-whole model to partition the number into tens and ones.

Can they tell you how many tens and ones there are in 32?

Repeat with other numbers.

- How does the part-whole model match the base 10?





- Use a part-whole model to partition each number into tens and ones.

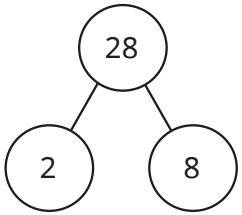
41	22	36	17	50

Partition into tens and ones

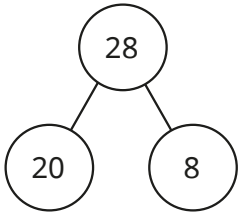
Reasoning and problem solving

Jo, Max and Sam each show a number in a part-whole model.

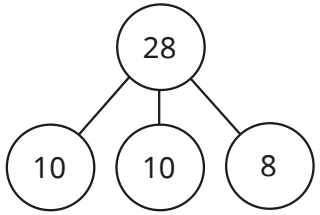
Jo



Max



Sam



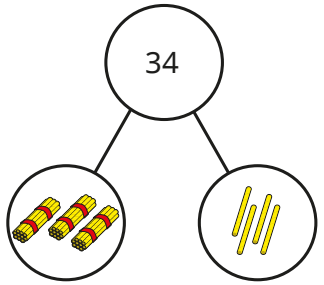
Who is correct?

How do you know?

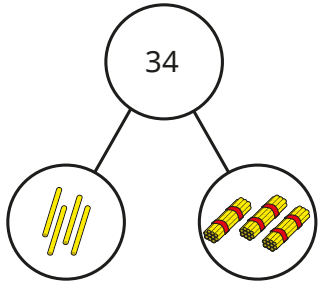
Max and Sam

Kim and Ron use straws to show a number.

Kim



Ron



Who is correct?

How do you know?

Both children are correct.

The number line to 50

Notes and guidance

Children have used a number line to count to 10 and 20 in previous blocks; in this small step, the number line is extended to include numbers to 50

Encourage children to explore the similarities and differences between a number track and a number line. There are lots of opportunities for practical activities within this step, such as children creating their own number line on the playground.

Children see examples of number lines with different start and end point values, as well as number lines between zero and 50 or between multiples of 10. They use their knowledge of counting to label number lines counting up in 1s before labelling number lines counting in 10s. Building on this, they find the position of given numbers on unlabelled number lines.

Things to look out for

- Children may think that number lines can only go up in 1s.
- When labelling a number line, children may write the numbers in between divisions, as they do on number tracks, rather than on divisions.
- Children may assume that all number lines start from zero.

Key questions

- Where does the number line start?
- Where does the number line end?
- Where do the numbers go on a number line?
- How can you use a number line to decide which number is greater/less?
- How much is each jump on the number line?

Possible sentence stems

- The first number on the number line is _____
- The last number on the number line is _____
- The number line is going up in _____

National Curriculum links

- Count to and across 100, forwards and backwards, beginning with zero or 1, or from any given number
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- Given a number, identify 1 more and 1 less

The number line to 50

Key learning

Use chalk to draw number lines with different start and end point values on the playground. Children practise starting on a given number and hopping to another number. Discuss which numbers they land on, and which ones they do not land on.

Challenge children to use the number lines to find 1 more or 1 less than a given number.

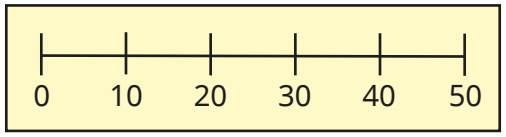
Give six children a number from 25 to 30

Ask them to order themselves into a number line.

What is the next number? What is the previous number?

- What is the same? What is different?

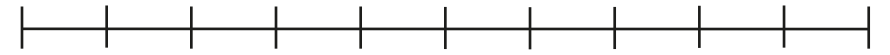
0	10	20	30	40	50

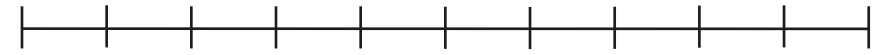


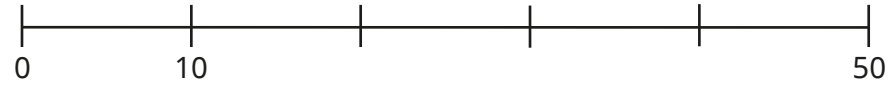
- Circle all the numbers on the number line that are less than 23

Circle all the numbers on the number line that are greater than 45

- Complete the number lines.





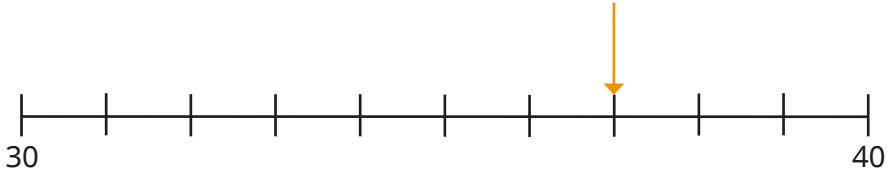


What is the same about the number lines? What is different?

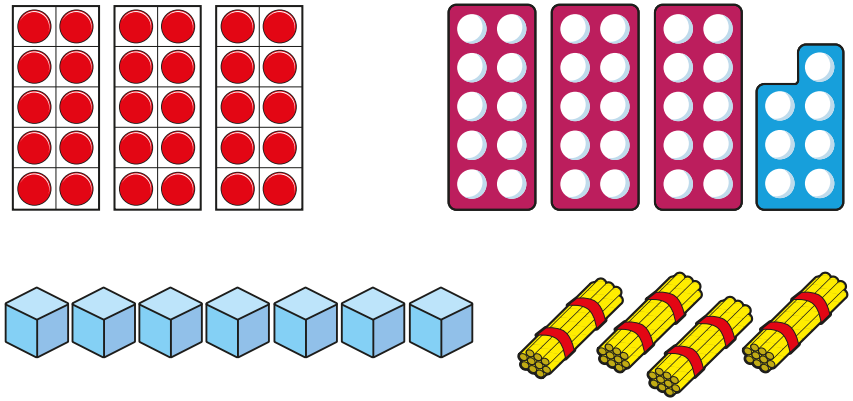
The number line to 50

Reasoning and problem solving

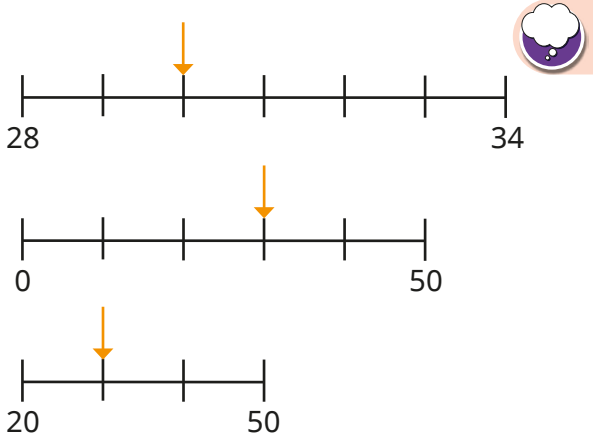
Ben draws an arrow on the number line.

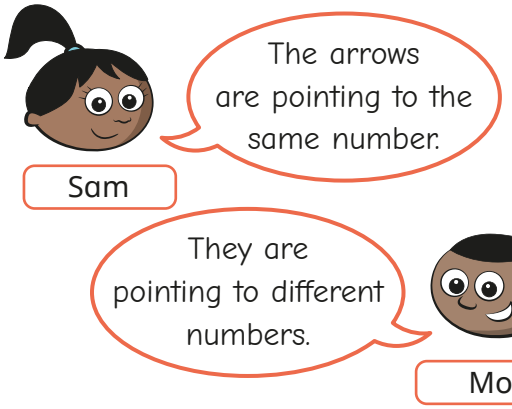


Which picture matches Ben's number?



37 (number pieces)





Who is correct?

Sam

Estimate on a number line to 50

Notes and guidance

Building on the previous small step, children estimate the positions of numbers on number lines up to 50

Children have estimated on number lines to 20, but they may need to recap the idea of an estimate being a "best guess". Remind them that estimates are not exact. Explore the process of finding a midpoint on a blank number line by asking what number is halfway between the start and end point numbers.

Discuss how that makes it easier to estimate the position of a number. After finding the midpoint, children can then position the number using proportional reasoning.

Things to look out for

- Children may position a number at the multiple of 10 on the number line, as they do not recognise that numbers can be between intervals.
- Children may think that they have an incorrect answer if their answer is slightly different from their partner's. As these are estimates, they could both be correct.
- Some children may find it difficult that there is not an exact answer when estimating.

Key questions

- What does "estimate" mean?
- Can you find halfway on the number line?
- What number is halfway between _____ and _____?
- Is _____ less than halfway or more than halfway?

  How do you know?
- Where is _____ on the number line? How do you know?
- Which two multiples of 10 is _____ between?

Possible sentence stems

- Halfway is _____
- _____ is here on the number line because ...
- _____ is closer to _____, so it goes here on the number line.

National Curriculum links

- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least

Estimate on a number line to 50

Key learning

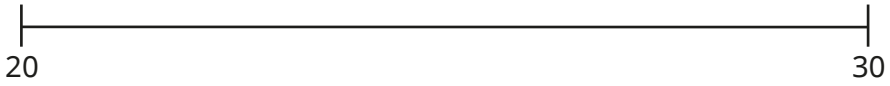
Use chalk to draw a line on the playground. Label one end 20 and the other end 30

Give a child a number card for 25 and ask them to position themselves on the number line, explaining their position. Discuss with the class whether they agree. Give another child a number card for 22. Discuss whether 22 is greater or less than 25. Why is this important? Give other children numbers to join the number line.

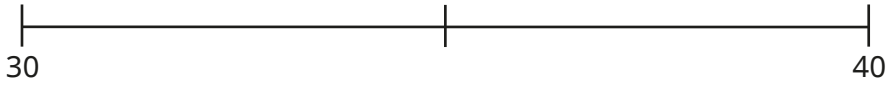
Ask what number would be halfway if the number line was changed to show 20 to 40

- Draw arrows to 4 and 9 on the number line.

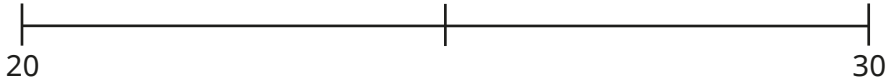
Use your answer to help you estimate where 24 and 29 are on this number line.



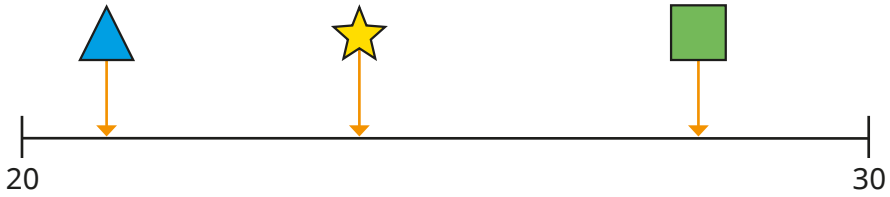
- Draw an arrow to 32 on the number line.



Draw an arrow to 28 on the number line.



- Here is a number line.



Match the shapes to the numbers.

24	21	28

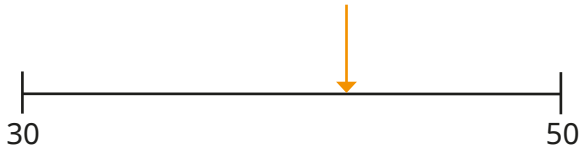
Estimate on a number line to 50

Reasoning and problem solving

What number could the arrow be pointing to?

e.g. 41

Ann draws an arrow on a number line to show a number.



What could Ann's number be?

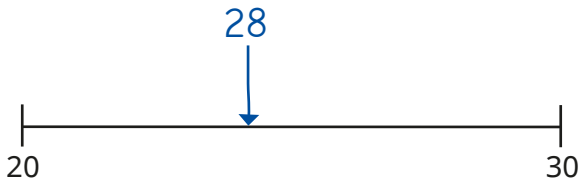
What can Ann's number **not** be?

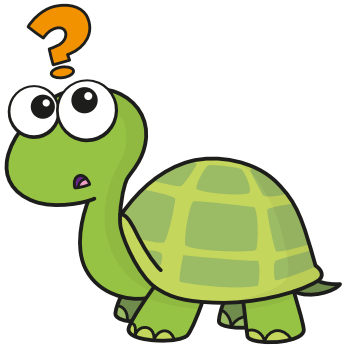
Compare answers with a partner.

any number between 40 and 45

less than 40 or greater than 45

Tiny estimates where 28 belongs on the number line.





How do you know that Tiny is incorrect?

25 is the halfway point on the number line.

28 is greater than 25 so should be between halfway and 30

1 more, 1 less

Notes and guidance

In this final step, children apply their counting skills to find 1 more and 1 less than any number between zero and 50. They have already found 1 more and 1 less than numbers within 20 in a previous block.

As children are still developing their understanding of 2-digit numbers, it is important that they find 1 more and 1 less of a number using concrete resources and representations. Initially, they could make a number using a ten frame and counters, before working out 1 more and 1 less by adding or removing counters. Children could then use number lines alongside concrete resources to count forwards or backwards.

Things to look out for

- Children may find it difficult to find 1 less than a multiple of 10. For example, they may write "1 less than 40 = 49"
- When using base 10 to find 1 less than a multiple of 10, children may just subtract a ten, for example 3 base 10 ten pieces is 1 less than 4 base 10 ten pieces.
- When finding 1 more than a multiple of 10, children may add 10, for example 1 more than 30 = 40

Key questions

- How can you represent the number _____?
- How can you find 1 more?
  How does this change the number?
  Which digit changes? Why?
- How can you find 1 less?
  How does this change the number?
  Is it only ever the ones digit that changes?

Possible sentence stems

- _____ is 1 more than _____
- _____ is 1 less than _____
- 1 more than _____ is _____
- 1 less than _____ is _____

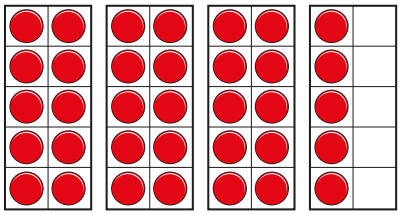
National Curriculum links

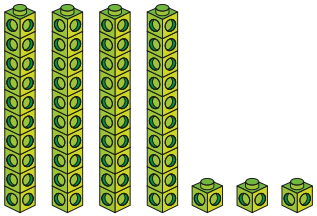
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- Given a number, identify 1 more and 1 less

1 more, 1 less

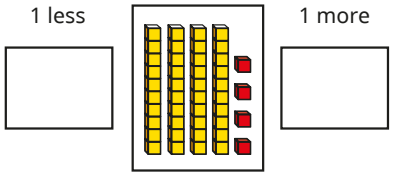
Key learning

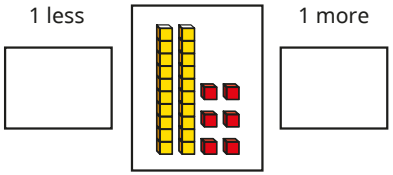
- Make 1 more and 1 less than each number.





- Write numbers to fill in the boxes.



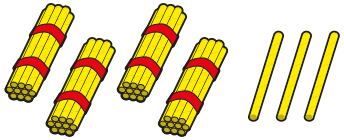


- Use the number track to fill in the missing numbers.

30	31	32	33	34	35	36	37	38	39	40

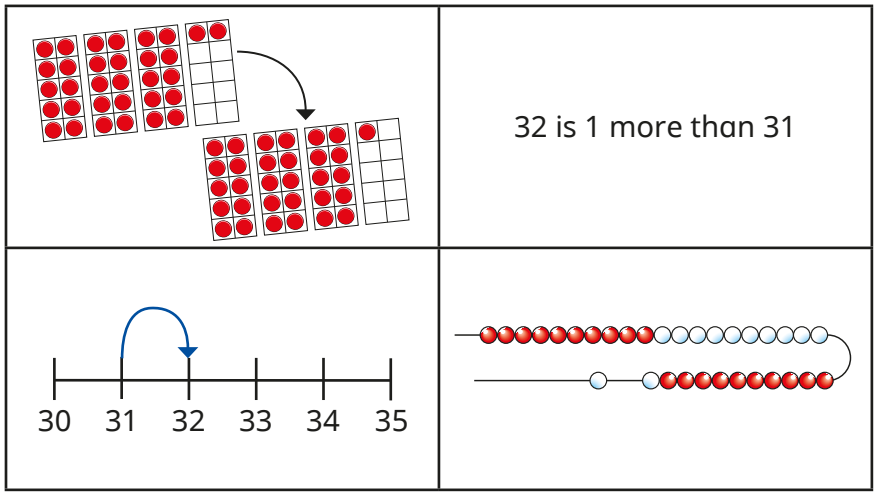
- _____ is 1 more than 34
- 34 is 1 more than _____
- _____ is 1 less than 39
- 39 is 1 less than _____

- Dan has these straws.



- How many straws does Dan have?
- If Dan gives one straw away, how many straws will he have left?
- If Dan is given one more straw, how many straws will he have?

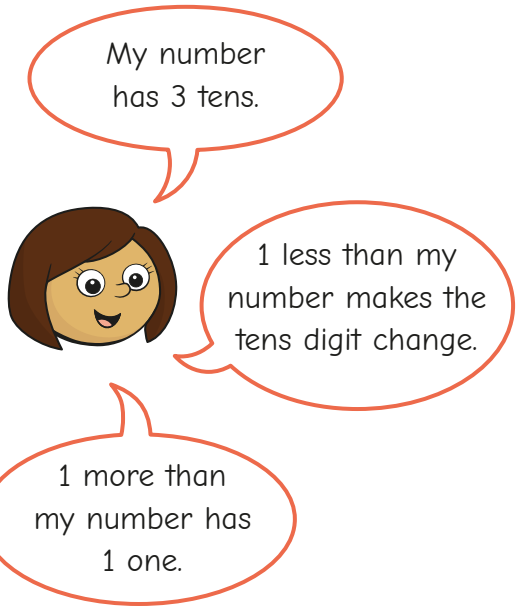
- What is the same about each picture? What is different?



1 more, 1 less

Reasoning and problem solving

Kim is thinking of a number.



What is Kim's number?

30

Is the statement always true, sometimes true or never true?

When I find 1 more than a number, I only change the ones digit.

Talk about it with a partner.

sometimes true

Use the number cards to complete the sentences.

28	29	30	31	32

_____ is 1 less than _____

_____ is 1 more than _____

How many different ways can you find?

multiple possible answers, e.g.

28 is 1 less than 29

32 is 1 more than 31

Spring Block 4

Length and height

Small steps

Step 1	Compare lengths and heights
Step 2	Measure length using objects
Step 3	Measure length in centimetres

Compare lengths and heights

Notes and guidance

In this small step, children compare lengths and heights of objects using language such as "longer than", "shorter than" and "taller than".

Children understand that height is a type of length and that the language they use changes, depending on what type of length they are describing and comparing.

Children should also be exposed to objects that have the same length or height and use the language of "is the same" or "is equal to" to compare.

At this stage, children only compare the lengths and heights of pairs of objects. Ordering lengths and heights is covered later in Key Stage 1

Things to look out for

- Children may confuse the words "longer" and "taller".
- If children do not line up the objects they are comparing, they may decide incorrectly which is longer/taller.
- Children may think that two different objects cannot be equal in length/height.

Key questions

- Which object is longer? How do you know?
- Which object is taller? How do you know?
- Which object is shorter? How do you know?
- What is the difference between "longer" and "taller"?
- Why is it important that you line the objects up before you compare them?
- Can two different objects have the same length? How do you know?

Possible sentence stems

- _____ is longer than_____
- _____ is taller than _____
- _____ is shorter than _____
- Before I can compare lengths or heights, I need to make sure that ...

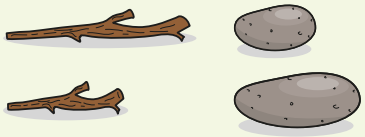
National Curriculum links

- Compare, describe and solve practical problems for: lengths and height; mass/weight; capacity and volume; time

Compare lengths and heights

Key learning

Tell children to find two objects, for example a stick and a pebble.

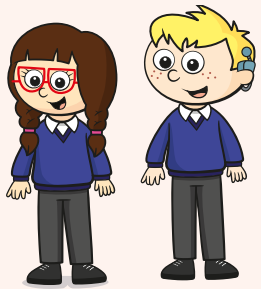


Ask which object is longer/shorter. How do they know?

Challenge them to find another object that is longer/shorter than the objects they have.

Choose two children to stand side by side.

Ask the rest of the class which child is taller. How do they know?

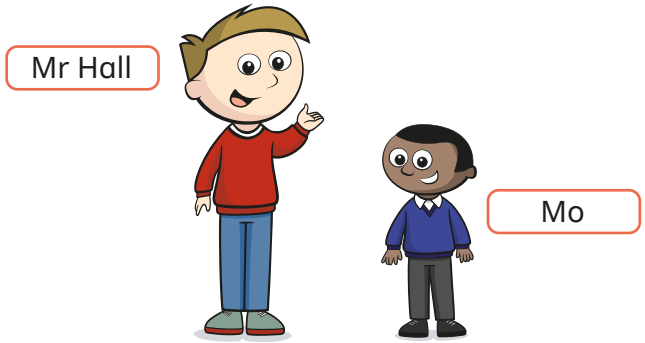


Ask who is shorter. How do they know?

Repeat with other pairs of children.

Challenge children to find a partner who is taller/shorter than them.

- Mr Hall and Mo are comparing their heights.



Choose a word to complete each sentence.

taller shorter

- Mr Hall is _____ than Mo.
- Mo is _____ than Mr Hall.

- Write **longer** or **shorter** to compare the ribbons.

- The plain ribbon is _____ than the stripy ribbon.
- The stripy ribbon is _____ than the plain ribbon.

Compare lengths and heights

Reasoning and problem solving

Jo, Max and Sam are comparing the heights of Ron and Mrs Lee.

Mrs Lee

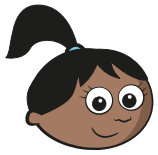
Ron

Jo

Mrs Lee is tall than Ron.

Ron is short than Mrs Lee.

Max



Sam

Mrs Lee is longer than Ron.

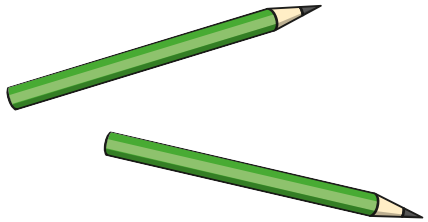
Improve the children's sentences to make them more accurate.

Jo: Mrs Lee is **taller** than Ron.

Max: Ron is **shorter** than Mrs Lee.

Sam: Mrs Lee is **taller** than Ron.

Kay thinks that the pencils are the same length.



How can Kay check if she is correct?

Line up the pencils at one end.

Ask children to find an object in the classroom that is longer than their rubber, but shorter than their pencil.

Ask them to find a classmate who is shorter than them, but taller than someone else.

multiple possible answers

Measure length using objects

Notes and guidance

In this small step, children begin to measure the lengths and heights of objects, using non-standard units of measure such as cubes or paper clips. As in the previous step, they explore both lengths and heights.

It is important that children know that in order to measure the length of something they need to use a consistent unit of measure. They should see that it is not useful to measure the length of something using a range of objects, for example a combination of cubes and paper clips. Similarly, the chosen unit of measure should be equal in size, for example all the paper clips must be the same.

Learning from the previous step is consolidated, as children make comparisons of lengths they have measured. They should see that for accurate comparisons they must use a consistent unit of measure, for example cubes for both items.

Things to look out for

- Children may think that they can use a combination of different objects to measure a length.
- When comparing lengths, children may think that they can use a different unit of measure for each item.

Key questions

- What could you use to measure the length/height of this object?
- Why do you have to use objects that are the same size to measure something?
- What would happen if you chose a different unit to measure the object?
- Where do you need to start/end measuring?
- Which object is longer/taller/shorter? How do you know?
- How much longer/taller/shorter is the _____ than the _____?

Possible sentence stems

- The length/height of the _____ is _____ cubes.
- The _____ is longer/taller/shorter than the _____
- The _____ is _____ cubes longer/shorter than the _____

National Curriculum links

- Compare, describe and solve practical problems for: lengths and height; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time

Measure length using objects

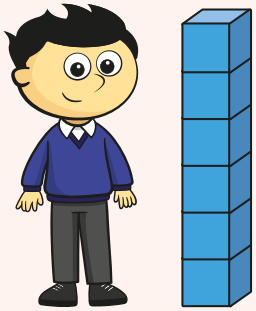
Key learning

Ask children to find some objects, for example small sticks or pebbles.

Ask them to measure the lengths of the objects using a non-standard unit of measure, for example cubes, bricks, paper clips or rubbers.

Ask children to measure each other's heights using a non-standard unit of measure, for example building blocks or sticks of equal length. Children may find it easier to lie on the floor rather than stacking the objects in a tall tower.

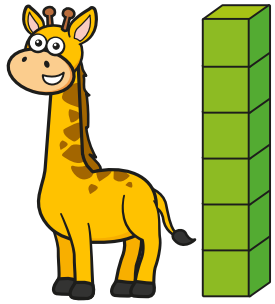
Ask children what would happen if they changed the unit of measure. Will the number of objects they use change? Why? Will the person's actual height change? Why?



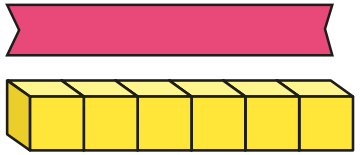
- Complete the sentences.

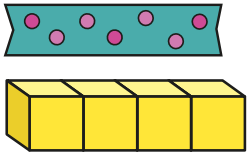
The train is _____ paper clips long.

The giraffe is _____ cubes tall.



- Max uses cubes to measure the lengths of two ribbons.





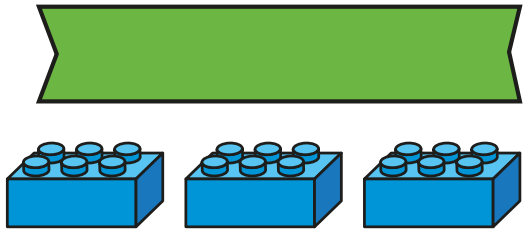
  - What is the length of each ribbon?
  - Write **longer** or **shorter** to complete the sentence.

    The plain ribbon is _____ than the spotty ribbon.
  - How much longer is one ribbon than the other?

Measure length using objects

Reasoning and problem solving

Mo is measuring the length of the ribbon.

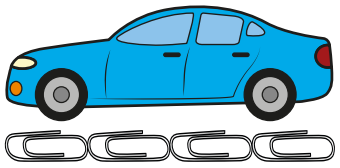


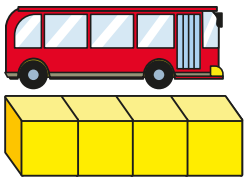
The ribbon is 3 bricks long.

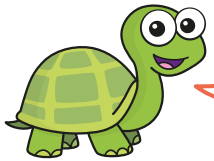
What mistake has Mo made?

Mo has left gaps between the units of measure (bricks).

Tiny and Ron are measuring the length of a car and a bus.



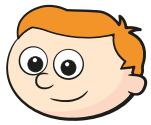




The car and the bus are the same length, because there are 4 paper clips and 4 bricks

Tiny

The car and the bus are not the same length.



Ron

Who do you agree with?

Why?

Ron

Measure length in centimetres

Notes and guidance

Building on the previous step, children measure the lengths and heights of objects using a ruler and a standard unit of measure: centimetres. They are introduced to the abbreviation "cm", so that they do not have to write the full word.

Discuss with children why it is helpful to have a standard unit of measure that can be used around the world. Model how to align a ruler with the object being measured. Also show how to look to the nearest whole centimetre when measuring objects that are not an exact number of centimetres.

Learning from the first step is consolidated, as children make comparisons of lengths they have measured.

Things to look out for

- Children may measure from the start of the ruler rather than from zero.
- Children may just look at the final number without ensuring that the ruler is lined up so that zero is at the beginning of the object.
- For measures that are not an exact number of centimetres, children may be unsure what to do.

Key questions

- What does "cm" mean?
- Why is it helpful to have a standard unit of measure?
- Where do you need to begin measuring from?
- How does using a ruler help you to compare the lengths/ heights of objects?
- Which object is longer/taller/shorter? How do you know?
- How much longer/taller/shorter is the _____ than the_____?
- What could you do if the object is not lined up exactly with a number on the ruler?

Possible sentence stems

- The _____ is _____ cm long/tall.
- The _____ is longer/taller/shorter than the _____

National Curriculum links

- Compare, describe and solve practical problems for: lengths and height; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time

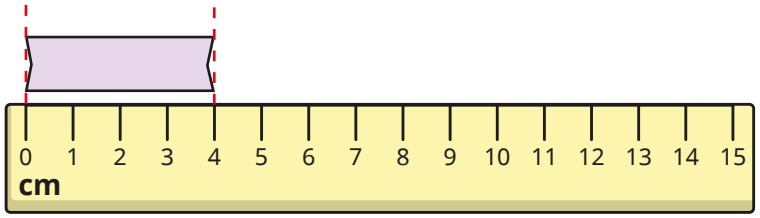
Measure length in centimetres

Key learning

Tell children to find some objects, for example small sticks or pebbles, that they will be able to measure using a ruler.

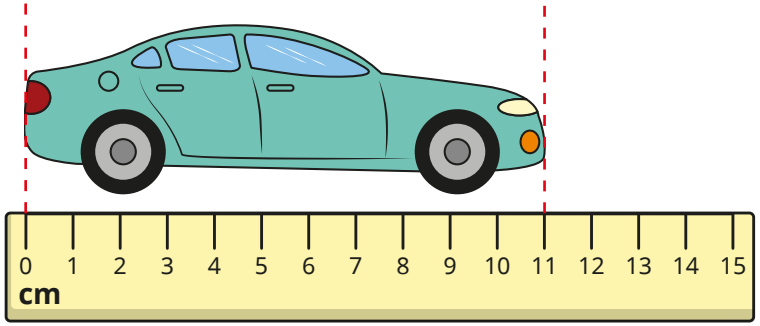
Ask children to measure the lengths of the objects in centimetres.

- How long is the ribbon?

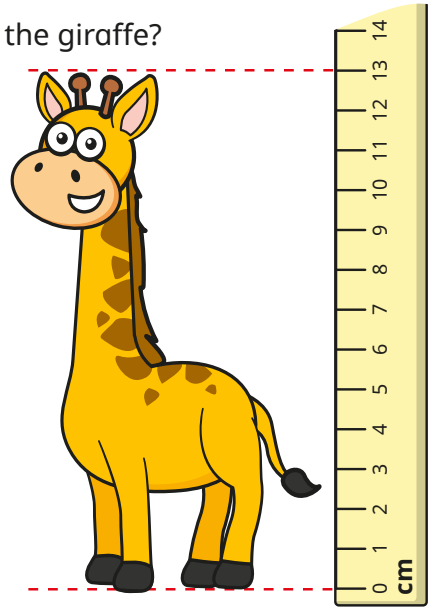


The ribbon is _____ cm long.

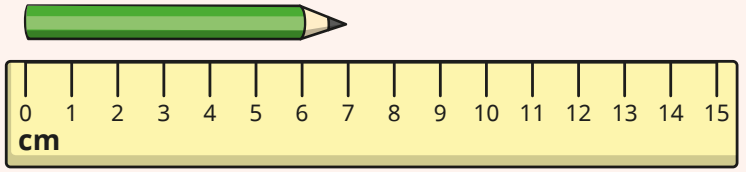
- What is the length of the car?



- How tall is the giraffe?



Give children a pair of objects, such as pencils of different lengths. Ask them to measure the length of each object.

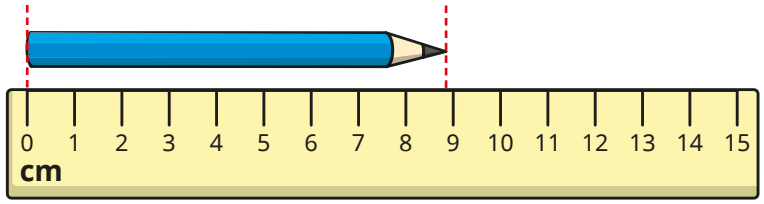


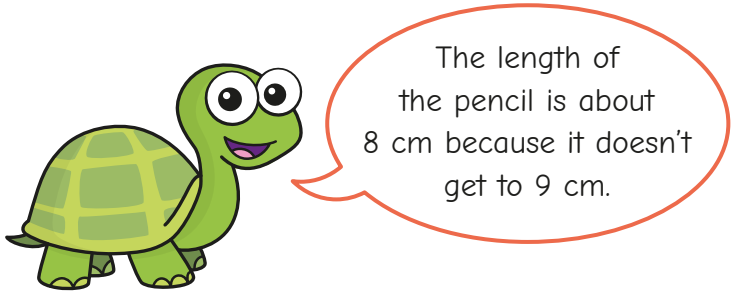
Ask which object is shorter and which is longer.

Measure length in centimetres

Reasoning and problem solving

Tiny is measuring the length of the pencil.



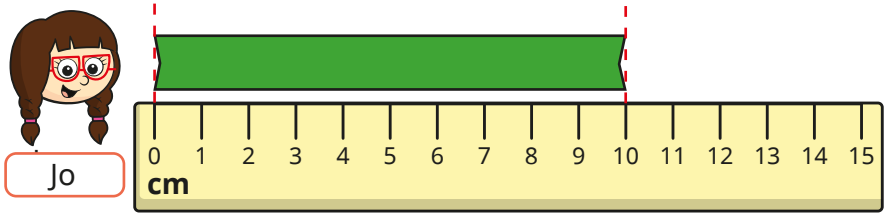


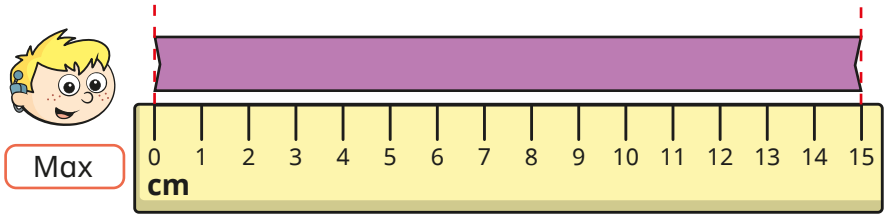
Do you agree with Tiny?

Why?

No

Jo, Max and Sam are comparing the lengths of some ribbons.





How long could Sam's ribbon be?

11 cm, 12 cm, 13 cm, 14 cm

Spring Block 5

Mass and volume

Small steps

Step 1	Heavier and lighter
Step 2	Measure mass
Step 3	Compare mass
Step 4	Full and empty
Step 5	Compare volume
Step 6	Measure capacity
Step 7	Compare capacity

Heavier and lighter

Notes and guidance

In this block, children are formally introduced to mass for the first time. They may have some understanding of describing something as heavy or light from their own experience or from previous learning in Reception.

Children begin by holding objects to compare them, using the language of "heavier" or "lighter". They then use balance scales to check their comparisons. They need to understand that the heavier object is lower on the balance scale. At this stage, children do not need to measure the actual mass of objects in order to compare them.

Children may assume that larger objects are heavier than smaller objects or that objects that are the same size/shape have the same mass. Comparing the mass of a large inflated balloon and a small ball of modelling clay, and comparing the mass of an inflated and a water-filled balloon should help to overcome these misconceptions.

Things to look out for

- Children may think that larger objects are always heavier.
- Children may think that if an object can hold something inside, it must be heavy. For example, they may think a box must be heavy because it can hold things inside it.

Key questions

- Which object do you think is heavier/lighter?
- Is a _____ heavier or lighter than a _____?
- How can you show which object is heavier/lighter?
- Are large objects always heavier than small objects? How do you know?
- How does the balance scale show which object is heavier?
- If two objects are the same size and shape, does that mean that they have the same mass? How do you know?

Possible sentence stems

- The _____ is heavier/lighter than the _____
- The _____ has the same mass as the _____
- I know which object is heavier/lighter because ...

National Curriculum links

- Compare, describe and solve practical problems for: lengths and heights; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weights; capacity and volume; time

Heavier and lighter

Key learning

Read *Mighty Maddie: Comparing Weights* by Stuart J Murphy.

Ask children to describe objects as lighter or heavier, as Maddie did when tidying her room. Do they agree with Maddie that the teddy bear is light and the toy train is heavy?

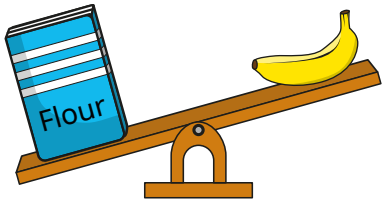
Ask children to draw an object that they think is heavy and an object that they think is light. They can explain to a partner why they chose each object.

Did children draw similar objects?

Collect different objects from outside or from around the classroom.

Use a balance scale to compare pairs of objects using the language of "heavier" and "lighter". Challenge children to find two objects that have the same mass. Ask children to find the heaviest and lightest objects that they can.

- Which object is lighter?



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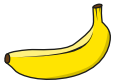
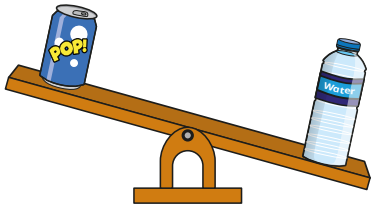


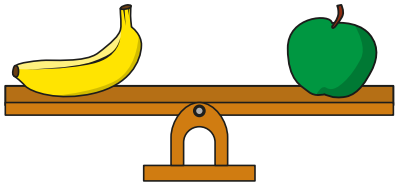
How do you know?

- Write **heavier** or **lighter** to complete the sentence.



The bottle is _____ than the can.

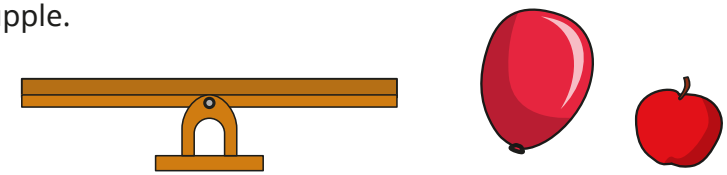
- What do you know about the masses of the banana and the apple?



Heavier and lighter

Reasoning and problem solving

Mo, Jo and Max are comparing the mass of a balloon and an apple.



Mo

I think the balloon will be heavier because it is bigger.

Jo

I think they will have the same mass because they are both red.

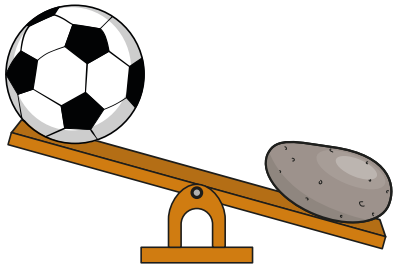
I think the apple will be heavier than the balloon.

Max

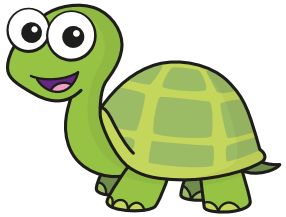
Who do you agree with?

Why?

Max



The football is heavier, because it is higher.



Do you agree with Tiny?

Why?

No

Measure mass

Notes and guidance

In this small step, children use a variety of non-standard units, such as cubes or bricks, to measure the mass of an object.

Building on the previous step, children should understand that when a scale is balanced, objects have the same mass. On a balanced scale, the number of non-standard units on one side tells them the mass of the object on the other side. Highlight the importance of choosing the same non-standard unit to measure the mass. Measuring the mass of an object using an assortment of different non-standard units, such as a number of cubes, pencils and wooden bricks, makes it difficult to record the object's mass.

Children may find it difficult to balance objects exactly. If an object does not balance exactly, encourage them to use the closest number or to try a different non-standard unit.

Things to look out for

- Children may find it difficult to balance objects exactly using non-standard units. For example, an object may be heavier than 3 bricks, but lighter than 4 bricks.
- When using objects as non-standard units for measuring, children may think that a certain type of object has a certain mass, for example that all cubes have the same mass, or all bricks have the same mass.

Key questions

- What does it mean when the scales are balanced?
- How do you know if two objects have the same mass?
- If you add one more cube, what will happen?
  If you take away one cube, what will happen?
- Which classroom objects are the best units to measure the mass of the object? Why?
- Why should you not use a variety of objects to measure the mass of an object?
- What is the mass of the _____ in cubes?

Possible sentence stems

- The mass of the _____ is the same as the mass of _____ cubes.
- The mass of the _____ is _____ cubes.

National Curriculum links

- Compare, describe and solve practical problems for: lengths and heights; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time

Measure mass

Key learning

Read *So Light, So Heavy* by Susanne Strasser.

Ask which animals were as heavy as the elephant.

Take children outside to collect objects and then get them to record the mass of each object using non-standard units, for example cubes.

Ask children to complete the sentence for each object.

The mass of the _____ is the same as _____ cubes.

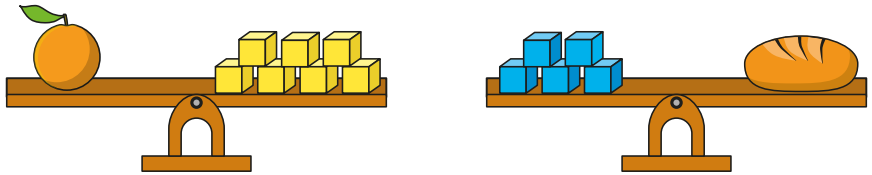
Remind children how to find and record the mass of an object using cubes.

Repeat for the same object using a different non-standard unit, for example pencils or bricks.

What do children notice?

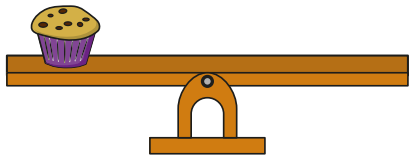
Discuss whether pebbles would be a good unit to measure the mass of something.

- What is the mass of each object?

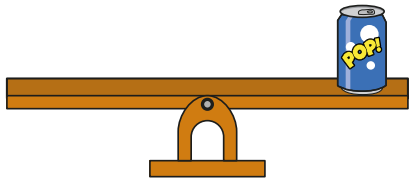


The mass of the _____ is _____ cubes.

- Draw cubes to balance the scales.
  - The mass of the muffin is 4 cubes.



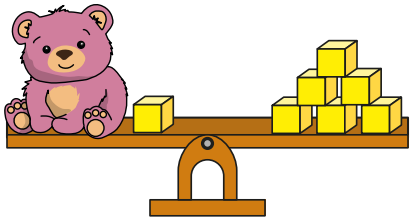
  - The mass of the can is 9 cubes.



Measure mass

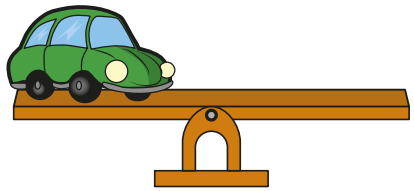
Reasoning and problem solving

What is the mass of the teddy bear?



How do you know?

5 cubes

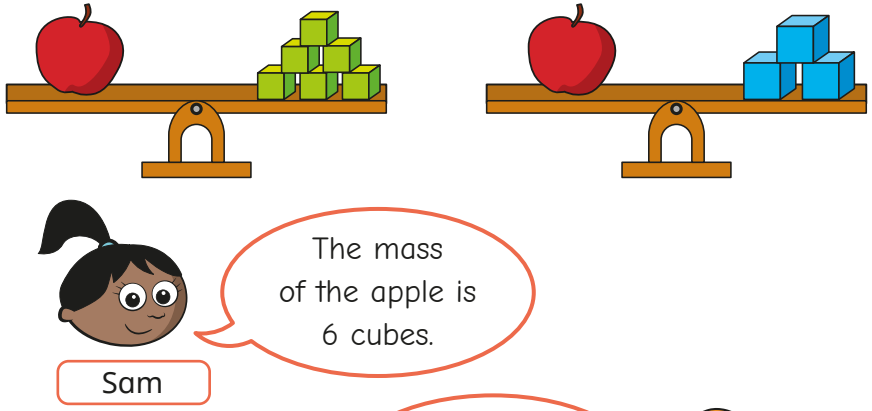


The toy car is heavier than 5 cubes, but lighter than 9 cubes.

Draw cubes on the scales to show what the mass of the car could be.

6, 7 or 8 cubes

Sam and Ron are finding the mass of an apple.



Who do you agree with?

Why?

Both children are correct.

Compare mass

Notes and guidance

In this small step, children compare the masses of two objects, still using non-standard units of measure.

Children should know that if, for example, an apple has the same mass as 6 cubes and a banana has the same mass as 4 cubes, then the apple is heavier than the banana, provided the cubes have the same mass.

Children use their knowledge of "heavier" and "lighter" from earlier in the block to compare the masses of objects. It is important that children are also exposed to examples of objects that have the same mass as each other.

Once children are confident comparing two objects, they can begin to order the masses of more than two objects and to use the language of "heaviest" and "lightest".

Things to look out for

- Children may try to use different non-standard units to measure the masses of objects, which will not allow accurate comparisons to be made. For example, if the mass of an apple is 5 cubes and the mass of an orange is 2 bricks, this does not necessarily mean that the mass of the apple is greater.

Key questions

- What does it mean when the scales are balanced?
- What is the mass of the _____ in cubes?
- Which of the two objects is heavier/lighter? How do you know?
- How much heavier/lighter is the _____ than the _____?
- Why do you need to use the same unit to measure the masses of the objects?

Possible sentence stems

- The mass of the _____ is _____ cubes.
- I know that the _____ is lighter/heavier than the _____ because ...
- The heaviest/lightest object is the _____

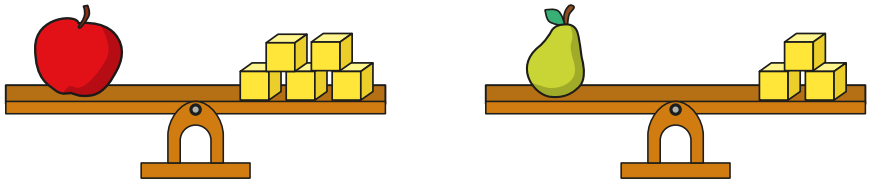
National Curriculum links

- Compare, describe and solve practical problems for: lengths and heights; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time

Compare mass

Key learning

- Ron is measuring the mass of fruit using cubes.



  - What is the mass of the apple?
  - What is the mass of the pear?
  - Choose a word to complete the sentence.

heavier lighter

The apple is _____ than the pear.

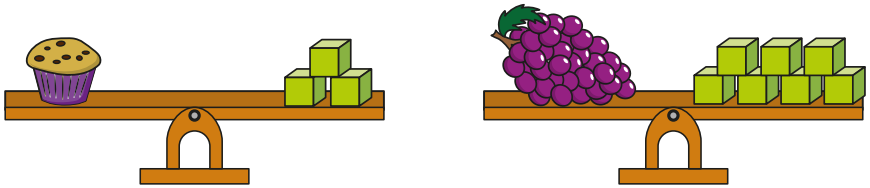
How do you know?

Collect two objects from outside.

Ask children to predict which object is heavier and which is lighter. Measure the mass of each object in cubes to find out which object is heavier.

How much heavier is it?

- Complete the sentences.

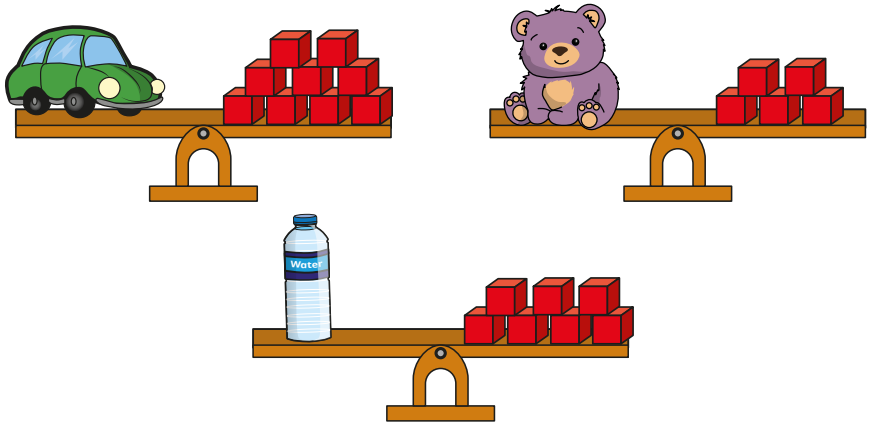


The mass of the muffin is _____ cubes.

The mass of the grapes is _____ cubes.

The muffin is _____ than the grapes.

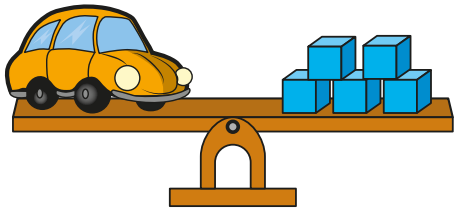
- Order the objects from lightest to heaviest.

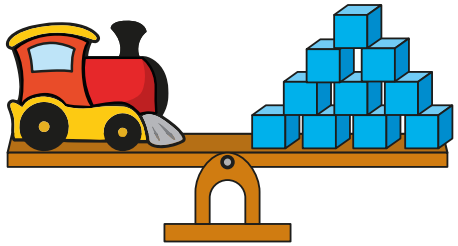


Compare mass

Reasoning and problem solving

How much heavier is the train than the car?

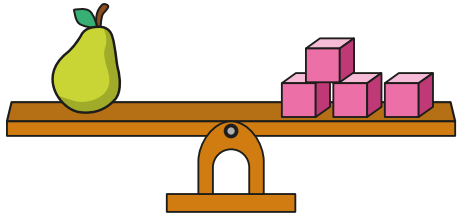


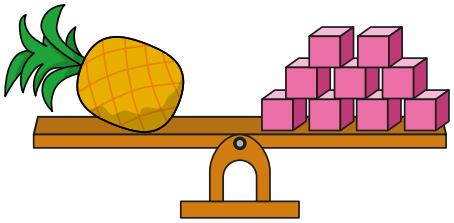


How did you work it out?

5 cubes

An apple is heavier than the pear, but lighter than the pineapple.





What could the mass of the apple be?

5, 6, 7 or 8 cubes

Full and empty

Notes and guidance

In this small step, children are introduced to volume and capacity for the first time. They begin by exploring practically the idea that capacity is the maximum amount that something can hold. Ensure that they experience a range of different sizes and shapes of containers and begin to make basic comparisons to see which has the greater capacity.

Children then explore the concept that volume is the amount of something inside a container. They describe the volume in a container using phrases such as “empty”, “nearly empty”, “nearly full” and “full”.

At this stage, no formal measurements of volume or capacity, such as litres, are used.

Key questions

- Which container do you think can hold more water? Why?
- Can two glasses that look different hold the same amount of water? Why?
- Does a taller/wider glass always hold more water?
- What does “full”/“empty” mean?
- How are “nearly empty” and “nearly full” different?

Possible sentence stems

- I think that this container can hold more water because ...
- The glass is full/empty because ...
- The glass is nearly empty/nearly full because ...

Things to look out for

- Children may believe that different shapes or sizes of containers must have different capacities or that a taller container must have a greater capacity than a shorter one, regardless of width.

National Curriculum links

- Compare, describe and solve practical problems for: lengths and heights; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time

Full and empty

Key learning

Read *A Beach For Albert: Capacity* by Eleanor May.

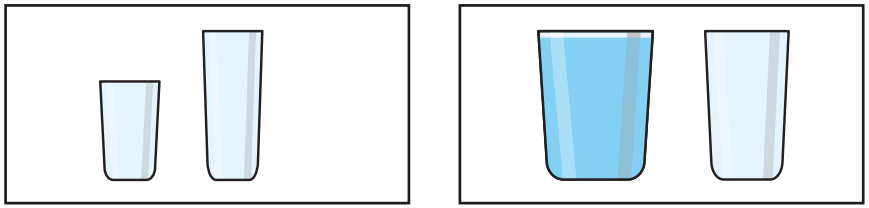
Children compare how much water each of the containers can hold and make suggestions about what other items Albert could use to carry the water.

Encourage children to describe how much water is in the pool using phrases such as "empty", "nearly empty", "nearly full" and "full".

Provide children with a variety of different sizes and shapes of container. Get them to predict which one has the greatest capacity. Challenge children to investigate how they can work out which container has the greatest capacity, for example filling one container with water and then pouring the water into another container.

Provide pairs of children with a container and a jug of water. As they pour water into their containers, ask them to describe the volume of water in the container using phrases such as "empty", "nearly empty", "nearly full" and "full".

- In each pair, which container has the greater capacity?



- Show the volume in each glass.

nearly empty **nearly full** **full**

Compare answers with a partner.

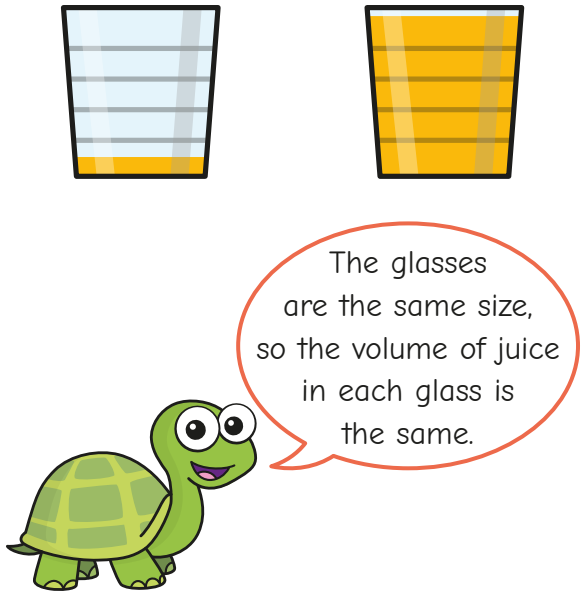
- Choose words to complete the sentence about each glass.

empty	nearly empty	nearly full	full

The glass is _____

Full and empty

Reasoning and problem solving

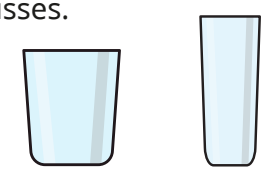


Do you agree with Tiny?

Explain your reasons.

No

Jo and Max are comparing their glasses.



Jo **Max**

Why do Jo and Max think this?

Whose glass can hold more water?

Jo **Max** **cannot tell**

cannot tell

Compare volume

Notes and guidance

In this small step, children develop their understanding of volume further and start to compare volumes using the language of "more than" and "less than".

Initially, children make simple visual comparisons between identical containers, using the language introduced in the previous step. They should still be exposed to a range of different size and shape containers. Children then compare and order more than two glasses. This can include following instructions to show a certain volume, for example showing more than half full, but less than nearly full.

Challenge children to also compare volumes in containers with different capacities. For example, if glasses are the same height but different widths and the level of the water is the same, then the wider glass must have a greater volume of water inside. Practical explorations of these types of problems will be key.

Key questions

- What does "empty"/"nearly empty"/"nearly full"/"full" mean?
- If the glasses are the same size and shape, how do you know which has more water in it?
- How can you order the volumes from greatest to smallest?
- What do you know about two glasses that are the same height, but one is wider than the other?

Possible sentence stems

- The glass is _____
- Glass A has _____ water than glass B.
- I know that there is _____ water in glass _____ because ...

Things to look out for

- When comparing volumes in different-sized containers, children may believe that if the water level is higher up the container, then the volume of water must be greater.

National Curriculum links

- Compare, describe and solve practical problems for: lengths and heights; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time

Compare volume

Key learning

- Use the words to describe the volume of juice in each glass.

empty	nearly empty	nearly full	full

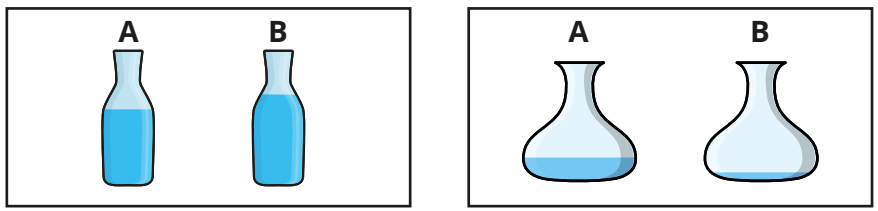
A B C

Glass _____ is _____

Write **more** or **less** to compare the volumes.

- Glass A has _____ juice than glass C.
- Glass C has _____ juice than glass A.
- Glass C has _____ juice than glass B.
- Glass B has _____ juice than glass A.

- Write **more** or **less** to compare the volumes.



Container A has _____ water than container B.

- Glass A has more water than glass B.

  Glass C has less water than glass B.

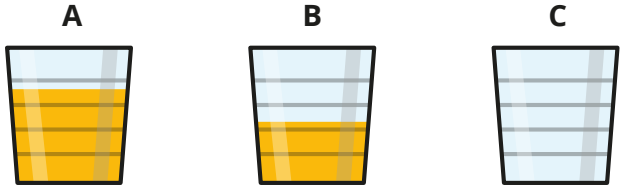
  Show the volume of water that could be in glasses A and C.

A B C

- Glass C has less juice than glass A but more juice than glass B.

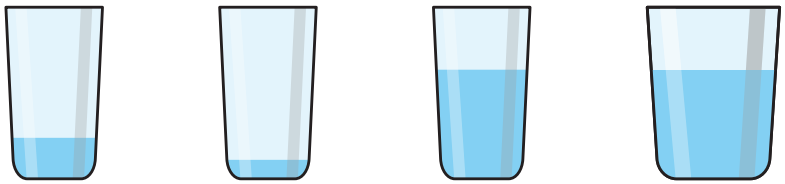
  Show the volume of juice that could be in glass C.

A B C



- Put the glasses in order from smallest to greatest volume.

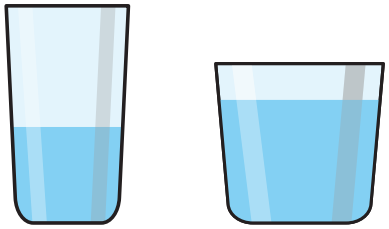
A B C D

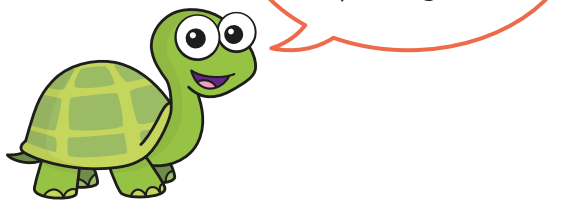


Compare volume

Reasoning and problem solving

The glasses can hold the same amount of water.

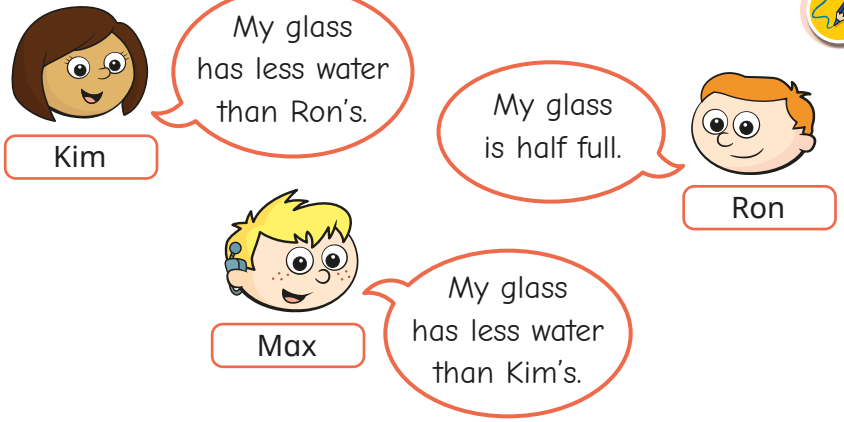




Explain Tiny's mistake.

Glass A is less than half full and glass B is more than half full, so glass B must have more water.

Kim, Ron and Max are describing their glasses of water.



Show how much water could be in each glass.

Compare answers with a partner.

multiple possible answers

Measure capacity

Notes and guidance

In this small step, children measure the capacity of different containers using non-standard units of measure. They formalise their understanding that the capacity of a container is how much of something it can hold. This can be cups of water or sand, cubes or marbles and so on.

Show children that to measure the capacity of a container, they need to make sure that the unit of measure remains the same, for example the same size of marble or the same size of cup. They also need to see that to accurately measure the capacity of a container, they must fill the container to the top.

Discuss different non-standard units of measure, and how some are more accurate than others. For example, cups of water and sand are more accurate than cubes or marbles because they take up more of the space in the container.

Things to look out for

- Children may not completely fill the container or the unit of measure, for example a cup.
- Children may use pebbles or marbles of different sizes when measuring the capacity of a container.

Key questions

- How can you measure how much liquid fills this container?
- What else can you fill the container with?
- How many cups of sand are needed to fill the container?
- How many marbles are needed to fill the container?
- Which unit of measure is more accurate? Why?
- If the cubes/marbles are smaller, will it take more or fewer cubes/marbles to fill the container than larger ones?
- If a cup is larger, will it take more or fewer cups to fill a container? How do you know?

Possible sentence stems

- _____ cubes are needed to fill the container.
- The capacity of the container is _____ cups of water.

National Curriculum links

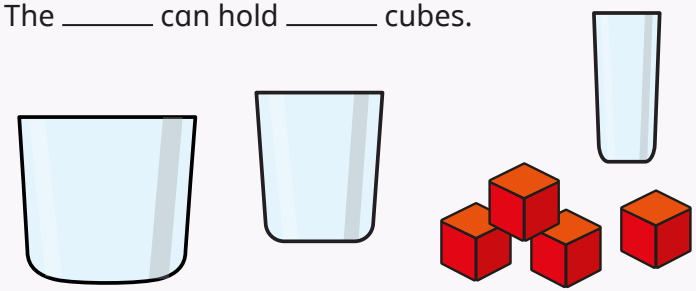
- Compare, describe and solve practical problems for: lengths and heights; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time

Measure capacity

Key learning

Give children cubes of the same size and different containers. Ask them how many cubes they can fit into each container and to complete the sentence for each container.

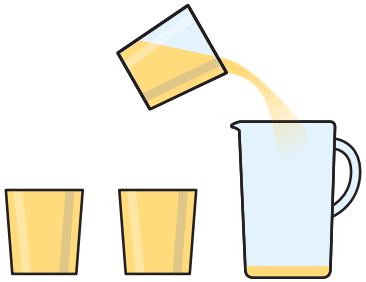
The _____ can hold _____ cubes.



As a class, measure and record the capacities of different containers using cubes, water and sand. Make sure children see that each cup of water must have the same amount in it.

What do children notice? Ask if they think that cubes or cups of water/sand are better for measuring capacity. Can they explain why?

- 3 cups of sand fill one container.

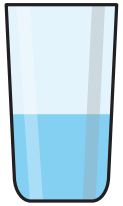


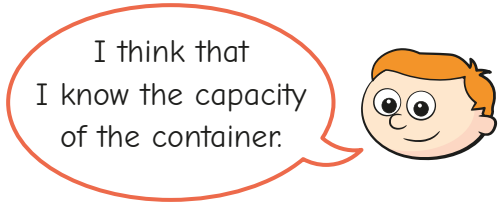
Complete the sentences.

The capacity of 1 jug is _____ cups of sand.

The capacity of 2 jugs is _____ cups of sand.

- Ron has poured 2 glasses of water into the container.





Why does Ron think this?

How could he check?

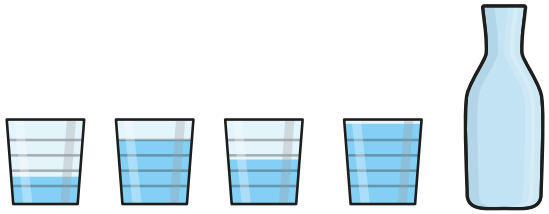
What is the capacity of the container?

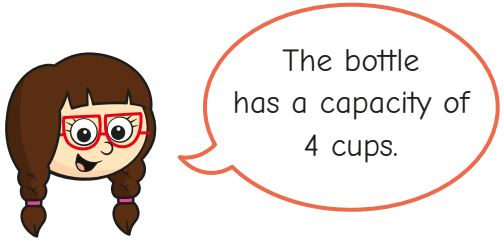
Measure capacity

Reasoning and problem solving

Jo pours these cups of water into the bottle.

The water fills the bottle.



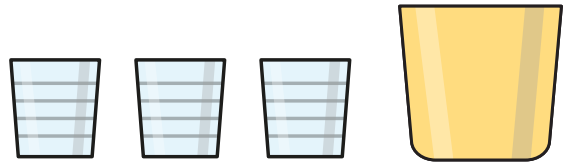


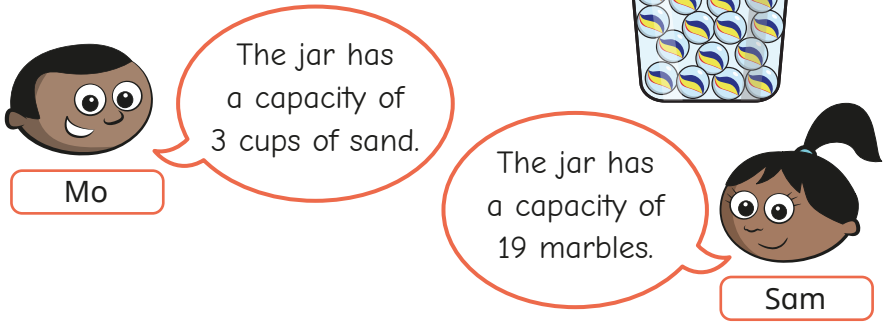
Do you agree with Jo?

Explain your answer.

No

Mo and Sam are measuring the capacity of a jar.





Who has used a more accurate measurement?

How do you know?

Mo

Compare capacity

Notes and guidance

In this small step, children compare the capacities of different containers, still using non-standard units of measurement.

Children recognise that if container A has a capacity of 3 cups of water and container B can hold more than 3 cups of water, then container B has a greater capacity than container A. They then move on to using inequality symbols to record this.

It is important that children know that the units of measure need to be the same for both containers in order to compare capacities. Remind them of the importance of filling each container to the top.

Finally, children compare more than two containers, putting them in either ascending or descending order of capacity.

Things to look out for

- Children may not completely fill each container.
- Children may not use the same units of measure for each container.
- Children may confuse the inequality symbols for "greater than" and "less than".

Key questions

- What can you use to measure the capacities of the containers?
- How many cups of water can the container hold?
- Which container can hold more marbles?
- Does container A hold more or less water than container B?
- Which container has the greater capacity? How do you know?
- How many more _____ does container A hold than container B?

Possible sentence stems

- Container A has a _____ capacity than container B.
- I know that container A has a _____ capacity because ...
- I need to use the same unit of measure because ...

National Curriculum links

- Compare, describe and solve practical problems for: lengths and heights; mass/weight; capacity and volume; time
- Measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time

Compare capacity

Key learning

Give children different-sized containers and cups of water as the unit of measure. Ask them to complete the sentences for each set of containers.

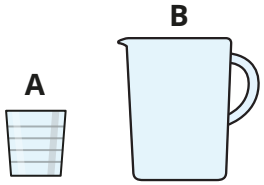
Container _____ can hold _____ cups of water.

Container _____ has a greater capacity than container _____

As a class, measure and record the capacities of different containers, using a range of non-standard units. Line up the containers in order, from smallest capacity to greatest for each non-standard unit. Discuss whether the containers are in the same order each time.

- Which container has the greater capacity?

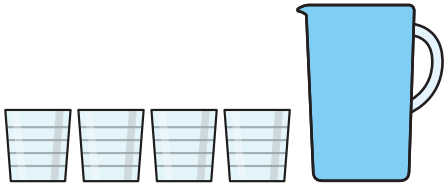
  How do you know?

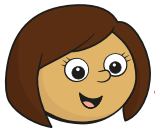


- Max and Kim are measuring the capacities of two jugs.

I used 4 cups to fill my jug.

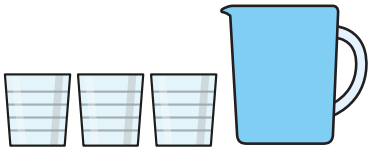
Max





I used 3 cups to fill my jug.

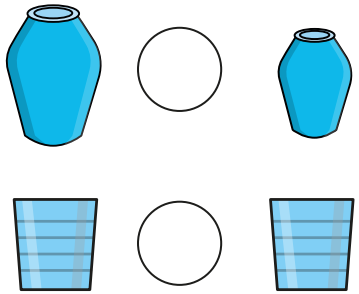
Kim



Which jug has the greater capacity?

How do you know?

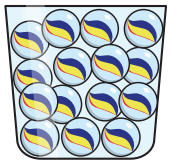
- Write < , > or = to compare the capacities of the containers.

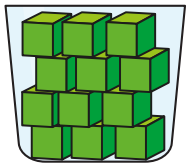


Compare capacity

Reasoning and problem solving

Mo and Sam are comparing the capacities of two jars.

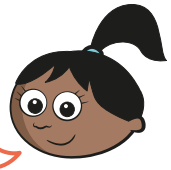




My jar can hold 15 marbles.

Mo

My jar can hold 12 cubes.



Sam

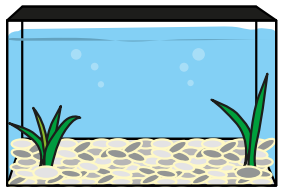
Can you tell which jar has the greater capacity?

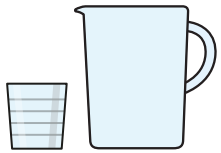
Why?

No

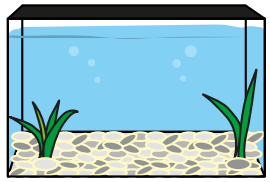
Dan fills his fish tank with 3 jugs of water.

Each jug can hold 4 cups of water.





Kay fills her fish tank with 8 cups of water.



Whose fish tank has the greater capacity?

How do you know?

Dan's