Autumn Scheme of Learning

Year 2

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

2020 will go down in history. The world has changed for all of us.

We want to do as much as we can to support children, teachers, parents and carers in these very uncertain times.

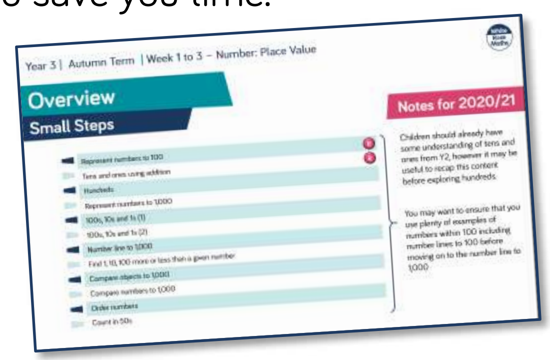
We have amended our schemes for 2020/21 to:

★ highlight key teaching points

★ recap essential content that children may have forgotten

★ flag any content that you might not have covered during the school closures period.

We hope these changes will add further value to the schemes and save you time.



Lesson-by-lesson overviews

We've always been reluctant to produce lesson-by-lesson overviews as every class is individual and has different needs. However, many of you have said that if blended learning becomes a key feature of school life next year, a weekly plan with linked content and videos could be really useful.

As always, we've listened! We've now produced a complete lesson-by-lesson overview for Y1 to Y9 that schools can use or adapt as they choose. Each lesson will be linked to a free-to-use home learning video, and for premium subscribers, a worksheet. This means that you can easily assign work to your class, whether they are working at home or in school.

Inevitably, this lesson-by-lesson structure won't suit everyone, but if it works for you, then please do make use of this resource as much as you wish.

Teaching for Mastery

These overviews are designed to support a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum.

The overviews:

- have number at their heart. A large proportion of time is spent reinforcing number to build competency
- ensure teachers stay in the required key stage and support the ideal of depth before breadth.
- ensure students have the opportunity to stay together as they work through the schemes as a whole group
- provide plenty of opportunities to build reasoning and problem solving elements into the curriculum.

For more guidance on teaching for mastery, visit the NCETM website:

https://www.ncetm.org.uk/resources/47230

Concrete - Pictorial - Abstract

We believe that all children, when introduced to a new concept, should have the opportunity to build competency by taking this approach.

Concrete – children should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – alongside this children should use pictorial representations. These representations can then be used to help reason and solve problems.

Abstract – both concrete and pictorial representations should support children's understanding of abstract methods.

Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

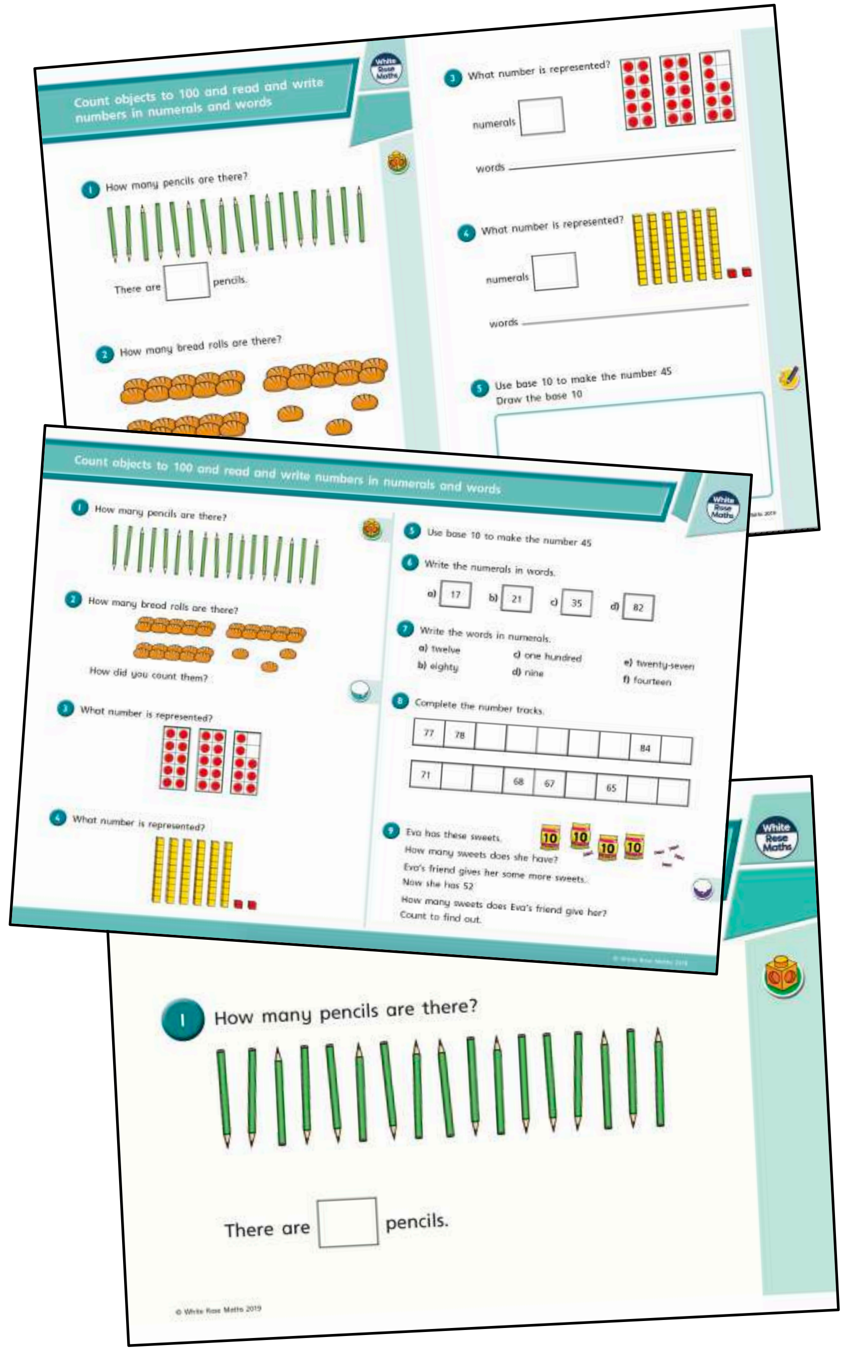
Supporting resources

NEW for 2019-20!

We have produced supporting resources for every small step from Year 1 to Year 8.

The worksheets are provided in three different formats:

- Write on worksheet – ideal for children to use the ready made models, images and stem sentences.
- Display version – great for schools who want to cut down on photocopying.
- PowerPoint version – one question per slide. Perfect for whole class teaching or mixing questions to make your own bespoke lesson.



For more information visit our online training and resources centre resources.whiterosemaths.com or email us directly at support@whiterosemaths.com

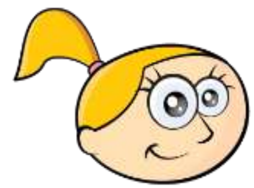
Meet the Characters

Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who’s your favourite?

Teddy

Rosie

Mo



Eva

Alex

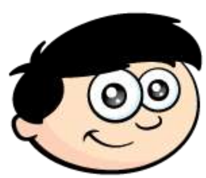
Jack

Whitney

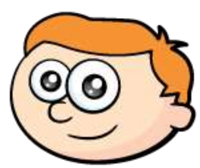
Amir

Dora

Tommy



Dexter



Ron

Annie

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value			Number: Addition and Subtraction					Measurement: Money		Number: Multiplication and Division	Consolidation
Spring	Number: Multiplication and Division				Statistics		Geometry: Properties of Shape		Number: Fractions			
Summer	Measurement: Length and Height		Geometry: Position and Direction		Consolidation and problem solving		Measurement: Time		Measurement: Mass, Capacity and Temperature			Consolidation

Autumn - Block 1

Place Value

Overview

Small Steps

- Counting forwards and backwards within 20 R
- Tens and ones within 20 R
- Counting forwards and backwards within 50 R
- Tens and ones within 50 R
- Compare numbers within 50 R
- Count objects to 100 and read and write numbers in numerals and words
- Represent numbers to 100
- Tens and ones with a part-whole model
- Tens and ones using addition
- Use a place value chart
- Compare objects
- Compare numbers
- Order objects and numbers

Notes for 2020/21

It is important to spend time early on recapping numbers within 20 and 50 before moving onto numbers to 100.

Many children will need this recap as they may not be secure in their understanding of tens and ones from Y1, even though they may have met it.

Overview

Small Steps

- Count in 2s R
- Count in 5s R
- Count in 10s R
- Count in 3s

Notes for 2020/21

We have separated the step counting in 2s, 5s and 10s into three recap steps in order to explore them in more detail.

White Rose Maths

Count & Write Numbers to 20

Notes and Guidance

Children are building on their existing knowledge of counting forwards and backwards by introducing the numbers 11-20
Children should explore the meaning of the suffix 'teen' and what this tells us about a number.
11, 12, 13 and 15 are usually difficult for children to understand because they cannot hear the single digit in the name like others e.g. sixteen – six ones and a ten.

Mathematical Talk

Let's count together from 9, 10, 11, 12, 13, 14, 15, 16

What do you notice about the sounds of the numbers?

Do you notice a pattern with the numbers?

What comes after the number 10?

What do you notice about the ends of most of these numbers?

What does 'teen' tell us about a number?

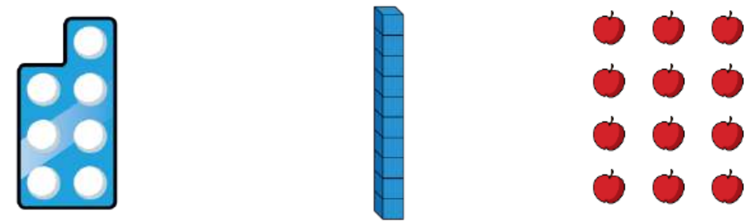
How do we say this number?

How would we write ______?

Varied Fluency

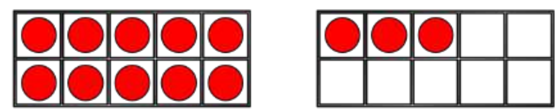
R

Match the representations to the correct numeral.



12 7 10

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



Use your own ten frames to show me the number:

Fourteen 18 Nine 16

Fill in the missing numbers.

	15		17	

16					11

Count & Write Numbers to 20

Reasoning and Problem Solving

Circle the odd one out and explain why.

11	12	13	14
15	61	17	18

61 is the odd one out. It should be 16, the digits have been swapped round.

Mr Monaghan says,

Will Mr Monaghan say 11?

Explain how you know.

Yes because 11 is between 8 and 20

Tens and Ones

Notes and Guidance

Children learn each number from 11 to 19 has '1 ten and some more'.
They will see 10 and 20 as having just tens and no ones.
Children still need to understand that numbers can be seen in different ways. Discuss 1 ten being equal to 10 ones.
Base 10 will be introduced in this step. Children can use these concretely but also draw them as 'sticks and bricks'. A line represents 1 ten and a dot represents 1 one.

Mathematical Talk

What numbers come after 10?
Which numbers have the 'teen' sound in them?
What does the number ______ look like?
Which is greater 1 ten or 1 one? How do you know?
What does 'teen' tell us about a number?
Can you swap tens for ones?
Will it change the amount? Explain.
Do we need to count the 10 individually?
Do we need to start counting from 0 every time?
Can you describe the number ______ using tens and ones?

Varied Fluency

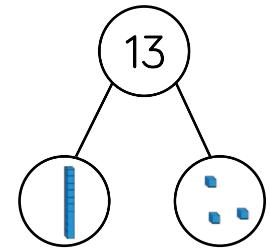
R

- Use the part-whole model to complete the sentences.

My number is ______

One part is ______, the other part is ______

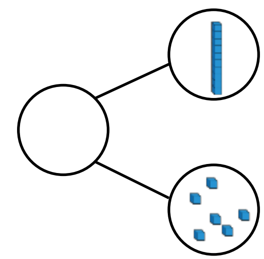
The whole is ______



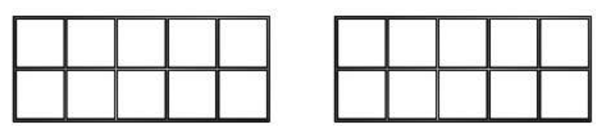
My number is ______

It has ______ tens and ______ ones.

The whole is ______



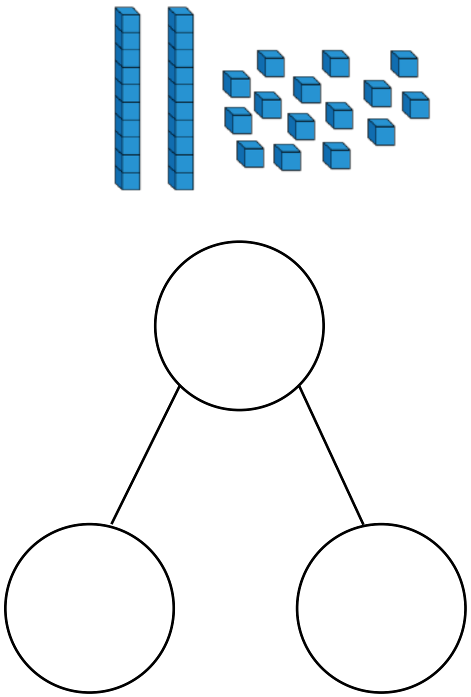
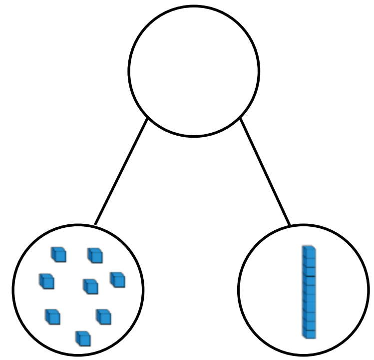
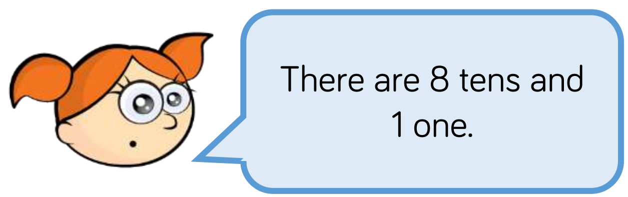
- Fill in the ten frames with counters to show 14 and complete the sentence.



14 has ______ ten and ______ ones.

Tens and Ones

Reasoning and Problem Solving

How many ways can you complete the part-whole model to show numbers up to 20, using the Base 10 equipment – you do not have to use it all. 	Open ended e.g. 1 ten and 5 ones make 15
Alex makes a part-whole model.  She says:  Explain her mistake. What is her number?	Alex has counted the ones as tens and the tens as ones. She should say there is 1 ten and 8 ones. Her number is 18

Numbers to 50

Notes and Guidance

Children count forwards and backwards within 50. They use a number track to support where needed, in particular crossing the tens boundaries and with teen numbers.
Children build on previous learning of numbers to 20
They learn about grouping in 10s and their understanding of 1 ten being equal to 10 ones is reinforced.

Mathematical Talk

How can we count a larger number of objects more easily.

What happens when we get to 10? 20? 30?

___ ones make ___ ten.

How many groups of 10 can we see in the number ___ ?

Which practical equipment is best for showing groups of 10?

Varied Fluency

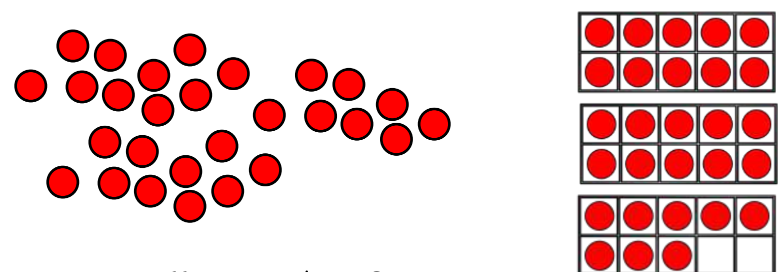
R

- Use the number track to
  - count forwards from 35 to 49
  - count back from 46 to 38

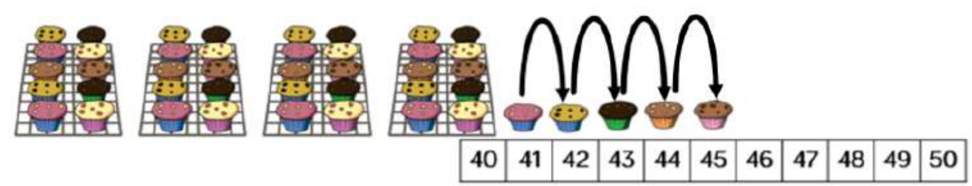
35	36	37	38	39	40	41	42	43	44	45	46	47	48	49

Can you count from ___ to ___ without a number track?

- These images both show the same number of counters.
Which counters are easier to count? Why?



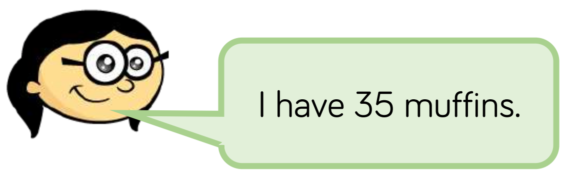
- How many muffins are there?

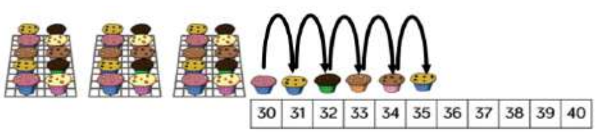


Numbers to 50

Reasoning and Problem Solving

Annie counts how many muffins she has.





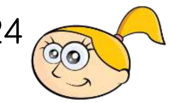
Do you agree with Annie?

Explain your answer.

Possible answer:

I do not agree with Annie because she has counted 30 twice. There should be 36 muffins.

Eva is counting from 38 to 24



Will she say the number 39?
Will she say the number 29?
Will she say the number 19?

Explain how you know.

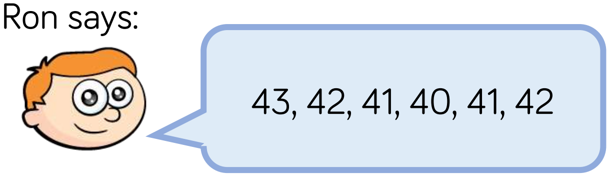
Eva will not say 39 or 19 because they are not between 38 and 24

She will say 29

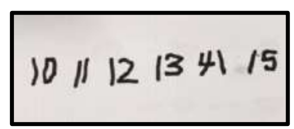
Children could show this on a number track.

Ron and Whitney are counting.

Ron says:



Whitney writes:



Can you spot their mistakes?

Ron has started counting up after 40 when he should have continued counting back.

Whitney has also written 41 instead of 14. She has reversed her digits.

Tens and Ones

Notes and Guidance

Children use practical equipment to represent numbers to 50 They continue to build their understanding that ten ones can be grouped into one ten. They need to practice grouping equipment into tens themselves (straws, cubes, lolly sticks, 10 frames) before introducing ready made tens or place value counters.

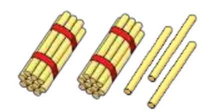
It is important that children understand how a number is made up of tens and ones, e.g. 34 = 3 tens and 4 ones.

Mathematical Talk

How many have we got? How can we make them easier to count?
How many tens are there?
How many ones are there?
I have ___ tens and ___ ones. What number does that make?
How do we record this number in words?

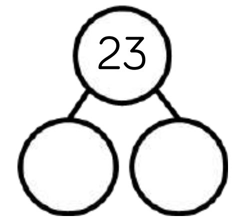
Varied Fluency

Count out 23 straws. How many bundles of 10 can you make?

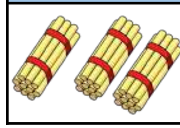
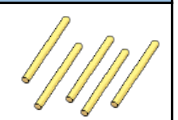


There are ___ tens and ___ ones.

___ tens + ___ ones = 23



What number is represented in the grid?

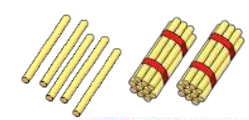
Tens	Ones
	

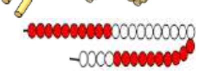
There are ___ tens and ___ ones.
___ tens + ___ ones = ___

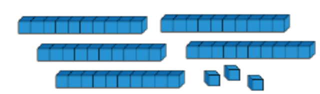
Match the pictures and words.

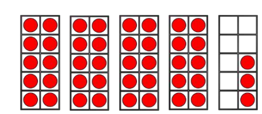
- Four tens and three ones
- Two tens and five ones
- Three tens and four ones
- Three ones and five tens

How many?





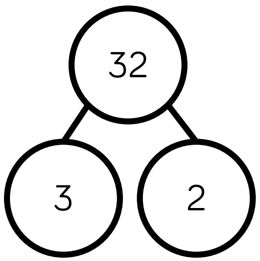




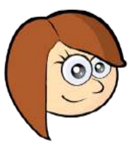
Tens and Ones

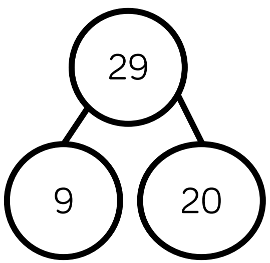
Reasoning and Problem Solving

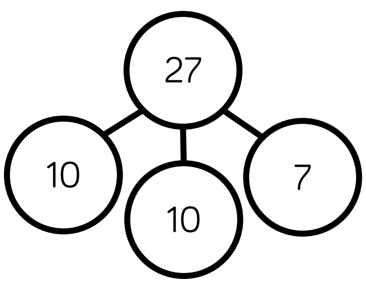
The children are completing the part whole models.




Tommy


Rosie





Jack


Are they correct?
Explain why.

Tommy is wrong. He has wrote 3 which should be 30 or 3 tens.

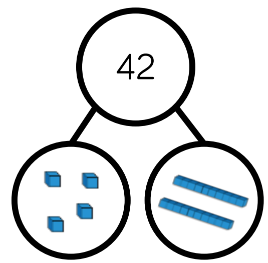
Rosie is correct – she has just recorded the ones first.

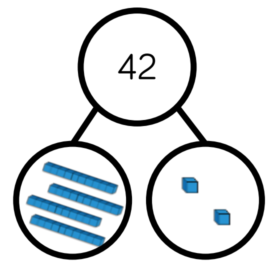
Jack is correct.
10 + 10 = 20
Two tens is the same as twenty.

Dora and Amir both try to build the same number.


Dora


Amir





Who is correct?

Can you explain the mistake that has been made?

Amir is correct.

Dora has got mixed up with tens and ones and shown 4 ones and 2 tens (24).

Compare Numbers within 50

Notes and Guidance

Building on previous learning of comparing practical objects within 50, children now compare two numbers within 50 using the inequality symbols.

Children continue to use the language 'more than', 'less than' and 'equal to' alongside the correct symbols to compare numbers.

Mathematical Talk

Which number is more? Which is less?

What could we use to represent the numbers?

What do <, > and = mean?

How do you know you have more or less?

What could you use to help you compare?

Varied Fluency

R

- Use the number track to compare the two numbers using words and inequality symbols.

19	20	21	23	24	25	26	27	28	29

29	30	31	32	33	34	35	36	37	38

21 is ________ than 26 ☐ is more than ☐

26 is ________ than 21 ☐ is less than ☐

21 ◯ 26 26 ◯ 21 ☐ > ☐ ☐ < ☐

- Use the 1-50 grid to compare the numbers.

12 ◯ 21

38 ◯ nineteen

40 ◯ 39 + 1

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

- Use a number line or 1-50 grid to compare:

fifteen ◯ 50 48 ◯ 39

28 ◯ 29 2 tens < ☐

Compare Numbers within 50

Reasoning and Problem Solving

R

Teddy is comparing two numbers.

My number is larger than 19 but not one more than 19

23 > [ ]

What could Teddy's number be?

What can't it be?

Teddy's number could be 21 or 22

It can't be 20 as this is one more than 19.

Dora compares the two values.

23 < 3 tens and 3 ones

Change one thing in the values so they are equal.

Dora could change 23 = 2 tens and 3 ones or 33 = 3 tens and 3 ones.

Pick two dominoes to represent two two-digit numbers.
For example,

43 21

Then compare them using <, > or =
43 > 21 21 < 43
Explain how you know.

Children could do this with a partner.

Possible response: 43 is larger than 21 as it has more tens.

Count Objects to 100

Notes and Guidance

To build on skills learned in Year 1, children need to be able to count objects to 100 in words and represent these numbers in numerals.

Problems should be presented in a variety of ways e.g. numerals, words and images. Variation should challenge children by providing them with missing numbers which are non-consecutive.

Mathematical Talk

How can you count the cars?
Do you have a strategy?
What is one more/one less?

Which is the largest number?
Which number is tricky to write in words?

Which numbers sound similar?
How are 17 and 70 different? Can you show me?

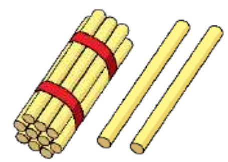
Varied Fluency

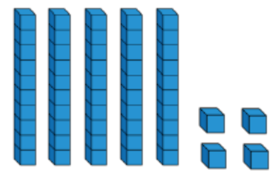
Count and write the number of cars in the car park.

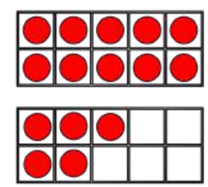
one		three	four			seven	eight		ten	eleven	

There are ______ cars in the car park.

What numbers are represented below?
Write your answer in numerals and words.







Match the numerals to the words.

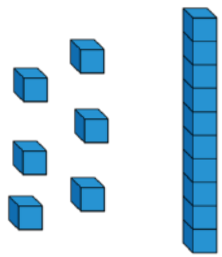
17   48   38   70

thirty-eight   seventy   forty-eight   seventeen

Count Objects to 100

Reasoning and Problem Solving

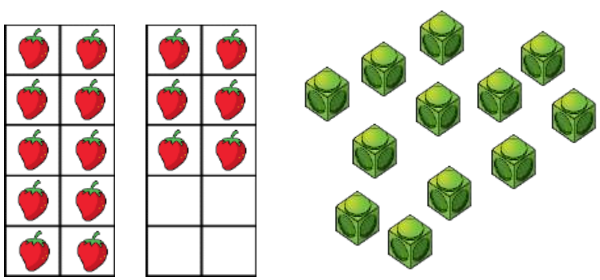
Jack says he has 61
Is he correct?



Explain your reasoning.

Jack is incorrect.
He has 16 not 61

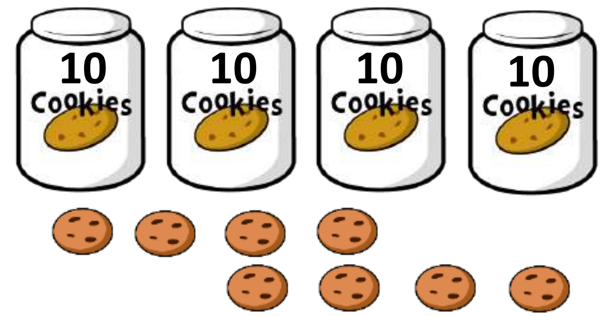
Here are two sets of objects.



Which are easier to count?
Explain your answer.

The strawberries are easier to count because they are set out on ten frames.

Each jar contains 10 cookies.



How many cookies are there altogether?

Write your answer in numerals and words.

What strategy did you use?

Did your partner use a different method?

What is the best strategy to use?

There are 48 (forty-eight) cookies altogether.

Children may count in 10s and 1s or know that there are 4 tens which are equal to 40 and then count on 8 more.

Represent Numbers to 100

Notes and Guidance

Children need to be able to represent numbers to 100 using a range of concrete materials, such as bead strings, straws, Base 10 equipment etc.

Children should also be able to state how a number is made up. For example, they can express 42 as 4 tens and 2 ones or as 42 ones.

Mathematical Talk

How have the beads been grouped? How does this help you count?

Can you show me the tens/ones in the number?

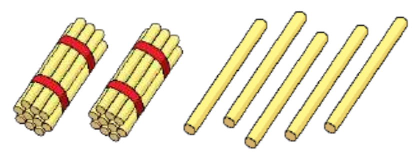
Which resource do you prefer to use for larger numbers? Which is quickest? Which would take a long time?

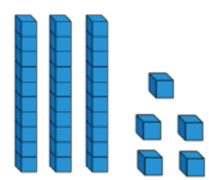
Varied Fluency

- Here is part of a bead string.

Complete the sentences.
There are ______tens and ______ones.
The number is ______.
Represent 45 on a bead string and complete the same sentence stems.

- Match the number to the correct representation.





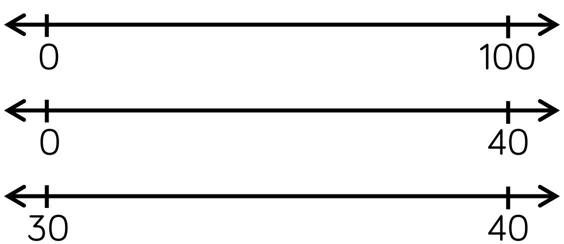
One ten and five ones
Thirty-five
25

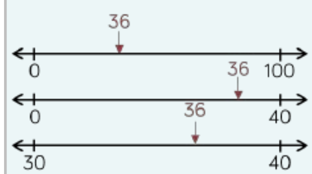
- Represent 67 in **three different** ways.

Represent Numbers to 100

Reasoning and Problem Solving

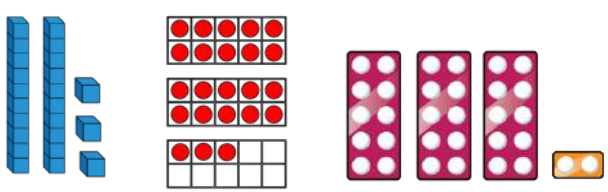
Where would 36 go on each of the number lines?





One of these images **does not** show 23
Can you explain the mistake?

A B C



C does not show 23, it shows 32
They have reversed the tens and ones.

How many two digit numbers can you make using the digit cards?

7 0 2

70, 20, 72, 27

What is the largest number?
Prove it by using concrete resources.

The largest number is 72

What is the smallest number?
Prove it by using concrete resources.

The smallest number is 20

Why can't the 0 be used as a tens number?

Because it would make a 1 digit number.

Tens and Ones (1)

Notes and Guidance

Children should have an understanding of what each digit represents when partitioning a number.

It is important that children can partition numbers in a variety of ways, not just as tens and ones. For example, 58 is made up of 5 tens and 8 ones or 4 tens and 18 ones, or 2 tens and 38 ones, etc.

Mathematical Talk

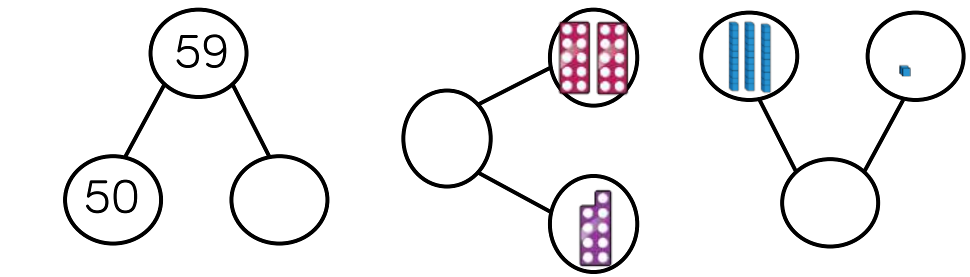
Which part do we know? How can we use the whole and part to work out the missing part?

Can you use concrete resources/draw something to help you partition?

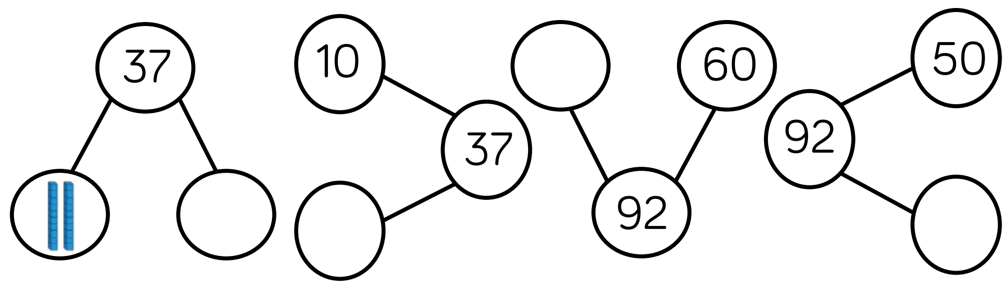
How can you rearrange the counters to help you count the lemon and strawberry cupcakes?

Varied Fluency

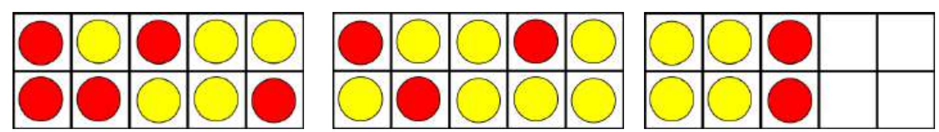
- Complete the part-whole models.



- Complete the part-whole models.



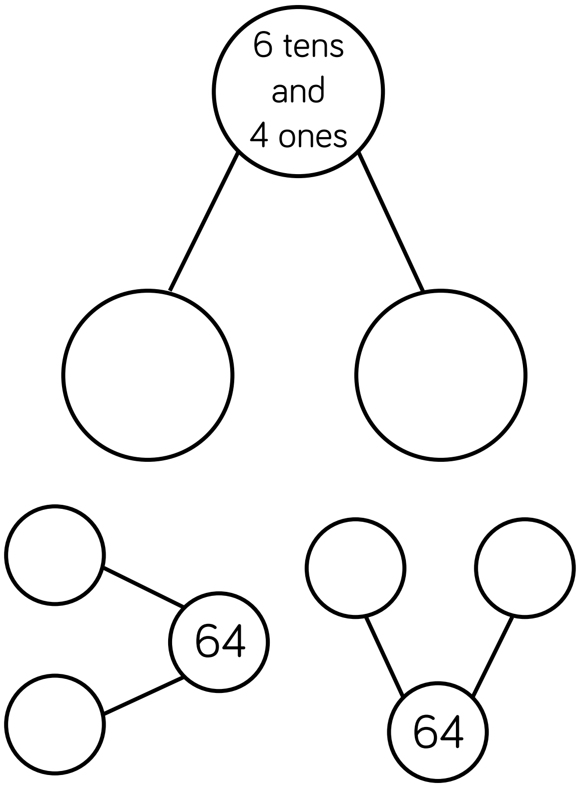
- The ten frames represent lemon and strawberry cupcakes.
Draw a part-whole model to show how many cupcakes there are altogether.

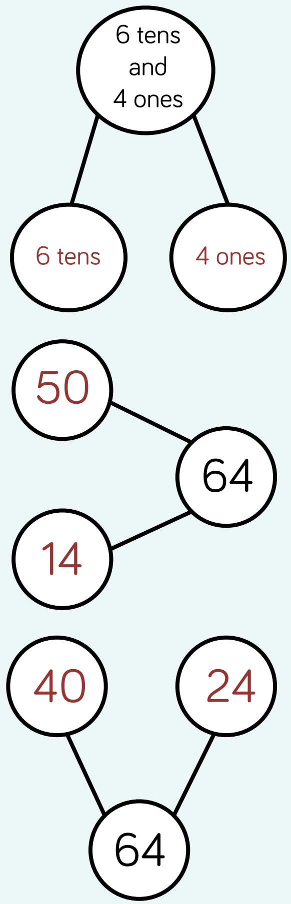


Tens and Ones (1)

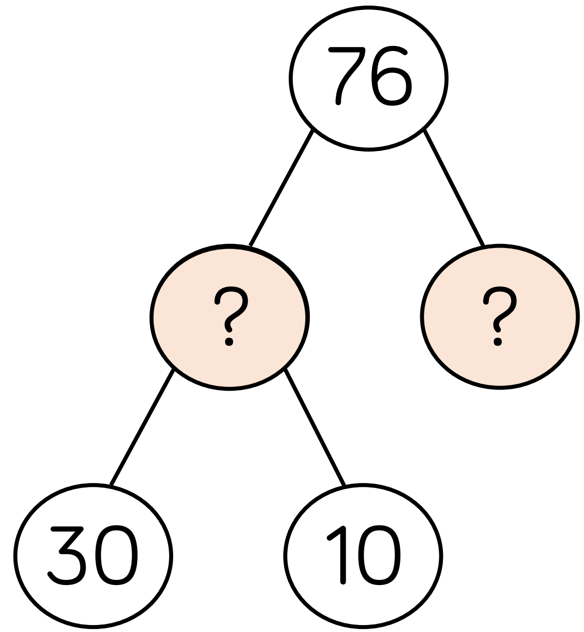
Reasoning and Problem Solving

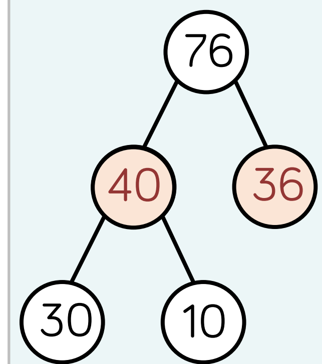
Complete each part-whole model in a **different** way.





Complete the extended part-whole model.





Tens and Ones (2)

Notes and Guidance

Children continue to use a part-whole model to explore how tens and ones can be partitioned and recombined to make a total.
Children will see numbers partitioned in different ways. For example, 39 written as 20 + 19
This small step will focus on using the addition symbol to express numbers to 100. For example, 73 can be written as 70 + 3 = 73

Mathematical Talk

What clues are there in the calculations? Can we look at the tens number or the ones number to help us?

What number completes the part-whole model?

What is the same/different about the calculations?

What are the key bits of information? Can you draw a diagram to help you?

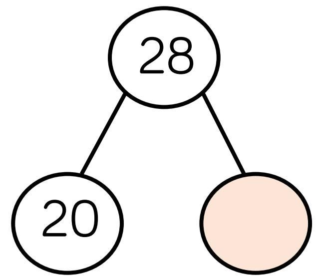
Varied Fluency

Match the number sentence to the correct number.

20 + 19	10 + 4	40 + 0	80 + 1

40	14	81	39

Complete the part-whole model and write four number sentences to match.



_____ + _____ = _____
_____ + _____ = _____
_____ = _____ + _____
_____ = _____ + _____

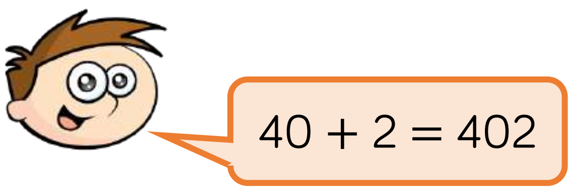
Dora has 20 sweets and Amir has 15 sweets.
Represent the total number of sweets:

- With concrete resources.
- In a part-whole model.
- As a number sentence.

Tens and Ones (2)

Reasoning and Problem Solving

Teddy thinks that,



Explain the mistake he has made.

Can you show the correct answer using concrete resources?

40 + 2 = 42
Teddy has just combined the numbers to make 402 without thinking about their place value.

Fill in the missing numbers.

1 ten + 3 ones = 13

2 tens + ___ ones = 23

3 tens + 3 ones = ____

___ tens + 3 ones = 43

What would the next number in the pattern be?

1 ten + 3 ones = 13
2 tens + 3 ones = 23
3 tens + 3 ones = 33
4 tens + 3 ones = 43

5 tens + 3 ones = 53

Place Value Charts

Notes and Guidance

Children should formally present their work in the correct place value columns to aid understanding of place value.

It is important for children to use concrete, pictorial and abstract representations in their place value chart.

Mathematical Talk

How many tens are there?

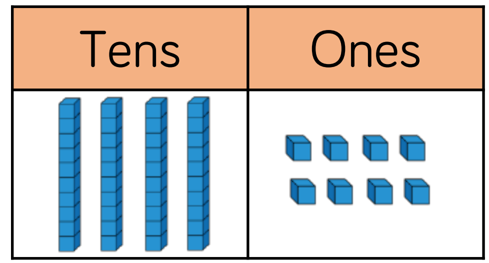
How many ones are there?

What is different about using Base 10 to using place value counters?

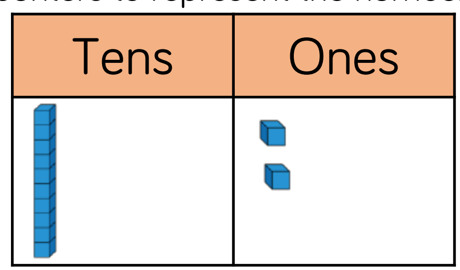
Can you write any other number sentences about the place value chart?

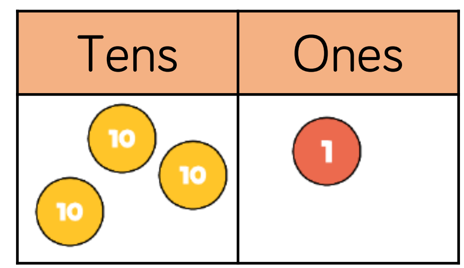
Varied Fluency

- What number is represented in the place value chart?



- Complete the place value chart using Base 10 and place value counters to represent the number 56





- What number is represented in the place value chart?

Tens	Ones
9	1

Write two different number sentences for this number.

____ + ____ = ____

____ = ____ + ____

Place Value Charts

Reasoning and Problem Solving

How many two digit numbers can you make that have the same number of tens and ones?

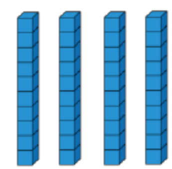
Show each one on a place value chart.

Tens	Ones

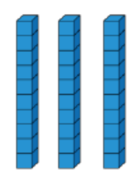
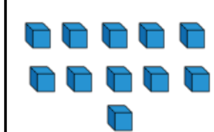
There are nine possibilities:
11, 22, 33, 44, 55, 66, 77, 88, 99

Do both place value charts show the same value?

A

Tens	Ones
	

B

Tens	Ones
	

What is the same?

What is different?

Yes, they both have the same value of 41

$40 + 1 = 41$

$30 + 11 = 41$

Same: Both A and B show 41

Different: There are a different number of tens and ones in each place value chart.

Compare Objects

Notes and Guidance

Comparing objects is introduced once children have a secure understanding of numbers in a place value chart.

Children are expected to compare a variety of objects using the vocabulary ‘more than’, ‘less than’ and ‘equal to’ and the symbols <, >, =

Mathematical Talk

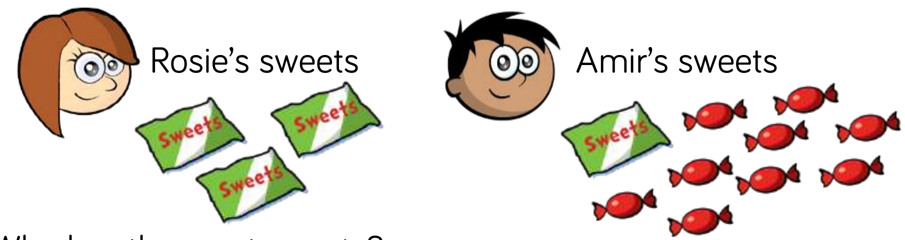
How can you arrange the objects to make them easy to compare?

Do groups of ten help you count? Why?

Do groups of ten help you compare? Why?

Varied Fluency

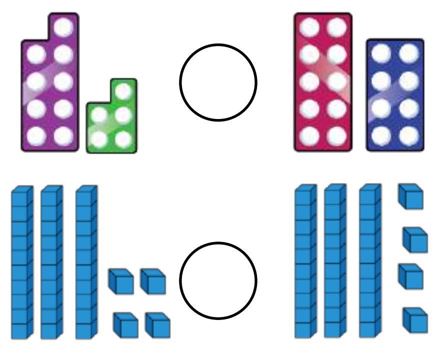
- A packet of sweets contain 10 sweets.

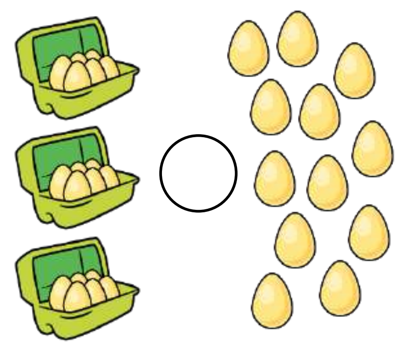


Who has the most sweets?

- Use cubes to show that:
  - Eleven is less than fifteen
  - 19 is greater than 9
  - 2 tens is equal to 20

- Use <, > or = to complete.



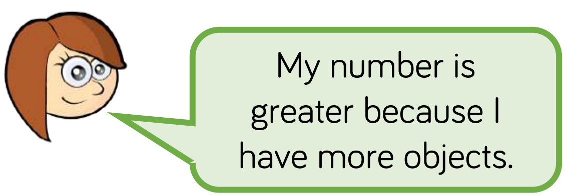


Compare Objects

Reasoning and Problem Solving

Rosie and Amir are comparing numbers they have made.

Rosie's number Amir's number

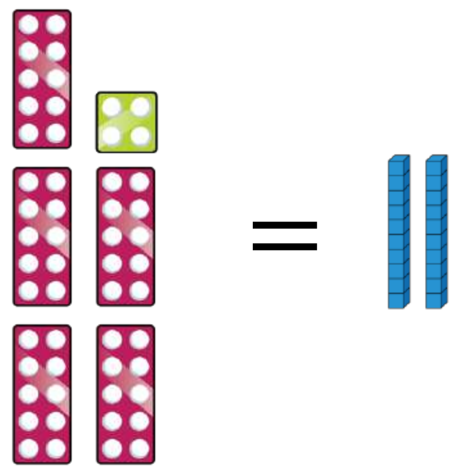


Is Rosie correct?

Explain your answer.

Rosie is incorrect because Amir has 4 tens which makes 40 and Rosie has 3 tens and 6 ones which makes 36, therefore Amir has more.

Add more Base 10 to make the number shapes and the Base 10 equal.



How much did you add in total to make them equal?

What is the smallest amount you could add if the symbol changed to <?

Children should add 3 tens and 4 ones to make 54 on both sides.

If the symbol changed to < the smallest amount they could add is 3 tens and 5 ones.

Compare Numbers

Notes and Guidance

Children compare numbers using the language greater than, less than, more than, fewer, most, least and equal to.

They are able to use the symbols <, > and = to write number sentences.

Children should have access to concrete resources to help them justify their answers.

Mathematical Talk

Can you prove your answers using concrete resources?

Can you prove your answers by drawing a diagram?

Is there more than one answer?

Do you need to work the number sentences out to decide which is greater?

Varied Fluency

- Complete the statements using **more than**, **less than** or **equal to**.

  42 is ________________ 46

  81 is ________________ 60 + 4

  30 + 8 is _____________ thirty-eight

- Complete the number sentences.

  4 tens and 9 ones > ________________

  ______________ < 70 + 5

  ______________ = eight tens

- Put <, > or = in each circle to make the statements correct.

  28 ◯ 30

  90 ◯ 70 + 28

  30 + 23 ◯ 40 + 13

  20 + 14 ◯ 24

Compare Numbers

Reasoning and Problem Solving

How many different numbers can go in the box?

$$13 < \boxed{} < 20$$

There are six different numbers: 14, 15, 16, 17, 18, 19

True or False?

One ten and twelve ones is bigger than 2 tens.

Explain how you know.

True
One ten and twelve ones = 22
Two tens = 20

Eva says,

When comparing numbers, the number with the highest number of ones is always the bigger number.

Do you agree?
Give some examples to support your answer.

Disagree, for example 19 is smaller than 21

Order Objects and Numbers

Notes and Guidance

Children order numbers and objects from smallest to greatest or greatest to smallest.
They should be encouraged to use concrete or pictorial representations to prove or check their answers.
Children use the vocabulary 'smallest' and 'greatest' and may also use the < or > symbols to show the order of their numbers.

Mathematical Talk

How does the number line help you order the numbers?

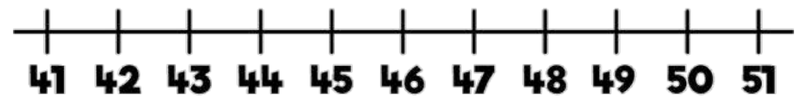
How does Base 10 prove that your order is correct?

How did you know which of the diagrams represented the smallest/greatest number?

Did you look at the tens or ones?

Varied Fluency

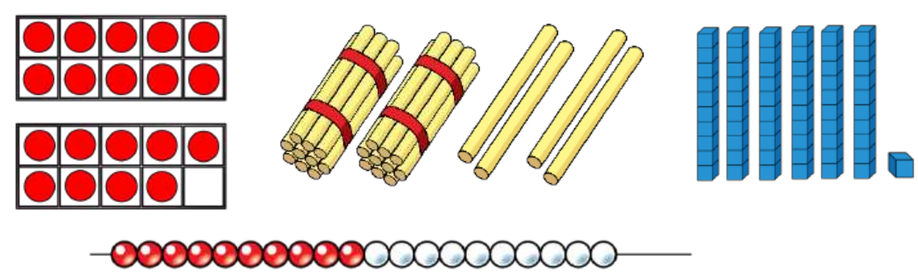
- Circle the numbers 48, 43 and 50 on the number line.



Put the numbers 48, 43 and 50 in order starting with the smallest.

- Use Base 10 to make the numbers sixty, sixteen and twenty-six. Write the numbers in order starting with the greatest number.

- The diagrams represent different numbers.



Circle the greatest number.
Circle the smallest number.
Complete the number sentence _____ > _____

Order Objects and Numbers

Reasoning and Problem Solving

Order the numbers below.
Which would be the fourth number?

33 53 37

29 34 43

Explain how you ordered them.

If I ordered them from smallest to largest:
29, 33, 34, 37, 43, 53 then 37 would be the fourth number.

Alternatively, if I order the numbers from largest to smallest:
53, 43, 37, 34, 33, 29 then 34 would be the fourth number.

Mo has written a list of 2-digit numbers.

The digits of each number add up to five.
None of the digits are zero.

Can you find all the numbers Mo could have written?

Write the numbers in order from smallest to largest.

What strategy did you use?

14, 23, 32, 41

Count in 2s

Notes and Guidance

Children build on their previous knowledge of counting in multiples of 2 and go beyond 20 up to 50

They will apply previous learning of one more and one less to counting forwards and backwards in twos. For example, two more than and two less than. The 1-50 grid can be used to spot and discuss patterns that emerge when counting in 2s.

Mathematical Talk

How can we count the pairs?
What does it mean to count in pairs?

Can we use tens frames to help us count in 2s?
Can you see any patterns when you count in 2s?

Varied Fluency

R

- How many socks are there?

There are ___ socks in total.

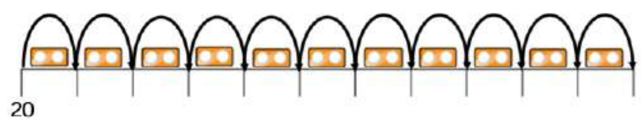
How many gloves are there?

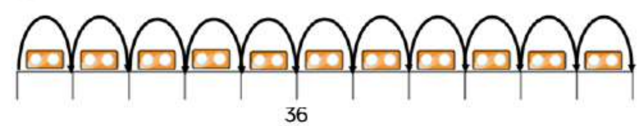
There are ___ gloves in total.
Represent the gloves using ten frames.

- Continue colouring in 2s on the grid. What do you notice?

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

- Complete the number lines by counting in 2s.



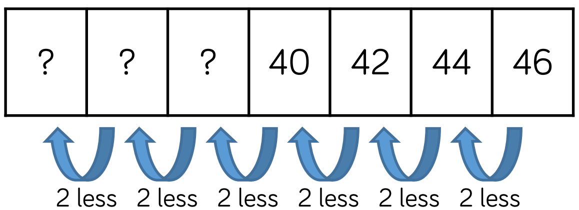


Count in 2s

Reasoning and Problem Solving

R

Count in 2s backwards to complete the number track.

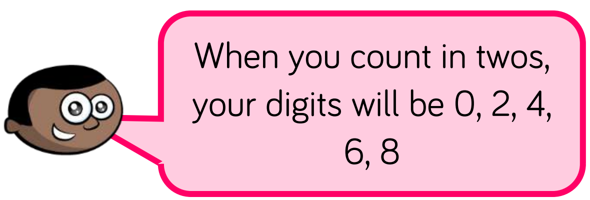


If you continue counting, will you say the number 25?

38, 36, 34

Possible answer:
Children will not say 25 because it is not a multiple of 2, they will say 28, 26, 24 and 22

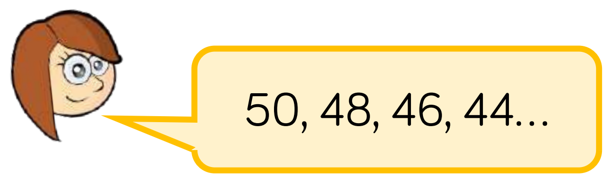
Always, sometimes, never…

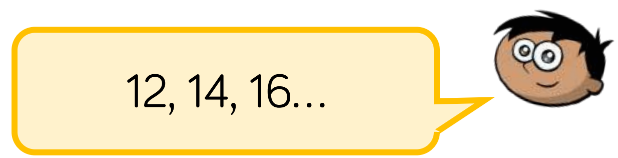


Prove it!

Sometimes. It depends on your starting number.
For example 1, 3, 5…
Also for 12, 14, 16, the tens digit is 1

Rosie counts back from 50 in 2s.
Amir counts up from 12 in 2s.





They say their numbers together.
Who will say 30 first.

Rosie says 11 numbers to reach 30
Amir says 10 numbers to reach 30
So Amir will get there first.

Count in 5s

Notes and Guidance

Children build on previous learning of counting in fives to go beyond 20 and up to 50

The 1-50 grid can be used to spot and discuss patterns that emerge when counting in 5s.

Mathematical Talk

How can we count the groups of 5?

Can you describe the pattern when you count in 5s?

Will _____ appear on our number line? Why/why not?

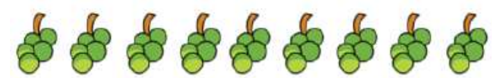
Varied Fluency

R

- How many fish are there?

There are ___ fish in each tank.
There are ___ tanks.
There are ___ fish altogether.

How many grapes are there?

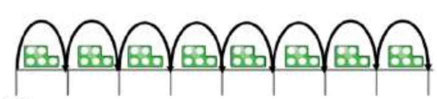


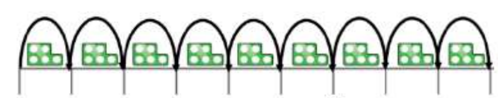
There are ___ grapes in each bunch.
There are ___ bunches.
There are ___ grapes altogether.

- Continue counting in 5s on the grid.

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

- Complete the number lines by counting in 5s.



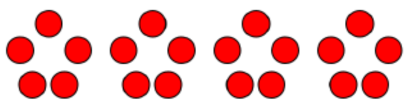


Count in 5s

Reasoning and Problem Solving

R

Amir is making this flower pattern with counters.



Annie says,

If you make 9 flowers, you will use 43 counters.

Do you agree with Annie?
Explain your answer.

Annie is wrong because 43 does not end in a 5 or a 0

If she makes 9 flowers she will use 45 counters.

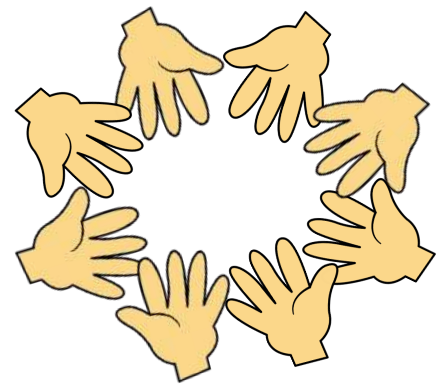
Odd One Out

25 27 30 45

Which is the odd one out? Explain your answer.

27 because you would not count it if you were counting in 5s. Children also may give other responses.

Work in groups.
Create a circle with your hands. You can choose to put in one hand or both hands.



Count how many fingers and thumbs you can see altogether.

Can you predict how many? Count to check.

Children can practise counting in 5s and recognise one hand is worth 5
They may start to spot patterns and reason about how many there will be.

Count in 10s

Notes and Guidance

Children count in groups of tens for the first time. Previously they have counted in 2s and 5s.
They use pictures, bead strings and number lines to support their counting.

Counting in 10s on a hundred square will also support children to see the similarities between the numbers when we count in tens.

Mathematical Talk

How many birds/flowers are there in total?

How can we use our number lines to help us count them?

Will _____ appear on our number line? Why?

What is the same about all the numbers we say when we are counting in tens?

Varied Fluency

R

- How many birds are there altogether?

There are _____ birds in each tree.
There are _____ trees.
There are _____ birds altogether.

- How many flowers are there altogether?

There are _____ flowers in each bunch.
There are _____ bunches.
There are _____ flowers altogether.

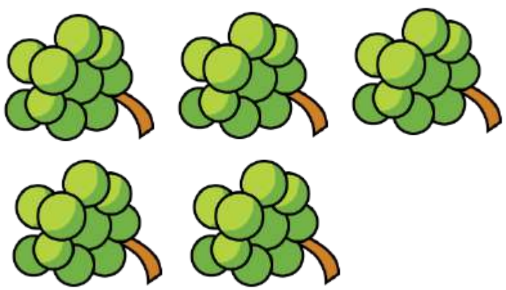
- Use a 0-100 bead string to count in tens.
Can we count forwards and backwards in tens?

Can we count in tens on a number track as well?
How does this match counting on a bead string?

Count in 10s

Reasoning and Problem Solving

In a shop, grapes come in bunches of 10



Max wants to buy forty grapes.

Are there enough grapes?

Yes there are enough grapes. There are fifty grapes and Max only needs forty.

Jemima is counting in 10s on part of a 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

She starts at 10

Shade in all the numbers Jemima will say.

What is the same about the numbers she says?

What is different about the numbers?

Jemima will say 10, 20, 30, 40 and 50

All the numbers have the same ones digit (0)

They all have different tens digit. The tens digit goes up by 1 for each new number she says.

Count in 3s

Notes and Guidance

Children count forwards and backwards in 3s from any multiple of 3

Encourage children to look for patterns as they count and use resources such as a number track, a counting stick and concrete representations.

Mathematical Talk

What do you notice about the numbers?

Are the numbers in the sequence getting larger or smaller?

Can you spot a pattern?

What are you counting up in?

Varied Fluency

What do you notice about the numbers that are circled?
Continue the pattern.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Complete the number sequences.

15		9	6		0
		27	24		18

Amir has 15 stickers. He collects 3 more each day.
Complete the number track to show how many he will have in six days.

15						

Count in 3s

Reasoning and Problem Solving

True or False?

I start at 0 and count in 3s
I say the number 14

Explain your answer.

False.
If I count in 3s I say 3, 6, 9, 12, 15....

Teddy is counting in 2s and Jack is counting in 3s.

Teddy	2	4	6	8
Jack	3	6	9	12
+				

Teddy says,

If we add our numbers together as we count we can make a new number pattern.

What pattern do they make?
What happens if both Teddy and Jack count in 5s and they add them together to make a new pattern?

If Teddy and Jack add their numbers together they will be counting in 5s.

If Teddy and Jack both count in 5s their new pattern would be counting in 10s.

White Rose Maths

Autumn - Block 2

Addition & Subtraction

Overview

Small Steps

- Fact families – addition and subtraction bonds to 20
- Check calculations
- Compare number sentences
- Related facts
- Bonds to 100 (tens)
- Add and subtract 1s
- 10 more and 10 less
- Add and subtract 10s
- Add by making 10 R
- Add a 2-digit and 1-digit number – crossing ten
- Subtraction - crossing 10 R
- Subtract a 1-digit number from a 2-digit number – crossing ten
- Add two 2-digit numbers – not crossing ten – add ones and add tens
- Add two 2-digit numbers – crossing ten – add ones and add tens

Notes for 2020/21

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

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

Overview

Small Steps

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

Notes for 2020/21

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

Fact Families

Notes and Guidance

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

Mathematical Talk

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

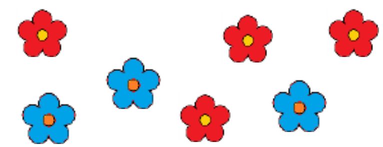
Does it change the answer if we add the blue and red flowers in a different order?

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

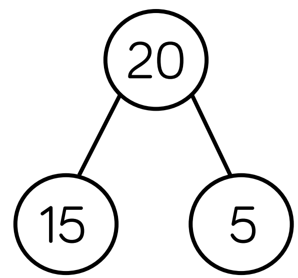
How many different number sentences are there in the fact family?

Varied Fluency

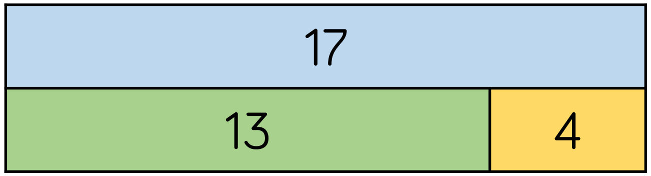
- Using concrete apparatus, can you talk about the relationships between the different flowers?



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



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



Fact Families

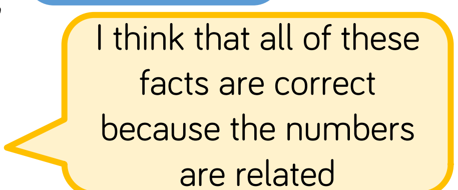
Reasoning and Problem Solving

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

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

8	−	5	=	3
8	−	3	=	5
8	=	5	−	3
3	=	8	−	5

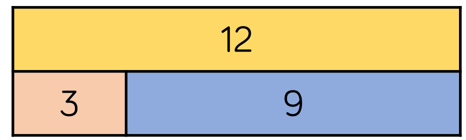
Rosie says,



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

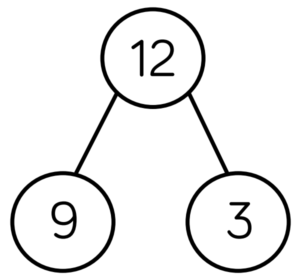
Ron is correct because 8 is not equal to $5 - 3$

Which of the representations are equivalent to the bar model?

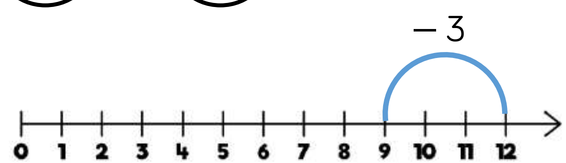


$12 = 9 + 3$

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



$9 - 3 = 12$



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

Check Calculations

Notes and Guidance

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

Mathematical Talk

What resources could you use to check your calculation?

Can you check it in more than one way?

Why do we need to check our calculation?

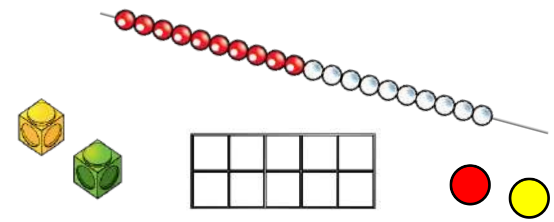
Is there another way you could represent this?

Varied Fluency

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

  $12 - 4 = 8$

  $7 + 8 = 15$



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

17	
12	5

  How many possible inverse calculations are there?

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

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

Check Calculations

Reasoning and Problem Solving

Eva did the following calculation:

$$12 - 8 = 4$$

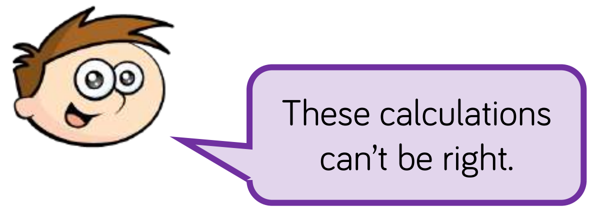
She checked it by using the inverse.

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

What advice would you give her?

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

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



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

How might he know?

What errors have been made in each calculation?

All of the calculations involve errors:

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

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

18 and 3 have been added instead of subtracted.

White Rose Maths

Compare Number Sentences

Notes and Guidance

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

Mathematical Talk

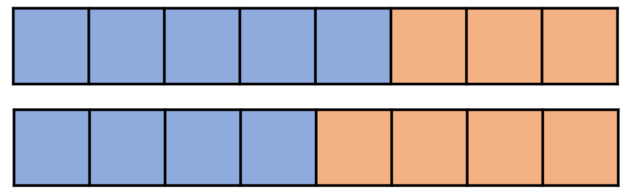
What other numbers make the same total?

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

Do you notice a pattern? What would come next?

Varied Fluency

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



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

$6 + 4$ ◯ $6 + 5$

$6 + 4$ ◯ $3 + 6$

$11 - 4$ ◯ $12 - 5$

$11 - 4$ ◯ $12 - 4$

- Complete the missing numbers.

5 + 3 = 6 + ______

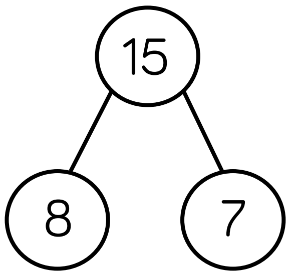
5 + 3 = ______ + 6 = 7 + ______

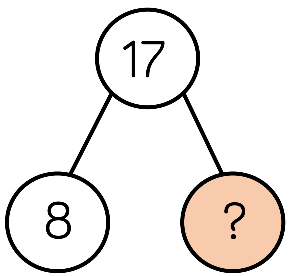
______ + 3 = ______ + 4 = 5 + 5

Compare Number Sentences

Reasoning and Problem Solving

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





Can you explain how this could be possible?

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

The missing number must be 9

Both missing numbers are less than 10

$$7 + \boxed{} < 7 + \boxed{}$$

How many different possible answers can you find?

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

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

Related Facts

Notes and Guidance

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

Mathematical Talk

What is the same? What is different?

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

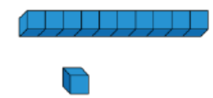
What do you notice about the part-whole models?

Is there a relationship between the numbers that are represented?

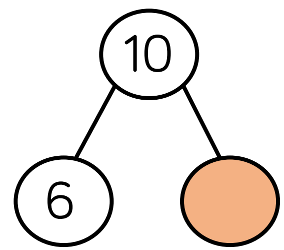
Varied Fluency

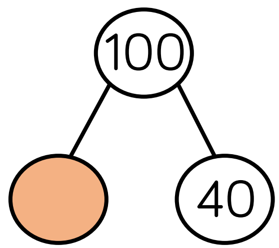
- I have 3 blue pens and 4 black pens. Altogether I have 7 pens. Tommy has 30 blue pens and 40 black pens. How many pens does he have in total?

  Use concrete apparatus to show your thinking.



- Complete the part-whole models below:





- Find the missing numbers in the related facts.

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

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

Related Facts

Reasoning and Problem Solving

Continue the pattern.

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

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

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

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

The digits are the same but the place value changes.

Alex says,

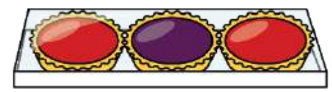
If I know $9 + 1 = 10$, I can work out $90 +$ ___ $= 100$

Find the missing number and explain how Alex knows.

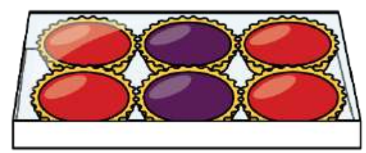
10

All the numbers are ten times greater.

Whitney has 3 jam tarts.



Tommy has 6 jam tarts.



Altogether they have 9 jam tarts.

$3 + 6 = 9$
So
___ + ___ $= 90$

What if all of the red jam tarts are eaten?

What if all of the purple jam tarts are eaten?

$30 + 60 = 90$

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

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

Bonds to 100 (Tens)

Notes and Guidance

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

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

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

Mathematical Talk

What does the word multiple mean?

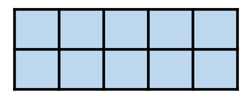
What does the blue represent? What does the yellow represent?

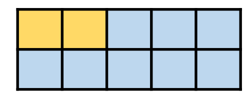
Why is it different to a normal 10 frame?

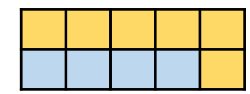
What patterns can you see? How does this help us to make up our own?

Varied Fluency

- Match the 10 frames to the sentences below:







One hundred equals eighty plus twenty

$100 = 100 + 0$

$40 + 60 = 100$

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

$2 + 6 = 8$

$20 + 60 =$ _____

2___ + ___0 = 80

80 = ___0 + 6___

- Continue the pattern

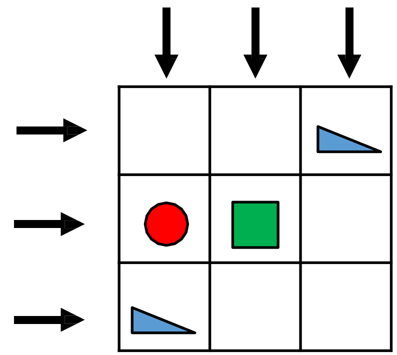
$90 = 100 - 10$
$80 = 100 - 20$

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

Bonds to 100 (Tens)

Reasoning and Problem Solving

Eva thinks there are 10 different number bonds to 90 using multiples of 10 Amir thinks there are only 5 Who is correct? Can you help the person who is wrong to understand their mistake?	Amir because 0 + 90 is the same as 90 + 0 Eva has repeated her answers – the multiples have been written the opposite way around.
Using multiples of 10, how many number bonds are there for the following numbers? 20 30 40 50 What do you notice about the amount of bonds for each number? If 80 has 5 bonds, predict how many 90 would have.	20 and 30 both have 2 40 and 50 both have 3 When the tens digit is odd it has the same number of bonds as the previous tens number. 90 would also have 5

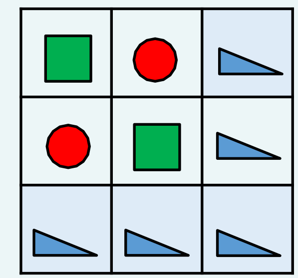


Squares are worth 10
Triangles are worth 20
Circles are worth 30

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

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

Solution



Lots of possible solutions available.

Add and Subtract 1s

Notes and Guidance

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

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

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

Mathematical Talk

What happens when we add 2?

What is the link between adding 1 and adding 2?

What about if we want to add 3?

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

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

Varied Fluency

- Create sentences based on the picture.

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

- Continue the pattern

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

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

- Continue the number tracks below.

31			34		

		45			48

				67	

	13				

Add and Subtract 1s

Reasoning and Problem Solving

True or False?

These four calculations have the same answer.

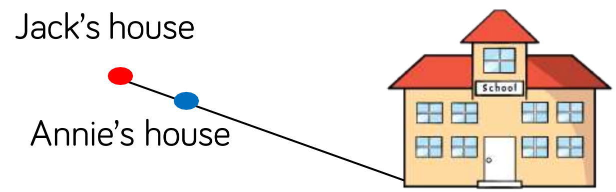
1 + 4 + 2	4 + 2 + 1
2 + 4 + 1	4 + 1 + 2

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

These four calculations have the same answer.

7 – 3 – 2	2 – 3 – 7
3 – 2 – 7	7 – 2 – 3

False, because subtraction isn't commutative.



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

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

1 km

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

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

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

4 km

White Rose Maths

10 More and 10 Less

Notes and Guidance

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

Mathematical Talk

What's the same? What's different?

Will you start with 35 or 55? Why?

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

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

Varied Fluency

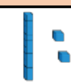
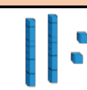
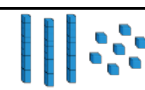
- Continue the number tracks below.

10	20	30			

			35	45	55			

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

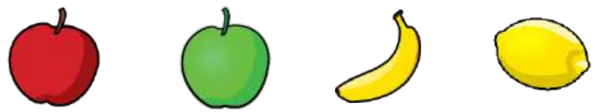
- Using concrete materials, complete the missing boxes.

10 less	Number	10 more
		
2	12	22
		
	37	

10 More and 10 Less

Reasoning and Problem Solving

SALE



15 p 22 p 35 p 68 p

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

What are the new prices?

Red Apple 5 p

Green Apple 12 p

Banana 25 p

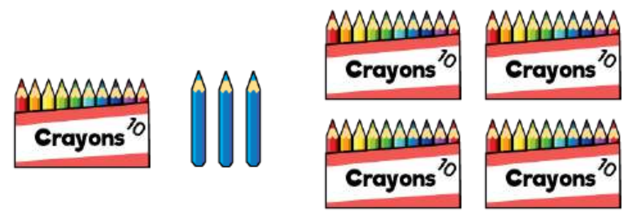
Lemon 58 p

Mo says,

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

Is he correct?
Explain your reasoning.

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



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

How many crayons do they have left?

Explain your reasoning.

43

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

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

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

Add and Subtract 10s

Notes and Guidance

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

For example **6**4 + **2**0 = **8**4

Mathematical Talk

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

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

Why is there a blank ones box?

Which column changes?

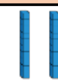
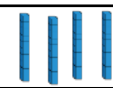
Which column stays the same?

Varied Fluency

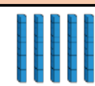
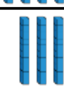
Continue the number track by adding 20 each time.

23				

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

Tens	Ones
	
	

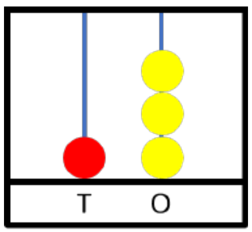
$$\begin{array}{r} 2\ 3 \\ +\ 4\ 0 \\ \hline \\ \hline \end{array}$$

Tens	Ones
	
	

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

Add and Subtract 10s

Reasoning and Problem Solving



Tommy has three spare red beads.

What numbers could he make?
Explain your answer.

23

33

43

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

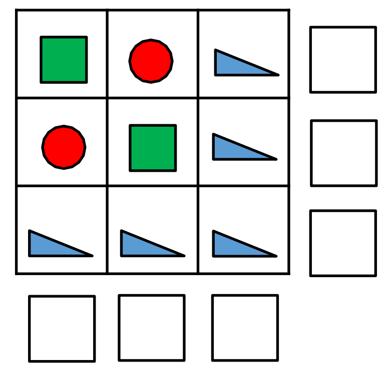
Here are Class 2's crayons.

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

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

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

Answers would be 96 or 76 respectively.



Circles represent 20
Triangles represent 10
Squares represent 50

What is the value of each row and column?

Rows

(top to bottom)

80

80

30

Columns

(left to right)

80

80

30

Add by Making 10

Notes and Guidance

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

Mathematical Talk

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

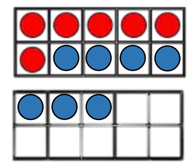
How does using the counters help you to see this strategy?

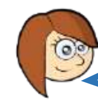
How does using a number line help you to see this strategy?

Varied Fluency

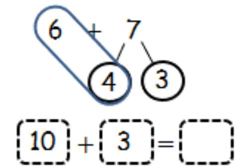
R

- Rosie has used the 10 frames to calculate 6 + 7

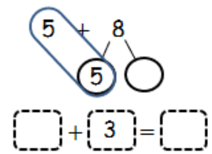


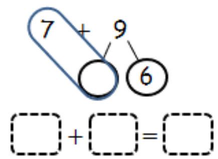


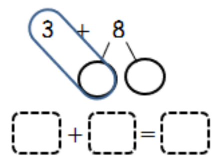
I partitioned the 7 into 4 and 3 so that I could make a full 10



Use Rosie's method to complete:

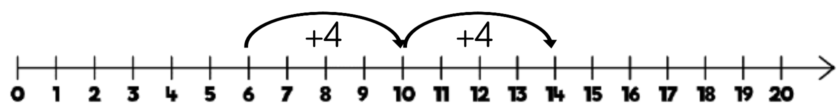






- Mo has used a number line to calculate 6 + 8

I partitioned 8 into 4 and 4 to make it easier.



Use Mo's method to calculate:

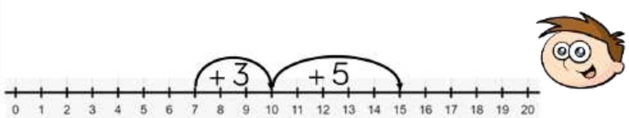
5 + 8 = ☐ 9 + 4 = ☐ 6 + 8 = ☐

Add by Making 10

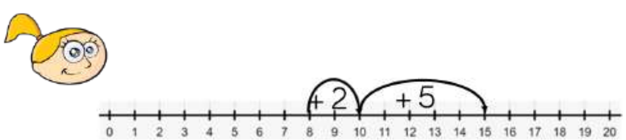
Reasoning and Problem Solving

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

Teddy shows it this way:



Eva shows it this way:



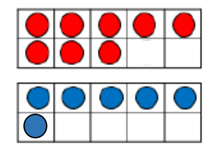
Who is correct?
Explain your answer.

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

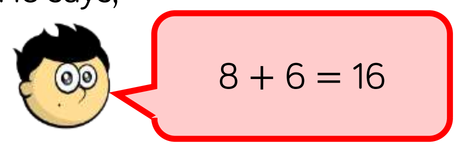
Teddy has started with 7 and partitioned the 8 into 3 and 5 to make 10

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

Dexter uses ten frames to calculate eight plus six.



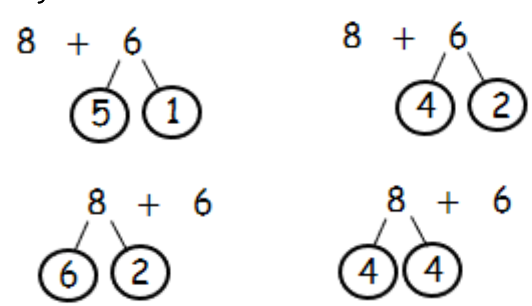
He says,



Do you agree?
Explain why.

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

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



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

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

Add 2-digits and 1-digit

Notes and Guidance

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

Mathematical Talk

Using Base 10, can you partition your numbers?

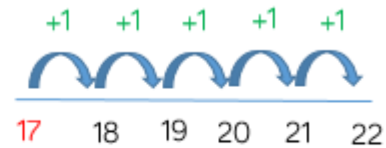
Can we exchange 10 ones for one ten?

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

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

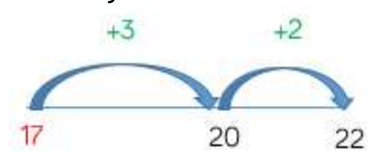
Varied Fluency

- $17 + 5 =$

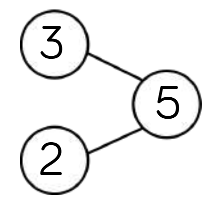


Can you put the larger number in your head and count on the smaller number? Start at 17 and count on 5

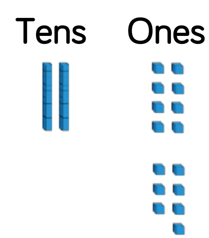
- Can we use number bonds to solve the addition more efficiently?



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



- Find the total of 28 and 7



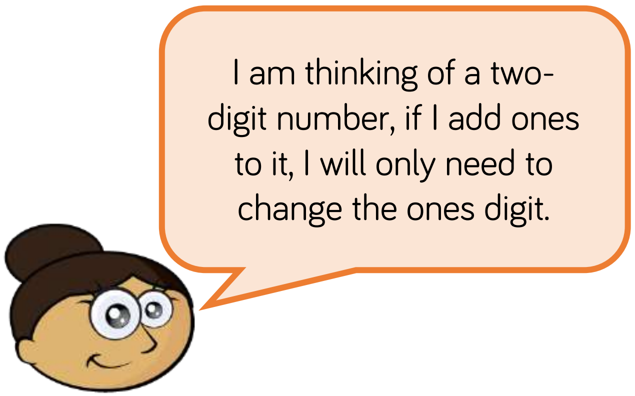
$$\begin{array}{cc} & 2\ 8 \\ + & \ \ 7 \\ \hline & 3\ 5 \\ \hline & 1\ \ \end{array}$$

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

Add 2-digits and 1-digit

Reasoning and Problem Solving

Always, Sometimes, Never



Explain your answer.

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

Here are three digit cards.

6 7 8

Place the digit cards in the number sentence.

How many different totals can you find?

$\square\square + \square =$

What is the smallest total?

What is the largest total?

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

75 is the smallest total.

93 is the largest total.

Subtraction – Crossing 10 (1)

Notes and Guidance

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

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

Children will move towards using this as a mental strategy.

Mathematical Talk

How can you partition a number to help you subtract?

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

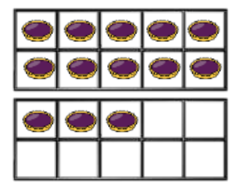
How does using a number line help you to see this strategy?

Can you think of another way to represent this problem?

Varied Fluency

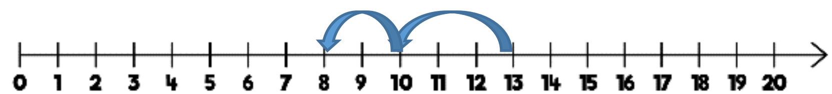
R

First there were 13 jam tarts

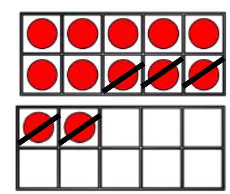


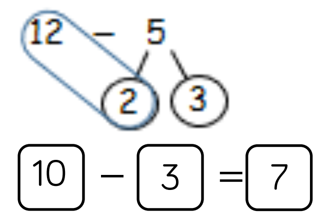
Then 5 were eaten

Now there are 8 jam tarts.

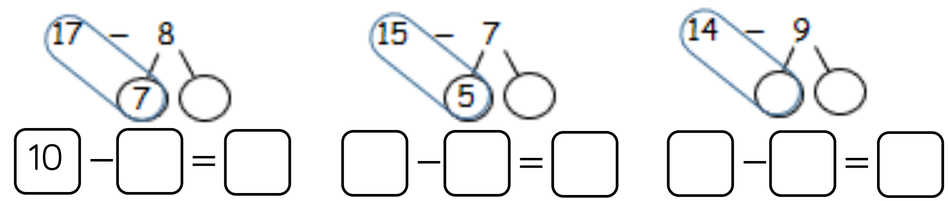


Rosie has used the ten frames to calculate 12 – 5





Use her method to complete:



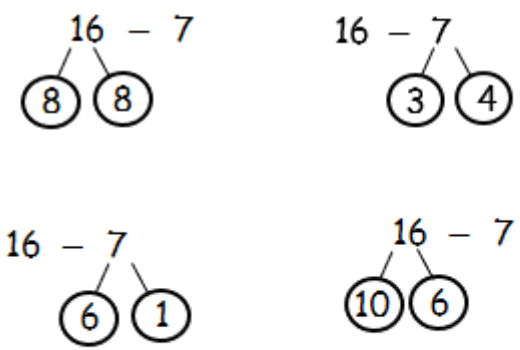
Subtraction – Crossing 10 (1)

Reasoning and Problem Solving

R

Rosie is calculating 16 – 7

Which of these methods is most helpful? Why?



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

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

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

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

15 – 5 = 10 – 1 = 9

Why is Teddy's working out wrong?

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

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

I can do this without working out any answers.

17 – 5 ◯ 12 – 5

14 – 4 ◯ 18 – 8

11 – 7 ◯ 11 – 4

Is Whitney correct? Explain how you know.

17 – 5 > 12 – 5

14 – 4 = 18 – 8

11 – 7 < 11 – 4

Subtract 1-digit from 2-digits

Notes and Guidance

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

Mathematical Talk

Are we counting backwards or forwards on the number line?

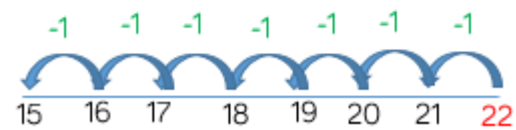
Have we got enough ones to subtract?

Can we exchange a ten for ten ones?

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

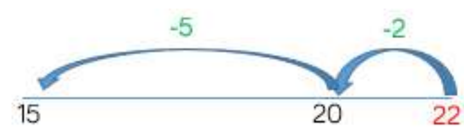
Varied Fluency

- 22 – 7 =

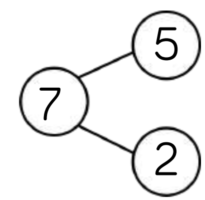


Can you put the larger number in your head and count back the smaller number? Start at 22 and count back 7

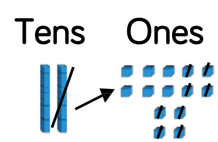
- Can we use number bonds to subtract more efficiently?



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



- Subtract 8 from 24



$$\begin{array}{r} {}^{1}\cancel{2}\,{}^{1}4 \\ -\quad 8 \\ \hline 1\ 6 \\ \hline \end{array}$$

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

Subtract 1-digit from 2-digits

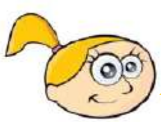
Reasoning and Problem Solving

Jack and Eva are solving the subtraction
23 – 9

Here are their methods:

Jack

I put 9 in my head and counted on to 23



Eva

I put 23 in my head and counted back 9

Who's method is the most efficient?

Can you explain why?

Can you think of another method to solve the subtraction.

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

Mo is counting back to solve 35 – 7

He counts

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

Is Mo correct?

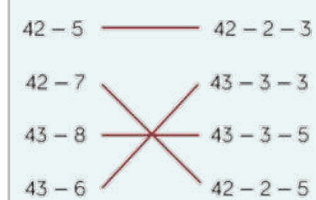
Explain your answer.

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

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

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

42 – 5	42 – 2 – 3
42 – 7	43 – 3 – 3
43 – 8	43 – 3 – 5
43 – 6	42 – 2 – 5



Add 2-digit Numbers (1)

Notes and Guidance

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

Mathematical Talk

Can you partition the number into tens and ones?

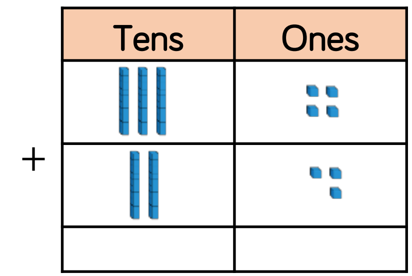
Can you count the ones? Can you count the tens?

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

How could you represent the problem?

Varied Fluency

- Find the sum of 34 and 23

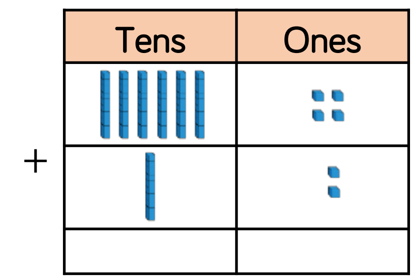


- 64 + 12 = _____

4 ones + 2 ones = _____

6 tens + 1 ten = _____

_____ tens + _____ ones = _____



- Mo has 41 sweets. Whitney has 55 sweets.

How many sweets do they have altogether?

Add 2-digit Numbers (1)

Reasoning and Problem Solving

Annie has 12 marbles.

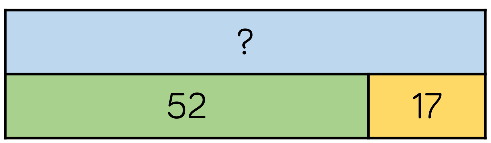
Ron has 13 marbles more than Annie.

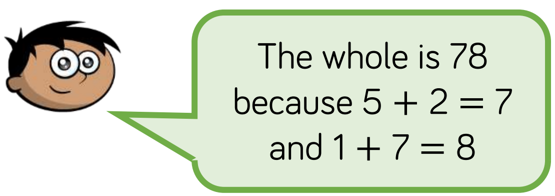
How many marbles do they have altogether?

Ron has 25 marbles.

Altogether they have 37 marbles.

Amir has been asked to complete the bar model.





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

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

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

What digits could go in the boxes?

$$\square 2 + \square 5 = 87$$

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

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

Add 2-digit Numbers (2)

Notes and Guidance

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

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

Mathematical Talk

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

Varied Fluency

- 64 + 17 = ____

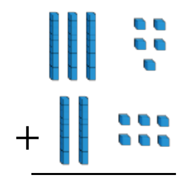
  4 ones + 7 ones = ____

  6 tens + 1 ten = ____

  ____ tens + ____ ones = ____

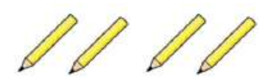
$$\begin{array}{r} 64 \\ +\ 17 \\ \hline 11 \\ +\ 70 \\ \hline 81 \end{array}$$

- Find the sum of 35 and 26



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

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



  How many pencils do they have altogether?

Add 2-digit Numbers (2)

Reasoning and Problem Solving

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

Find all the possible pairs of numbers that can complete the addition. $\begin{array}{r} \boxed{1}\,\boxed{} \\ +\ \boxed{2}\,\boxed{} \\ \hline \boxed{4}\,\boxed{2} \\ {\scriptstyle 1}\phantom{\boxed{0}} \end{array}$ How do you know you have found all the pairs? What is the same about all the pairs of numbers?	13 + 29 19 + 23 14 + 28 18 + 24 15 + 27 17 + 25 16 + 26 All the pairs of ones add up to 12

Subtract with 2-digits (1)

Notes and Guidance

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

Mathematical Talk

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

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

What are the numbers worth? Tens or ones?

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

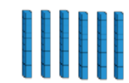
Varied Fluency

78 minus 34 = _____

8 ones – 4 ones = _____

7 tens – 3 tens = _____

We have _____ tens and _____ ones.

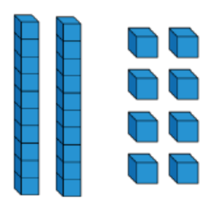
Tens	Ones
	

34 – 13 = _____

34
30 4
–10 –3
20 1

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

Subtract 13 from 28



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

Subtract with 2-digits (1)

Reasoning and Problem Solving

Annie has 33 stickers. Dexter has 54 stickers. How many more stickers does Dexter have? What method did you use to solve the problem?	Here the children are working out the difference. Children might use subtraction to solve the problem or they might count on to find the difference. Dexter has 21 more stickers than Annie.
Find the missing numbers. $\begin{array}{r} \boxed{6}\,\boxed{} \\ -\ \boxed{2}\,\boxed{} \\ \hline \boxed{4}\,\boxed{2} \end{array}$ Is this the only possible solution? Explain your answer. Make the numbers using Base 10 to help you find your answer.	9 and 7 8 and 6 7 and 5 6 and 4 5 and 3 4 and 2 3 and 1 2 and 0

Subtract with 2-digits (2)

Notes and Guidance

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

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

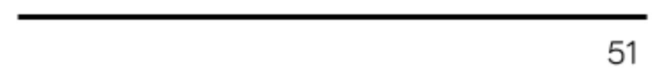
The skill of flexible partitioning is useful here when the children are calculating with exchanges.

Mathematical Talk

Have we got enough ones to take away?
Can we exchange one ten for ten ones?
How many have we got left?
What is the difference between the numbers?
Do we always need to subtract the ones first? Why do we always subtract the ones first?
Which method is the most efficient to find the difference, subtraction or counting on?

Varied Fluency

- Use the number line to subtract 12 from 51



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

- $42 - 15 =$

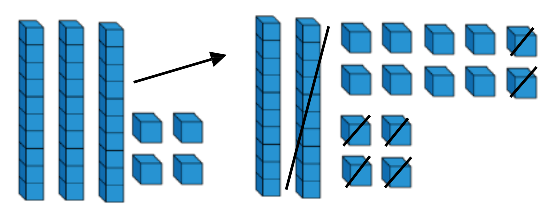
42
40 2
-10 -5

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

42
30 12
-10 -5
20 7

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

- Take 16 away from 34



$$\begin{array}{r} \overset{2}{\cancel{3}}\,{}^{1}4 \\ -\ 1\ 6 \\ \hline 1\ 8 \\ \hline \end{array}$$

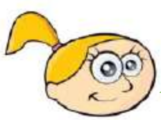
Subtract with 2-digits (2)

Reasoning and Problem Solving

Eva and Whitney are working out some subtractions.

I am working out
74 – 56

Whitney



Eva

One of my numbers in my question is 15

Whitney's answer is double Eva's answer.

What could Eva's subtraction be?

Whitney's answer is 18

Eva's answer is 9

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

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

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

13

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

18

Explain your answer.

Find & Make Number Bonds

Notes and Guidance

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

Mathematical Talk

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

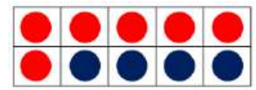
What number bond can we see? How does this help us find the number bond to 20?

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

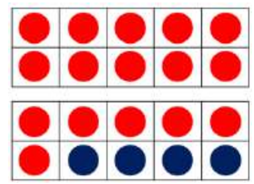
Varied Fluency

R

What number bond is represented in the pictures?

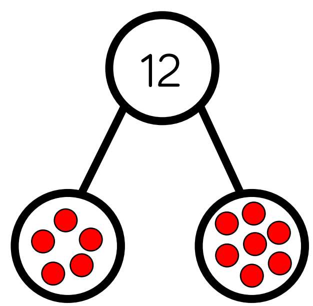


There are ___ red counters.
There are ___ blue counters.
Altogether there are ___ counters.
___ + ___ = ___ ___ + ___ = ___



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

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



12 = 12 + 0
12 = 11 + ____
12 = 10 + ____

Find & Make Number Bonds

Reasoning and Problem Solving

Use equipment to represent each of the calculations below.

What is the same?
What is different?

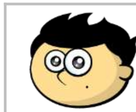
$$7 + 3 = 10$$

$$17 + 3 = 20$$

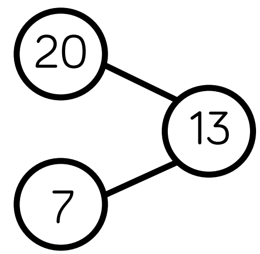
$$20 = 7 + 13$$

Explain your thinking.

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



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



Can you spot his mistake?

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

True or false?

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

Prove it – can you use a systematic approach?

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

Bonds to 100 (Tens and Ones)

Notes and Guidance

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

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

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

Mathematical Talk

How many more do we need to make 100?

How many tens are in 100?

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

Can you make the number using Base 10?

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

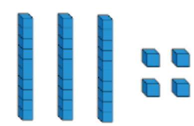
Varied Fluency

Use a 100 square. If:

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

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

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

- 
- 5 tens and 3 ones
- 37

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

25 + ___ = 100

100 – 84 = ___

___ + 69 = 100

100 – ___ = 11

Bonds to 100 (Tens and Ones)

Reasoning and Problem Solving

Teddy has completed the missing number sentence.

46 + 64 = 100

Is Teddy correct?
Explain your answer.

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

Each row and column adds up to 100.

Complete the grid.

45	45	
	35	
15		65

45	45	10
40	35	25
15	20	65

Complete the pattern.

15 + 85 = 100
20 + 80 = 100
25 + 75 = 100
30 + ___ = 100
___ + ___ = 100

Can you explain the pattern?

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

Add Three 1-digit Numbers

Notes and Guidance

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

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

Mathematical Talk

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

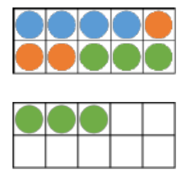
Why are we allowed to change the order of the numbers?

Which two numbers did you add first? Why?

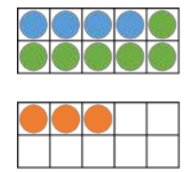
What if you added a different two numbers first, would your answer be the same?

Varied Fluency

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



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



$4 + 6 = 10$

$10 + 3 = 13$

- Find the totals of each row and column.

5	4	2	
3	7	8	
5	7	3	

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

$5 + 4 + 6$ ◯ $6 + 5 + 4$

$7 + 3 + 8$ ◯ $7 + 7 + 3$

$9 + 2 + 5$ ◯ $8 + 3 + 5$

$8 + 4 + 2$ ◯ $2 + 5 + 8$

Add Three 1-digit Numbers

Reasoning and Problem Solving

Always, Sometimes, Never odd + odd + odd = odd Use one-digit numbers to test if this is true e.g. $3 + 5 + 7$	Always, children may recognise that two odds make an even so three odds make an odd.
Which numbers would you add together first in the following number sentences? Why would you add those first? $3 + 5 + 7 =$ $8 + 2 + 6 =$ $4 + 3 + 4 =$ Is there always an easier order to add three one-digit numbers?	3 and 7 first – number bond to 10 8 and 2 first – number bond to 10 4 and 4 first – double a number. No, e.g. $5 + 6 + 7$

Take 3 consecutive one-digit numbers, e.g. 4, 5 and 6. Add them together. What do you notice? Choose different groups of 3 consecutive one-digit numbers and see if there is a pattern.	$1 + 2 + 3 = 6$ $2 + 3 + 4 = 9$ $3 + 4 + 5 = 12$ $4 + 5 + 6 = 15$ $5 + 6 + 7 = 18$ $6 + 7 + 8 = 21$ $7 + 8 + 9 = 24$ If we order the groups, we can see that the totals go up by 3 each time. This is because we are adding one to each number each time so we are adding 3 extra altogether.

Autumn - Block 3

Money

Overview

Small Steps

- Recognising coins and notes (R)
- Count money – pence
- Count money – pounds (notes and coins)
- Count money – notes and coins
- Select money
- Make the same amount
- Compare money
- Find the total
- Find the difference
- Find change
- Two-step problems

Notes for 2020/21

Children may have missed learning on money in Year 1.

Before starting this block ensure that children are familiar with coins and notes.

Recognising Coins

Notes and Guidance

Children will recognise and know the value of different denominations of coins.

Children will use their knowledge of place value to match coins with equivalent values. For example, ten 1 pence coins is equivalent to one 10 pence coin. This could be linked with the concept of exchanging.

Teachers could use coins to support this activity (or pictures where appropriate).

Mathematical Talk

How have you organised the coins?

What is the value of each coin? How do you know?

How many 1 pence coins will you need to make 2 p? 5 p? 10 p? 20 p? 50 p? 1 pound?

How many 1 pound coins will you need to make 2 pounds?

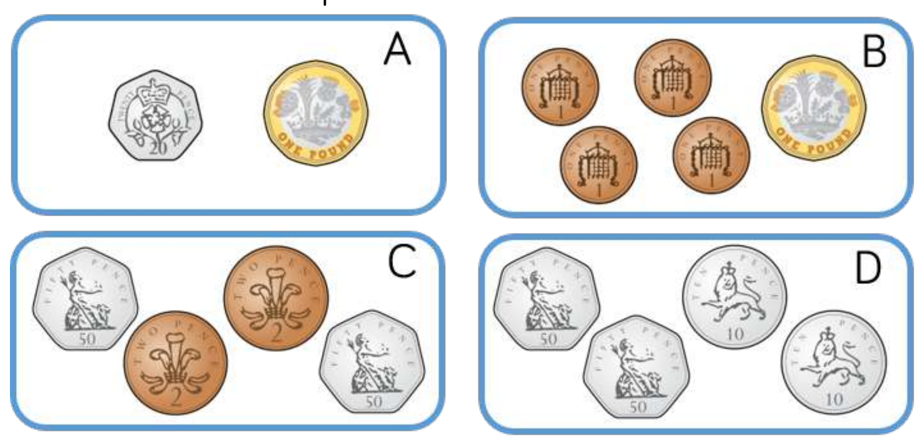
Varied Fluency

R

- Organise the coins on your table into pence and pounds. Can you name each coin?

- Write down the value of each coin.

- Match the cards with equal values.



Recognising Coins

Reasoning and Problem Solving

Dora says:

Do you agree with Dora?

Justify your answer.

Dora is incorrect.

A 50 p coin isn't round.
A 20 p coin isn't round.
A £1 coin isn't round.

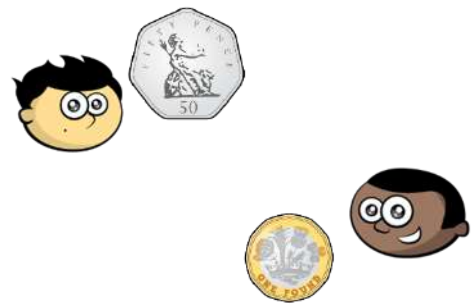
Which is the odd one out?

20 p	8 p	2 p	10 p

Why?

8 p is the odd one out because we do not have an 8 p coin.

The tooth fairy left some money for two children.



Jack has 50 pence. Mo has one pound.

Jack thinks he has more money because his coin is physically bigger.

Explain why Jack is wrong.

Jack is wrong because although the 50 pence coin is physically bigger it only has a value of 50 pence, but the pound coin has a value of 100 pence.

Recognising Notes

Notes and Guidance

Once children are able to identify and recognise coins they need to be able to recognise notes.

Children use their understanding of place value to see that one note can represent many pounds, for example, a ten pound note could be 10 pound coins or 3 two pound coins and 4 one pound coins. Children also need to be aware that one note may be worth many times the value of another note.

Mathematical Talk

Can you name each note?

What is the same about each note?

What is different about each note?

How many ___ pound notes are equivalent to a ___ pound note?

Varied Fluency

R

- How many of each note can you see?

There are _____ 5 pound notes.
There are _____ 10 pound notes.
There are _____ 20 pound notes.

- What is the value of each note?

 = $\boxed{}$ pounds

 = $\boxed{}$ pounds

 = $\boxed{}$ pounds

- Fill in the blanks.

One  = $\boxed{}$ 

One  = $\boxed{}$ 

Recognising Notes

Reasoning and Problem Solving

Teddy is given one  for Christmas.

Eva is given two 

Teddy: I got more than you did because my number is bigger.

Eva: I got more than you did because I got two notes.

Who is correct?

Explain your reasoning.

Both Teddy and Eva are wrong because they both have £10.

Eva has two £5 notes, which makes £10, and Teddy has a £10 note.

Jack, Rosie and Amir each have some money in their pockets.
Jack and Amir both have coins and Rosie has a note.

Amir: I have more money than Rosie.

Jack: I have less money than Rosie.

What note could Rosie have?

Rosie could have a £5 note.
She could not have a £10 or a £20 note because they are larger than Amir's amount.

Always, sometimes, never

Money in notes is worth more than money in coins.

Sometimes - if you have £6 in coins it is worth more than a £5 note.
However you could also have less than £5 in coins.

Count Money - Pence

Notes and Guidance

This block introduces the £ and p symbols for the first time.

Children will count in 1 p, 2 p, 5 p and 10 p coins. Children can also use related facts to count in 20 p coins.

Children do not convert between pounds and pence, therefore children will need to recognise the 50 p coin but they will not count up in 50 p coins.

Mathematical Talk

What is different about the coins you have counted?

Is the group with the most coins always the biggest amount? Why?

What do you notice about the totals?

Are silver coins always worth more than copper coins?

What different ways can you count the coins?
Which is the quickest way?

Varied Fluency

Count the money.

 = ___ p

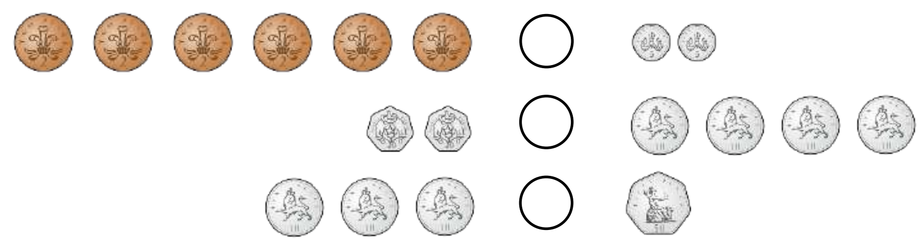
 = ___ p

 = ___ p

___ p = 

___ p = 

Use <, > or = to compare the money.



Count the money.

 = ___ p

 = ___ p

Count Money - Pence

Reasoning and Problem Solving

Jack selects four of these coins.

He can use the coins more than once.

What total could he make?

What is the lowest total?

What is the greatest total?

Example answers:

20 p, 10 p, 10 p and 1 p makes 41 p.

5 p, 5 p, 5 p and 5 p makes 20 p.

1 p, 20 p, 5 p and 2 p makes 28 p.

The lowest total would be 1 p, 1 p, 1 p and 1 p, makes 4 p.

The greatest total would be 20 p, 20 p, 20 p and 20 p makes 80 p.

Draw coins to make the statements correct.

 >

< 

For the first one, any answer showing less than 30 p on the right is correct. E.g. two 10 p coins.

For the second one, any answer showing less than 25 p on the left. E.g. three 2 p coins.

Count Money - Pounds

Notes and Guidance

Children will continue counting but this time it will be in pounds, not pence. The £ symbol will be introduced.
Children must be aware that both coins and notes are used to represent amounts in pounds.
Children will count in £1, £2, £5, £10 and £20s.
In this year group, children work within 100, therefore they will not count in £50s.

Mathematical Talk

Do the notes have a greater value than the coins?

Which is the hardest to count? Which is the easiest? Why?

What do you notice about the amounts?

Does it matter which side the equals sign is?

Can you find the total in a different way?

Varied Fluency

- Count the money.


= £____

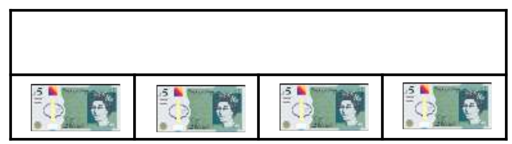
£____ =



= £____

£____ =


- Complete the bar models.



£30		

- Match the money to the correct total.



£25 £60 £10

Which is the odd one out? Explain why.

Count Money - Pounds

Reasoning and Problem Solving

Ron thinks he has £13  Is he correct? Explain your answer.	No, because three £2 coins make £6 £10 and £6 is equal to £16 He has mistaken his £2 coins for £1 coins.
Explain the mistake. £2, £4, £6, £7, £8, £10	£7 is the mistake. It is an odd number. The 2 times table are all even. When counting in £2s, we would say £2, £4, £6, £8, £10

Count Money – Notes & Coins

Notes and Guidance

In this step, children will build on counting by bringing pounds and pence together.

Decimal notation is not used until KS2 therefore children will write the total using 'and' e.g. £5 and 30 p rather than £5.30

Children will not count across £1. They will count the pounds and pence separately before putting them together.

Mathematical Talk

How did you work out the total amount of money?

What strategy did you use to count the money when there is pounds and pence?

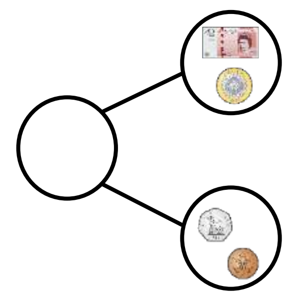
Explain what to do when the pounds and pence are mixed up.

Varied Fluency

How much money is there altogether?

There is £____ and ____p.

Complete the part-whole model.



What's the same and what's different about the parts?

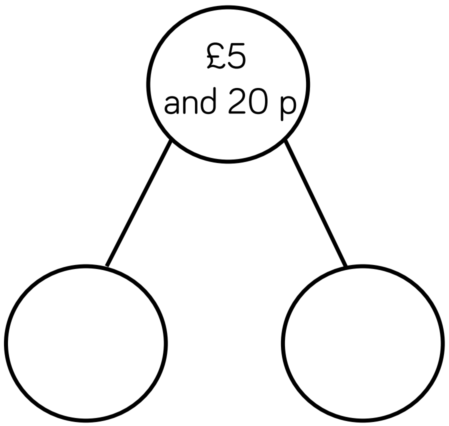
Fill in the gaps to make the statements correct.

- £10 + £5 + 50 p = £_____ and _____p
- £20 + £2 + 10 p + 10 p + 2 p = £_____ and _____p
- £5 + £___ + 50 p + 20 p + 20 p + 1 p = £10 and ____p

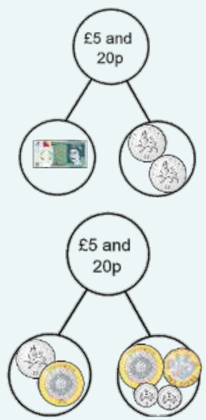
Count Money – Notes & Coins

Reasoning and Problem Solving

How many ways can you complete the part-whole model by drawing money?



Example answers:



Mo has the following coins.

He thinks he has 51 p.

Explain his mistake.

Mo thinks the 5 p is a 50 p coin. He has 6 p. Alternatively, he has combined the 5 and 1 from each coin.

Here are some coins and a note.

Amir says, "There is 10 p".

Dexter says, "There is £10".

Are either of them correct?

Explain why.

No, Amir and Dexter have taken the digits 2, 2, 5 and 1 and added them together.

The coins are a mix of pounds and pence so need to be counted separately.

Select Money

Notes and Guidance

Children select coins to make an amount, from a set of coins given to them. They will use these practically, draw them and write the abstract amounts.
They will continue to use both pounds and pence to embed previous learning.
Children are continuing to work on recognising money by selecting the correct coins or notes from a wide range.

Mathematical Talk

How do you know you have made 56 p?
Is your answer the same as your partner?
Can you find any other ways to make this amount?

Does it matter if you say pence or pounds first?

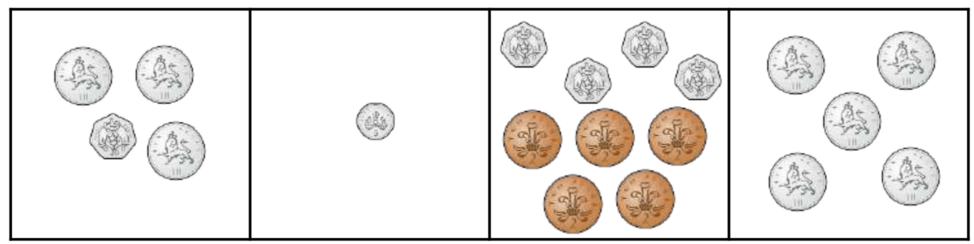
Does this change the total?

Can you show this amount in a different way?

Varied Fluency

- Circle 56 p.

- Which does **not** show 50 p?



- Draw money on the purses to match the amounts.

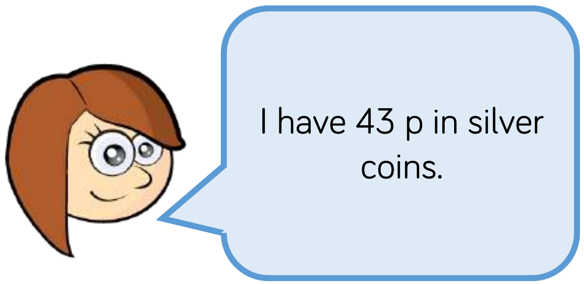
£21 and 32 p

£13 and 40 p

Select Money

Reasoning and Problem Solving

Rosie says,



Do you agree?

Explain why.

No, because 3 pence can only be made with copper coins.

Annie and Ron both claim to have 90 p.

Annie has 3 coins and Ron has 4 coins.

Could they be correct?

Which coins could they have?

Yes, they can because:
Annie = 50 p, 20 p, 20 p.
Ron = 50 p, 20 p, 10 p, 10 p.

Use the money to fill the purses.

You can only use each coin or note once.

Cross them out once you have used them.

Example answer:

£10 and 15 p

£5 and 51 p

Circle the odd one out.

23 p = 20 p, 2 p, 1 p
25 p = 20 p, 5 p
28 p = 20 p, 8 p

Explain your answer.

28 p = 20 p, 8 p is because if you are using coins there is not an 8 p coin. Children may give other answers.

Make the Same Amount

Notes and Guidance

Children explore the different ways of making the same amount. As before, they will not count pence over into pounds.

Examples need to be modelled where pounds and pence are together but children need to continue to be encouraged to count the pounds and pence separately.

Mathematical Talk

Can the same amount be made using different coins?
How did you compare the amounts?
How is your way different to a partner?

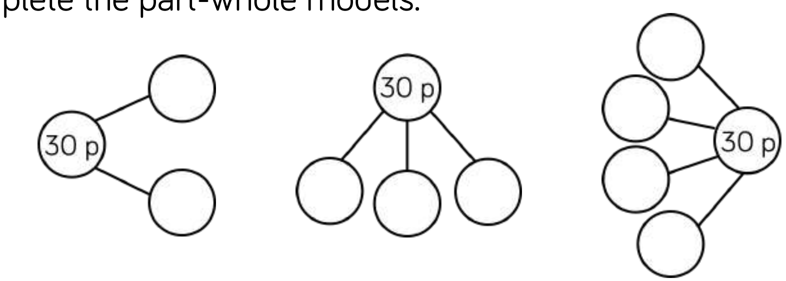
Can you swap a coin/note for others and still make the same amount?

What is the smallest amount of coins you can use to make ____?

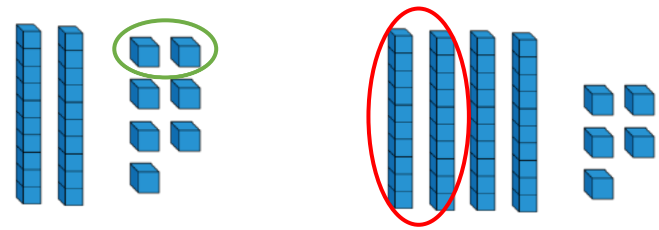
Varied Fluency

- Match the amounts.

- Complete the part-whole models.



- The Base 10 represents money. What coin is represented by each circle?



Make the Same Amount

Reasoning and Problem Solving

Make 50 p three ways using the coins below.

You can use the coins more than once.

Example answers:

20 p, 20 p, 10 p

10 p, 10 p, 10 p, 10 p, 5 p, 5 p

1 p (50 times)

How many ways can you make 10 p using only copper coins?

Did you use a strategy?

Example answers:

2 p, 2 p, 2 p, 2 p, 2 p

2 p, 2 p, 2 p, 2 p, 1 p, 1 p

Compare Money

Notes and Guidance

Children compare two different values in either pounds or pence.

Children will see examples with both pounds and pence, but they will only focus on one of these - the other must be the same e.g. £3 and 10 p > £2 and 10 p where 10 p is the constant.

Children recap comparing vocabulary such as greater/less than and use the inequality symbols.

Mathematical Talk

What do you notice about the amounts you have compared?

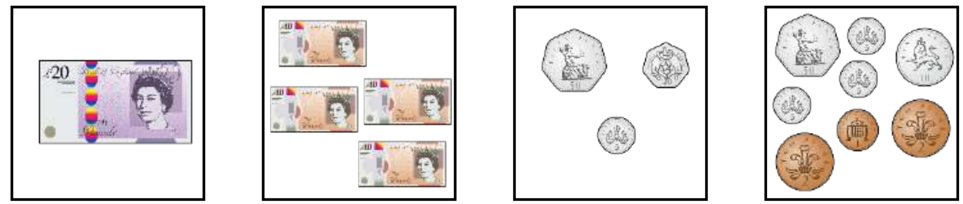
What's the same? What's different?

How do you know who has the most, when they both have 64?

Can you add a value that will go in between the greatest and the least?

Varied Fluency

- Circle the box with the greatest amount.



- Who has the most? Who has the least? How do you know?

Dora

I have £64

I have 64 p

Teddy

- Use <, > or = to compare the amounts.

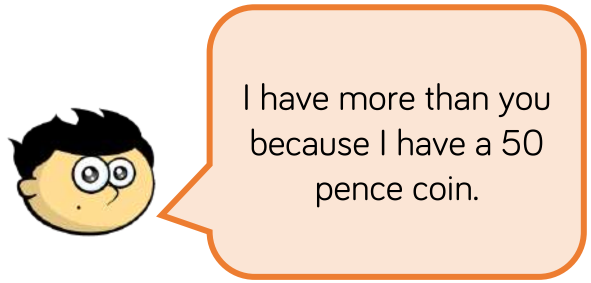
 ◯ 

 ◯ 

 ◯ 

Compare Money

Reasoning and Problem Solving

Annie has three coins in her hand. Jack says,  Is he correct? Explain why.	It depends on the coins Annie has. Children explore and show e.g. 20 p, 20 p, 20 p > 50 p 5 p, 2 p, 2 p < 50 p

True or False? 5 copper coins can be worth more than 1 silver coin.	Only true when 5 p is the silver coin. Children should explore different true and false answers.
Four 5 pence coins are worth more than two 10 pence coins.  Do you agree? Explain why.	No, they are equal to each other. They both make 20 p.

Find the Total

Notes and Guidance

Children will build on their knowledge of addition to add money including:

- 2-digit and 2-digit
- 2-digit and ones
- 2-digit and tens
- 3-single digits

Children will be encouraged to use different methods to add the amounts of money, such as count on, partitioning and regrouping.

Mathematical Talk

How did you find the missing amounts? Share your strategies with a friend.
Was your method different to a friend?

What is the most efficient method? Why?

Can you write a worded question for a friend?

What was the greatest amount you found?

Varied Fluency

Complete the table.

Pounds	Pence	Total
£4	25 p	£____ and ____p
£2		£2 and 40 p
	65 p	£20 and 65 pence
		£15 and 20 p
	55 pence	

Complete the bar models.

7 p	5 p	9 p

£6	£4	£2

Amir buys bread and eggs.

49 p

30 p

How much does he spend?

Find the Total

Reasoning and Problem Solving

Dexter has these coins and notes.

He makes an amount greater than £20 but less than £30

Draw the money he could have used. You can use each coin or note more than once.

How many different ways can you find?

Possible answers:

£10, £10 and £5 makes £25

£10, £5, £5, £2 makes £22

Etc.

Here is a shopping list.

Item	Price
Rubber	20 p
Ruler	18 p
Pencil	32 p
Crayon	27 p
Pen	45 p
Glue	36 p

- I spend exactly 50 p. Which two items did I buy?
- I bought two of the same item and it cost me 90 p. What was the item?
- Choose two items. How many different amounts can you make?
- What is the closest you can get to 65 p?

The ruler and the pencil as 18 p and 32 p makes 50 p.

Two pens as 45 p and 45 p makes 90 p.

Children to explore the totals that can be made by adding two items together.

The rubber and the pen would cost 65 p as 20 p and 45 p sum to 65 p.

Find the Difference

Notes and Guidance

Children expand their knowledge of addition and subtraction strategies by specifically finding the difference between two amounts.

In this step, children should see both counting on and counting back being modelled to them.
They need to discuss which is the most efficient for different questions.

Mathematical Talk

Which costs more? How do you know?
How can you work out how much more?

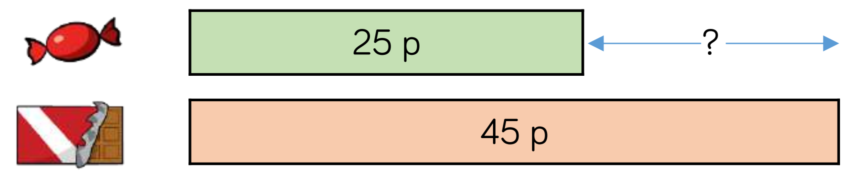
What's the difference?

How much less?/How many fewer?

What method did you use to work this out?

Varied Fluency

- Work out the difference between the cost of a bag of sweets and a bar of chocolate.



- Find the difference between the amounts of money Amir and Mo have.

Amir   Mo

- Alex has £2 and 15 p.
  Rosie has £2 and 40 p.

  How much more money does Rosie have than Alex?

Find the Difference

Reasoning and Problem Solving

I have 57 p.

Whitney

I have 2 silver coins and 1 bronze coin.

Mo

What could Mo have?

Work out the difference between the amounts.

How many different answers can you find?

Example answers:

Mo could have more by:

- 50 p, 20 p, 1 p
- 50 p, 20 p, 2 p

Mo could have the same by:

- 50 p, 5 p, 2 p

Mo could have less by:

- 5 p, 5 p, 1 p
- 20 p, 10 p, 2 p

Jack has 2 p.

Eva has 10 p.

Both of them have a 2 p coin.

What **other** coins could Eva have?

4 × 2 p
3 × 2 p and 2 × 1 p
2 × 2 p and 4 × 1 p
1 × 2 p and 6 × 1 p
8 × 1 p
5 p and 2 p and 1 p
5 p and 3 × 1 p

Find Change

Notes and Guidance

Children build on their subtraction skills by finding change from a given amount. They need to identify amounts from the coins given, write the calculations and choose efficient methods.

In this step, children will be introduced to converting £1 to 100 p to be able to subtract from £1. This links to their number bond knowledge to 100.

Mathematical Talk

How much does Dora have? How do you know?
Can you write a calculation to work out how much she will have left?

Why is it important to use the £ or p symbol?

What strategy did you use to find the change?
Did you use concrete objects to help?

Varied Fluency

- Dora has these coins.

She spends 53 p.
What money will she have left? What coins could it be?

- Write the calculation and find the amount of change.

32 p

___ – ___ = ___

- Ron spends 65 p in the shop.
He pays with a £1 coin.

How much change will he receive?

Find Change

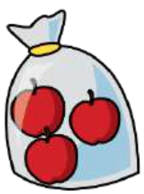
Reasoning and Problem Solving

I have 20 p.

My change is more than 5 p but less than 10 p.

What could I have bought?

Sweet: 7 p



Apples: 18 p

Chocolate: 12 p

Banana: 4 p

Example answers:

Chocolate bar or a sweet and banana.

I paid for my shopping with one coin.

Here is my change.

What could I have paid with and how much would the item have been?

Could have paid with a 20 p coin and it would have cost 3 p.

Could have paid with a 50 p coin and it would have cost 33 p.

Could have paid with a £1 coin and it would have cost 83 p.

Could have paid with a £2 coin and it would have cost £1 and 83 p.

Two-step Problems

Notes and Guidance

Children draw together all of the skills they have used in this block and consolidate their previous addition and subtraction learning.
Children may need some scaffolding to see the different steps.
Bar modelling is really useful to see the parts and wholes, and supports children in choosing the correct calculation.

Mathematical Talk

Where does the £33 go in the bar model?
How can you find the total?

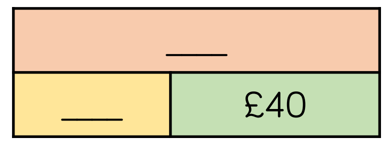
Here is a one step problem. Can you think of a second step?

Can you write your own two step word problem?

Did you use a concrete or pictorial representation to help you?

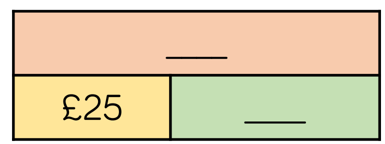
Varied Fluency

- Rosie has £33 in her money bank, and gets £40 more.
Fill in the bar model and write a calculation to show her total.



___ + ___ = ___

She then buys a top for £25. Complete the bar model and write a calculation to show what she has left.



___ – ___ = ___

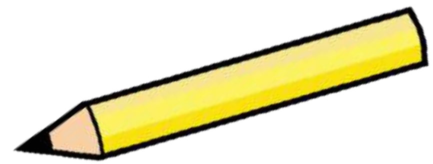
- Amir has these coins.

He spends 54 p. How much does he have left?

- A scarf is £12 and a bag is £25
Whitney buys one of each and pays with a £50 note.
How much change will she receive?

Two-step Problems

Reasoning and Problem Solving

Ghost Train: 90 p Annie finds a 20 p coin. She puts it with her other three 20p coins. Does Annie have enough to ride the ghost train? Explain why.	No, because she only has 80 p. She would need 10 p more. 90 p > 80 p
Alex has 90 pence. She bought a rubber for 30 pence and wants to buy a pencil.  **Pencil:** 70 p The shopkeeper will not sell her the pencil. Explain why.	90 p – 30 p = 60 p 70 p > 60 p She does not have enough money to buy the pencil.

Autumn - Block 4

Multiplication & Division

Overview

Small Steps

- Make equal groups R
- Add equal groups R
- Make arrays R

Notes for 2020/21

Use this time to recap the basics of multiplication. Year 2 multiplication will be covered in the Spring term.

Making Equal Groups

Notes and Guidance

Children begin by using stories which link to pictures and concrete manipulatives to explore making equal groups and write statements such as 'there are ___ groups of ___.' They will recognise and explain how they know when they are equal or not. Children see equal groups that are arranged differently so they understand that the groups look different but can still be equal in number.
At this stage children do not explore multiplication formally.

Mathematical Talk

How do I know that the groups are equal? What does equal mean?

How many pencils are there in each pot? How can I complete the sentence to describe the groups?

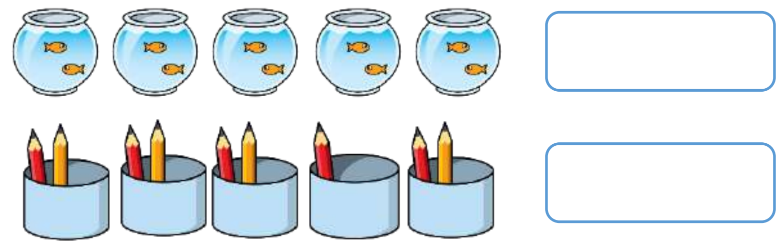
What's the same and what's different?

Are Josh's groups equal or unequal? How can we make them equal?

Varied Fluency

R

Are the groups equal or unequal? Write a label for each.



Complete the sentences

There are ___ groups of ___ pencils.

There are ___ groups of ___ flowers.

Josh is drawing equal groups of 3

Complete his drawing.

Making Equal Groups

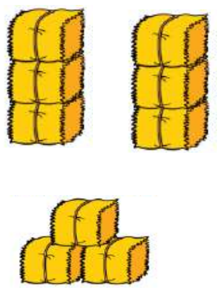
Reasoning and Problem Solving

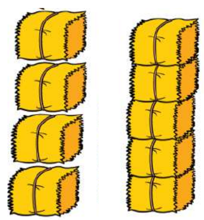
Dora and Rosie are making hay bundles.

Who has made equal groups?


Dora


Rosie





Explain how you know.

Possible answer:
Dora has made equal groups because she has 3 groups of 3 hay bundles.

Rosie has two unequal groups.

Use concrete materials or pictures to complete the questions.

Alex has 4 equal groups.
Show me what Alex's groups could look like.

Whitney has 3 unequal groups.
Show me what Whitney's groups could look like.

Children will show 4 groups where there are the same amount in each group for Alex and 3 groups that are unequal for Whitney.

Encourage children to do this in more than one way.

White Rose Maths

Add Equal Groups

Notes and Guidance

Children use equal groups to find a total. They focus on counting equal groups of 2, 5 and 10 and explore this within 50.
Children could begin by linking this to real life, for example animal legs, wheels, flowers in vases etc.
Stem sentences alongside number sentences can help children link the calculation with the situation. Ensure children have the opportunity to say their sentences aloud.

Mathematical Talk

How many apples are there in each bag?
Do all of the bags have an equal number of apples?
How many equal groups can you see?

How can we represent this with counters/cubes/on a number line/in a number sentence etc?

What other equipment could you use to represent your pattern? What's the same? What's different?

Which is more, 3 groups of 10 or 4 groups of 5? Prove why.

Varied Fluency

R

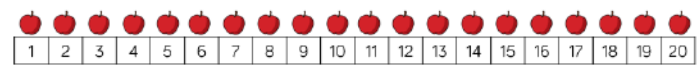
- How many wheels altogether?

$2 + 2 + 2 + 2 + 2 =$

How many fingers altogether?

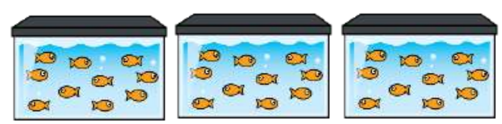
$5 + 5 + 5 =$

- How many apples are there? Complete the sentences.



$5 + 5 + 5 + 5 =$ ____
There are ____ apples.
There are ____ groups of ____ apples which is equal to ____

- How many fish are there?
Complete the sentences.



____ + ____ + ____ = ____
There are ____ fish.

Can you show this using ten frames?

Add Equal Groups

Reasoning and Problem Solving

Eva and Whitney are making equal groups of bread rolls.

Eva

We need one more group to make 40

We need 10 more rolls to make 40

Whitney

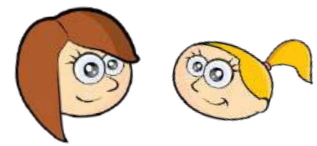
Who do you agree with? Explain why.

Possible answer:

I agree with both.

They are counting in groups of 10 so they need one more group of 10

Rosie and Eva have equal groups of either 2, 5 or 10



Each of their totals is less than 40

Rosie has 5 equal groups.
Eva has 3 equal groups.

Eva's total is more than Rosie's total.

What could they be counting in?

Use equipment to help you.

Possible answers:

Rosie: 2 + 2 + 2 + 2 + 2 = 10
Eva: 5 + 5 + 5 = 15

Rosie: 5 + 5 + 5 + 5 + 5 = 25
Eva: 10 + 10 + 10 = 30

Rosie: 2 + 2 + 2 + 2 + 2= 10
Eva: 10 + 10 + 10 = 30

Make Arrays

Notes and Guidance

Children begin to make arrays by making equal groups and building them up in columns or rows.

They use a range of concrete and pictorial representations alongside sentence stems to support their understanding.

Children also explore arrays built incorrectly and recognise the importance of columns and rows.

Mathematical Talk

How many equal groups do I have? How many in each group?
Can I represent my apples with counters?

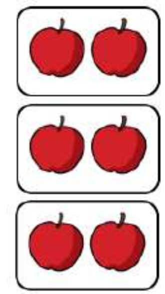
What is the difference between columns and rows?
How many counters in each row? How many counters in each column?

How can I record my array with a number sentence?

Varied Fluency

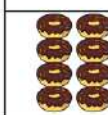
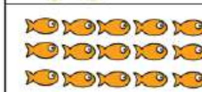
R

Build an array with counters to represent the apples.
Complete the sentences.



There are ____ apples in each row.
There are ____ rows.
____ + ____ + ____ = ____
There are ____ apples altogether.

Complete the table.

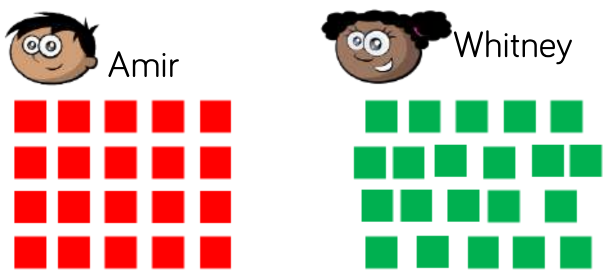
Array	Description - columns	Description - rows	Totals
	5 columns 2 cookies in each column	2 rows 5 cookies in each row	2 + 2 + 2 + 2 + 2 = 10 5 + 5 = 10
	__ columns __ donuts in each column	__ rows __ donuts in each row	
	__ columns __ fish in each column	__ rows __ fish in each row	
	3 columns 5 cupcakes in each column	5 rows 3 cupcakes in each row	

Make Arrays

Reasoning and Problem Solving

R

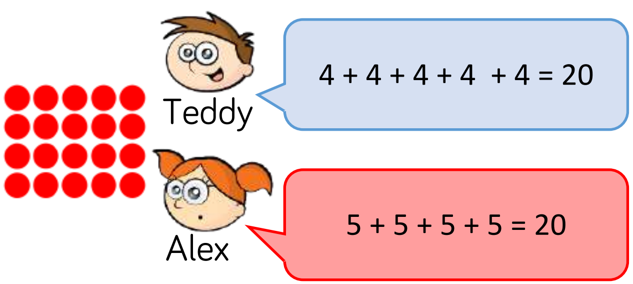
Amir and Whitney are making arrays.



Who has made a mistake? Explain why.

Possible answer:
Whitney has made a mistake because her array is not in columns. There are an unequal amount of squares in each row.

Teddy and Alex are writing number sentences to describe the array.



Who do you agree with? Explain why.

Possible answer:
They are both right. Teddy has counted the columns. Alex has counted the rows.

Eva begins to make an array with 40 counters.
She has finished her first row and her first column.
Complete her array.

Write two different number sentences to describe the finished array.

Possible answer:
Array showing 10 + 10 + 10 + 10 = 40

Or

4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 = 40

Spring Scheme of Learning

Year 2

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

2020 will go down in history. The world has changed for all of us.

We want to do as much as we can to support children, teachers, parents and carers in these very uncertain times.

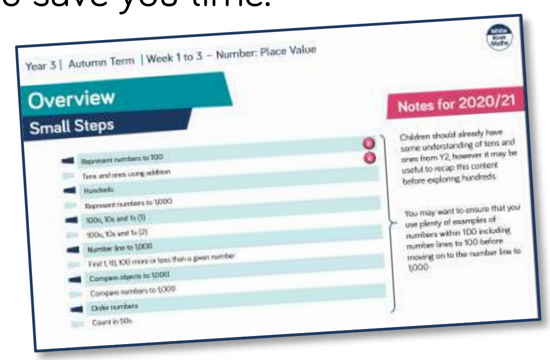
We have amended our schemes for 2020/21 to:

★ highlight key teaching points

★ recap essential content that children may have forgotten

★ flag any content that you might not have covered during the school closures period.

We hope these changes will add further value to the schemes and save you time.



Lesson-by-lesson overviews

We've always been reluctant to produce lesson-by-lesson overviews as every class is individual and has different needs. However, many of you have said that if blended learning becomes a key feature of school life next year, a weekly plan with linked content and videos could be really useful.

As always, we've listened! We've now produced a complete lesson-by-lesson overview for Y1 to Y9 that schools can use or adapt as they choose. Each lesson will be linked to a free-to-use home learning video, and for premium subscribers, a worksheet. This means that you can easily assign work to your class, whether they are working at home or in school.

Inevitably, this lesson-by-lesson structure won't suit everyone, but if it works for you, then please do make use of this resource as much as you wish.

Teaching for Mastery

These overviews are designed to support a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum.

The overviews:

- have number at their heart. A large proportion of time is spent reinforcing number to build competency
- ensure teachers stay in the required key stage and support the ideal of depth before breadth.
- ensure students have the opportunity to stay together as they work through the schemes as a whole group
- provide plenty of opportunities to build reasoning and problem solving elements into the curriculum.

For more guidance on teaching for mastery, visit the NCETM website:

https://www.ncetm.org.uk/resources/47230

Concrete - Pictorial - Abstract

We believe that all children, when introduced to a new concept, should have the opportunity to build competency by taking this approach.

Concrete – children should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – alongside this children should use pictorial representations. These representations can then be used to help reason and solve problems.

Abstract – both concrete and pictorial representations should support children's understanding of abstract methods.

Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

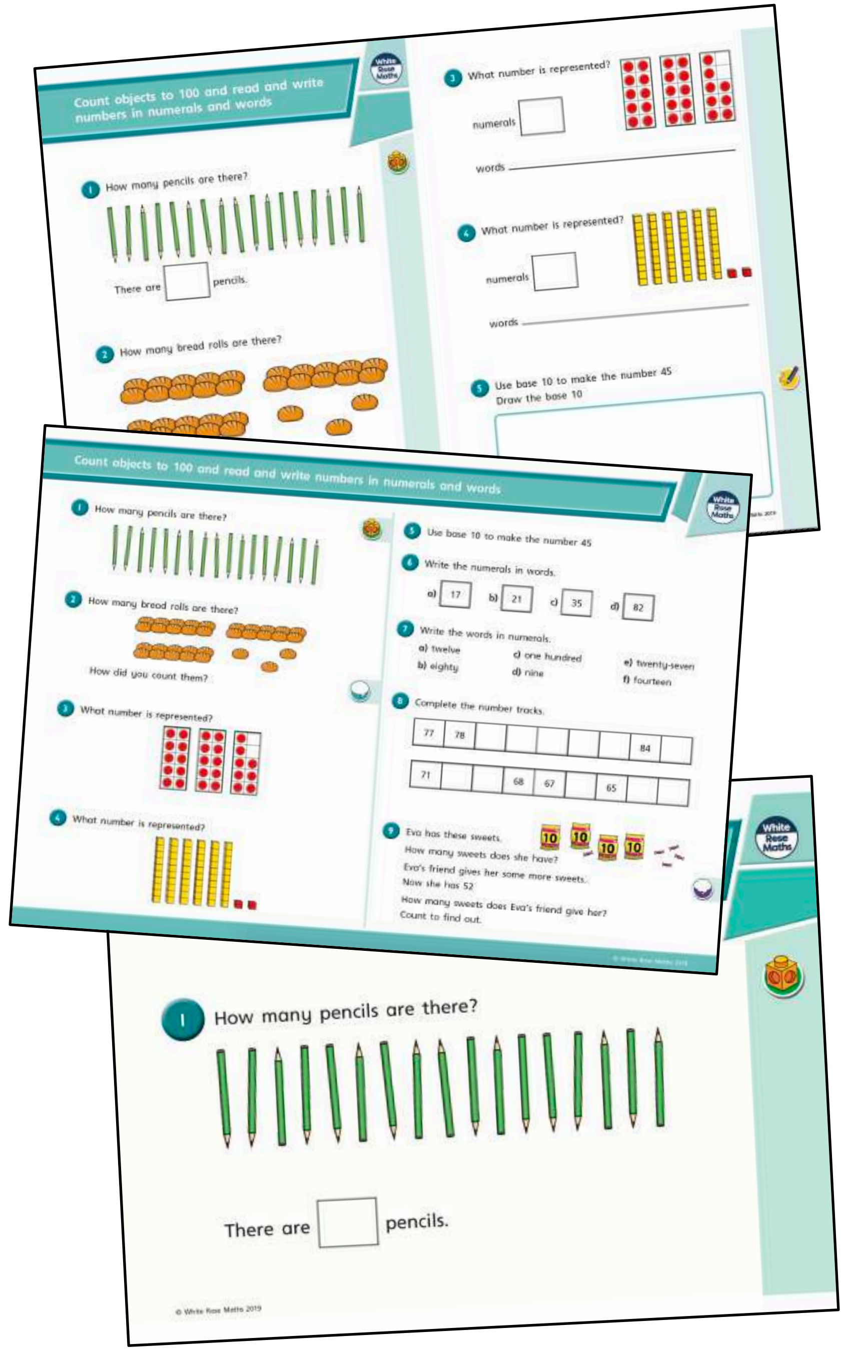
Supporting resources

NEW for 2019-20!

We have produced supporting resources for every small step from Year 1 to Year 8.

The worksheets are provided in three different formats:

- Write on worksheet – ideal for children to use the ready made models, images and stem sentences.
- Display version – great for schools who want to cut down on photocopying.
- PowerPoint version – one question per slide. Perfect for whole class teaching or mixing questions to make your own bespoke lesson.



For more information visit our online training and resources centre resources.whiterosemaths.com or email us directly at support@whiterosemaths.com

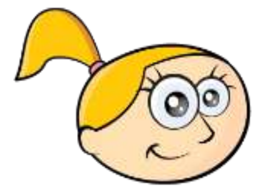
Meet the Characters

Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?

Teddy

Rosie

Mo



Eva

Alex

Jack

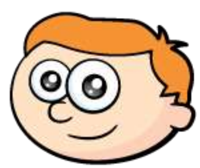
Whitney

Amir

Dora

Tommy

Dexter



Ron

Annie

White Rose Maths

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value			Number: Addition and Subtraction					Measurement: Money		Number: Multiplication and Division	Consolidation
Spring	Number: Multiplication and Division				Statistics		Geometry: Properties of Shape		Number: Fractions			
Summer	Measurement: Length and Height		Geometry: Position and Direction		Consolidation and problem solving		Measurement: Time		Measurement: Mass, Capacity and Temperature			Consolidation

White Rose Maths

Spring - Block 1

Multiplication & Division

White Rose Maths

Overview

Small Steps

- Recognise equal groups
- Make equal groups
- Add equal groups
- Multiplication sentences using the × symbol
- Multiplication sentences from pictures
- Use arrays
- Make doubles R
- 2 times-table
- 5 times-table
- 10 times-table
- Make equal groups – sharing R
- Make equal groups – sharing
- Make equal groups – grouping R
- Make equal groups – grouping
- Divide by 2
- Odd & even numbers
- Divide by 5
- Divide by 10

Notes for 2020/21

Some of this content was previously in the Year 2 Autumn term. It has been moved over to Spring to allow more time on place value and addition and subtraction.

Prior to this block children had the opportunity to recap making equal groups, adding equal groups and making arrays from Year 1. Children can now build on this in the Spring term.

Concrete manipulatives are vital to introduce this topic and support children's conceptual understanding of the concept.

Recognise Equal Groups

Notes and Guidance

Children describe equal groups using stem sentences to support them. It is important that children know which groups are equal and unequal, and why they are equal or unequal. The addition and multiplication symbols are not used within this small step but use of the language of addition and multiplication will support them in understanding repeated addition and multiplication. The examples included refer to the times tables facts that Year 2 children need to know.

Mathematical Talk

What does the 2 represent? What does the 3 represent?

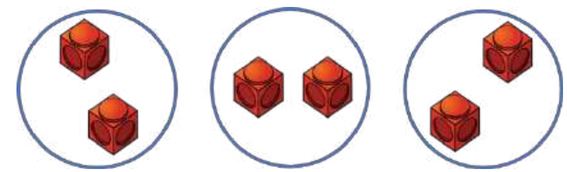
What does the 5 represent? What does the 2 represent?

I have ___ equal groups, with ___ in each group. Which image am I describing?

Why are these groups equal/unequal?

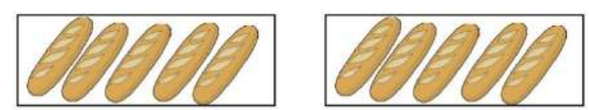
Varied Fluency

- Complete the stem sentences.



There are ____ equal groups with ____ in each group.

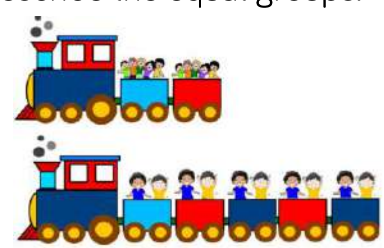
- Complete the sentences.



There are ____ equal groups with ____ in each group.

There are ________ baguettes altogether.

- Describe the equal groups.

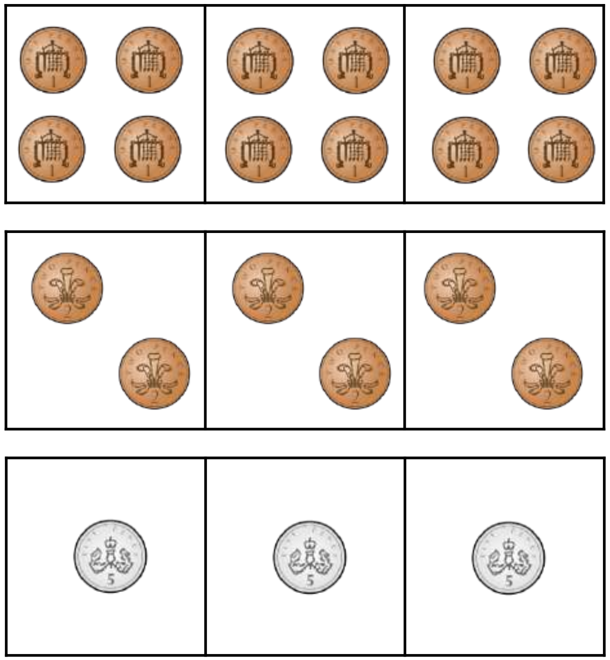


What is the same and what is different in each group?

Recognise Equal Groups

Reasoning and Problem Solving

Which group of money is the odd one out?

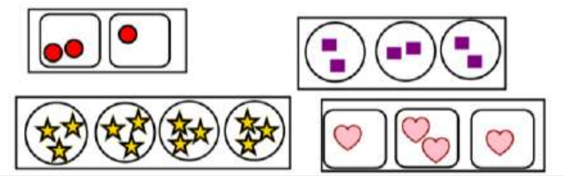


Explain why.

The bags with 5 p in each because the 2 ps and 1 ps have 4 p in each group.

Sort into equal and unequal groups.

Equal Groups	Unequal Groups

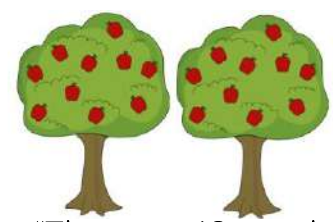


Create your own picture to go in each column.

Hearts and dots in unequal groups.

Stars and squares in equal groups.

Spot the mistake.



Alex says, “There are 10 equal groups with 2 in each group. There are ten 2s.”

There are 2 equal groups with 10 in each group

There are two 10s.

Make Equal Groups

Notes and Guidance

Children should be able to make equal groups to demonstrate their understanding of the word 'equal'.

With the examples provided to the children, it is important that they are exposed to numerals and words, as well as multiple representations.

Mathematical Talk

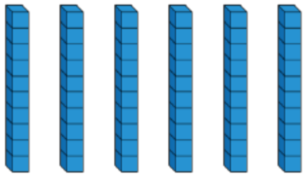
How else could you represent these in equal groups?

How many ways can you represent this?

How have you grouped your items?

Varied Fluency

- The Base 10 shows six equal groups with ten in each group. There are six tens.



How else can you represent these as equal groups?

- How many ways can you represent 'four equal groups with three in each group'?

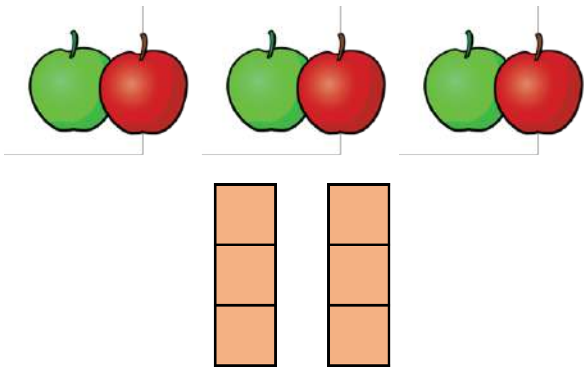
- What else do we need to show 'five 3s'?

How else can we show five equal groups with 3 in each group? Compare your answer with a partner.

Make Equal Groups

Reasoning and Problem Solving

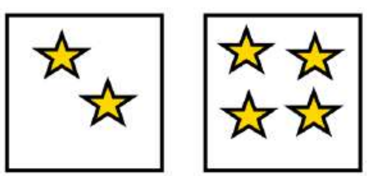
Has Eva shown the equal groups correctly?



Draw or use cubes to show what Eva should have done.

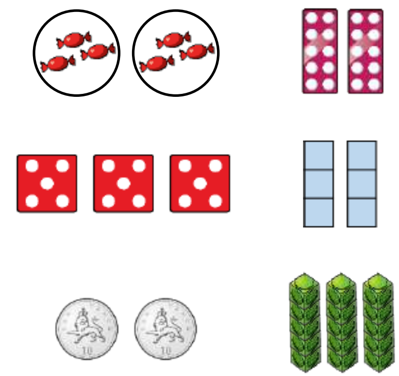
Children to draw or make 3 towers with 2 in each tower.

How can you make the groups equal?



Various answers e.g. move one star from right to left box. Any answer that makes them equal.

Match the equal groups.



Three 5s

Two 10s

Two 3s

Sweets, squares, two 3s.

Dice, cubes, three 5s.

Coins, number pieces, two 10s.

Add Equal Groups

Notes and Guidance

Children begin to connect equal groups to repeated addition.

At this point children have added 3 one digit numbers together, therefore they can add up to 3 equal groups when each group is any one digit number.

If there are more than 3 equal groups, the examples must be limited to 2s, 5s, 10s and 3s.

Mathematical Talk

What do the two 3s represent?

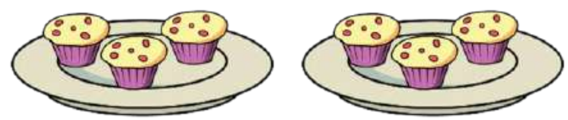
Why are we using the addition symbol?

How else can we show the equal groups?

What is the total?

Varied Fluency

Complete:



There are ____ equal groups with ____ in each group.
There are ____ 3s.
____ + ____ = 6

Complete:

There are ____ equal groups with ____ in each group.
There are three ____s.
____ + ____ + ____ = 12

Complete the table.

	Draw It	Say It	Add It
			

Add Equal Groups

Reasoning and Problem Solving

True or False?

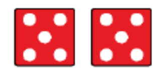
5 + 5 = 2 + 2 + 2 + 2 + 2

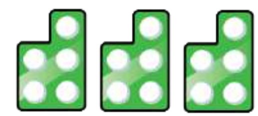
Draw an image or use cubes to help you explain your answer.

This is true because they are both equal to 10 but the groups look different.

To the left of the 'equal to' sign are 2 equal groups of 5, and to the right of the 'equal to' sign are 5 equal groups of 2.

Which one does not belong?





Two 5s

Ten

5 + 5

What do we need to change to make them all represent the same?

The three 5s do not belong. We would have to take away one five.

The Multiplication Symbol

Notes and Guidance

Children are introduced to the multiplication symbol for the first time. They should link repeated addition and multiplication together, using stem sentences to support their understanding.
They should also be able to interpret mathematical stories and create their own involving multiplication.
The use of concrete resources and pictorial representations is still vital for understanding.

Mathematical Talk

What does the 3 represent? What does the 6 represent?

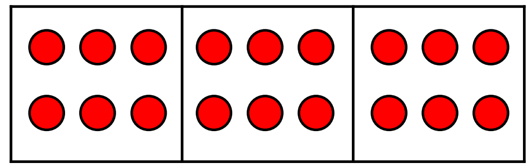
What does 'lots of' mean?

Does $18 = 3 \times 6$ mean the same?

How is $6 + 6 + 6$ the same as 3×6? How is it different?

Varied Fluency

Complete the sentences to describe the equal groups.



___ + ___ + ___ = 18

___ × ___ = 18

There are ___ equal groups with ___ in each group.
There are three ___.

Complete:

Three 2s	Draw It	Addition	Multiplication
There are 3 equal groups with 2 in each group.			

Complete:

Addition	Multiplication	Story
10 + 10 + 10		
	6 × 5	

The Multiplication Symbol

Reasoning and Problem Solving

 $3 + 3 + 3 = 3 \times 3$ Is Mo correct? Explain why. Draw an image to help you.	He is correct because $3 + 3 + 3 = 9$ and $3 \times 3 = 9$
Use <, > or = to make the statements correct. 3×5 ○ $5 + 5 + 5 + 5$ 2×2 ○ $2 + 2$ 10×2 ○ $5 + 5 + 5$	$3 \times 5 < 5 + 5 + 5 + 5$ $2 \times 2 = 2 + 2$ $10 \times 2 > 5 + 5 + 5$

Think of a multiplication to complete: $6 + 6 + 6 > \_\_ \times \_\_$	Any two numbers which multiply together to give an answer of less than 18
The total is 12, what could the addition and multiplication be?	$6 + 6 = 2 \times 6$ $2 + 2 + 2 + 2 + 2 + 2 = 6 \times 2$ $3 + 3 + 3 + 3 = 4 \times 3$ $4 + 4 + 4 = 3 \times 4$ $12 = 1 \times 12$ $1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 12 \times 1$

Multiplication from Pictures

Notes and Guidance

Children will use the multiplication symbol and work out the total from pictures.

They should also be able to interpret a multiplication word problem by drawing images to help them solve it.

Coins could be used within this small step too.

Mathematical Talk

What does the 4 represent?

What does the 3 represent?

What does the 12 represent?

Can you think of your own story for $3 \times 4 = 12$?

Varied Fluency

Complete:

___ × ___ = ___

___ lots of 3 = ___

___ multiplied by ___ = 12

Complete:

 ○ 

4 lots of 3 ○  

 = 1 × ___

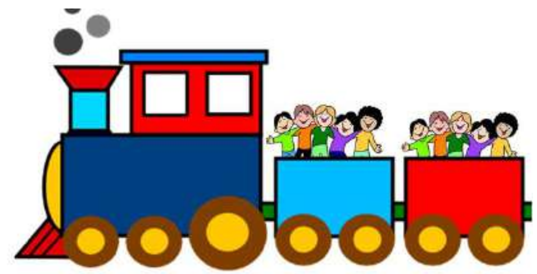
Complete the table.

Picture	Multiplication	Sentence
	$4 \times 10 = 40$	4 lots of 10 is equal to 40
	$35 = 7 \times 5$	
		6 lots of 3 is equal to 18

Multiplication from Pictures

Reasoning and Problem Solving

There are four baskets. There are three dolls in each basket. How many dolls are there altogether? Draw an image and write a calculation to represent the problem.	The image could be 4 circles with 3 dots in each. The calculation: $4 \times 3 = 12$
Write a story for the calculation 4×10 Draw an image to illustrate your story.	Stories with 4 groups and 10 in each group, for example: Four tables with ten children on each table. Four purses with 10p in each purse.

 2×5 $5 + 5$ 5×2 Each calculation could explain the image. Explain why.	There are 2 groups with 5 people in each group. There are 5 people in one group and 5 in the other. There are 5 lots of 2 people.

Use Arrays

Notes and Guidance

Children explore arrays to see the commutativity of multiplication facts e.g. $5 \times 2 = 2 \times 5$

The use of the array could be used to help children calculate multiplication statements.

The multiplication symbol and language of 'lots of' should be used interchangeably.

Mathematical Talk

Where are the 2 lots of 3?

Where are the 3 lots of 2?

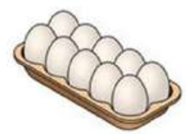
What do you notice?

What can we use to represent the eggs?

Can you draw an image?

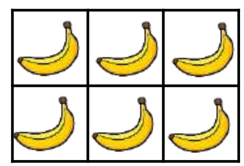
Varied Fluency

- On the image, find 2×5 and 5×2

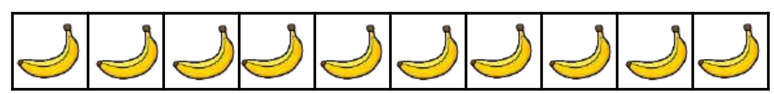


Can you represent this array using another object?

- Complete the number sentences to describe the arrays.



2×3 and ___ $\times$ ___



___ $\times$ ___ and ___ $\times$ ___

- Draw an array to show:

$4 \times 5 = 5 \times 4$
3 lots of $10 = 10$ lots of 3

Use Arrays

Reasoning and Problem Solving

With 12 cubes, how many different arrays can you create?

Once you have created your array complete:

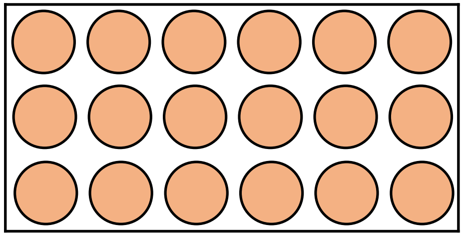
___ × ___ = ___ × ___

$1 \times 12 = 12 \times 1$

$2 \times 6 = 6 \times 2$

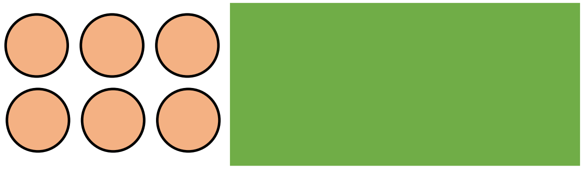
$3 \times 4 = 4 \times 3$

Find different ways to solve six lots of three.



Count in 3s
3 lots of 3 add 3 lots of 3
5 × 3 add 1 × 3
etc.

Part of this array is hidden.



The total is less than 16

What could the array be?

4 × 2
5 × 2
6 × 2
7 × 2

Making Doubles

Notes and Guidance

Children explore doubling with numbers up to 20
Reinforce understanding that 'double' is two groups of a number or an amount. Children show and explain what doubling means using concrete and pictorial representations.

They record doubling using the sentence, 'Double ___ is ___' and use repeated addition to represent doubles in the abstract. They look at representations to decide whether that shows doubling or not.

Mathematical Talk

Can you sort these representations in to doubles and not doubles? How do you know they've been doubled?

What comes next in my table, why?

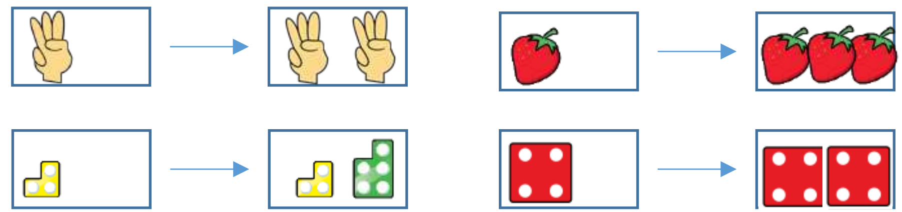
How can we show the double differently?

If double 2 is 4, what is double 20?
What is the largest double we can roll on a normal dice?

Varied Fluency

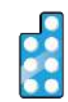
R

- Circle the representations which have been doubled:

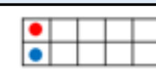
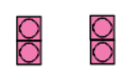
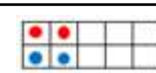
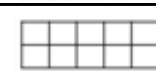
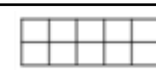


- Take a number piece and double it. Complete the sentence.

 Double ____ is ____

 Double ____ is ____

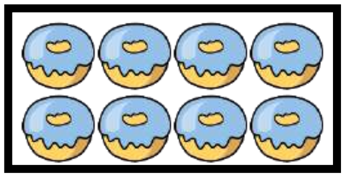
- Complete and continue the table.

Build	Represent	Add	Double
		1 + 1 = 2	Double 1 is 2
		2 + 2 = __	Double 2 is __
		3 + 3 = __	Double 3 is __
		__ + __ = __	Double 4 is __

Making Doubles

Reasoning and Problem Solving

Louise doubles her donuts. The picture shows what she had after she doubled her donuts.



Whitney

Louise started with 4 and ended with 8 donuts.

Eva

Louise started with 8 and ended with 16 donuts.

Mo

Louise started with 2 and ended with 4 donuts.

Who do you agree with? Explain why.

Possible answer:
Whitney is correct because the image shows what she was left with. She had 8 after she doubled and double 4 is 8

Complete the table by doubling each number.

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

What patterns do you notice?

Possible answer:

1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16
9	18
10	20

The doubles increase by 2 each time.
The doubles are all even.
The doubles end in 2,4,6,8 or 0

The 2 Times-Table

Notes and Guidance

Children should be comfortable with the concept of multiplication so they can apply this to multiplication tables.

Images, as well as number tracks, should be used to encourage children to count in twos.

Resources such as cubes and number pieces are important for children to explore equal groups within the 2 times-table.

Mathematical Talk

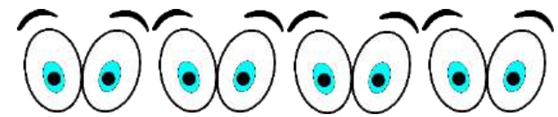
If 16 p is made using 2 p coins, how many coins would there be?

How many 2s go into 16?

How can the images of the 5 bicycles help you to solve the problems?

Varied Fluency

- Count in 2s to calculate how many eyes there are.



There are ____ eyes in total.

____ × ____ = ____

- Complete the number track.

2	4		8		12

14	16	18			24

	2	4	6	8	

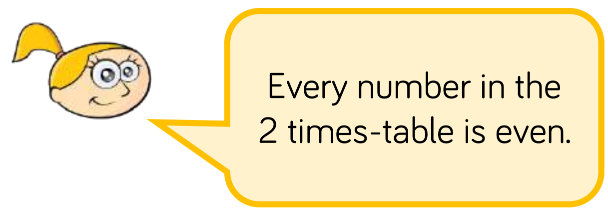
- How many wheels are there on five bicycles?

If there are 14 wheels, how many bicycles are there?

The 2 Times-Table

Reasoning and Problem Solving

Fill in the blanks. $3 \times \_\_\_ = 6$ $\_\_\_ \times 2 = 20$ $\_\_\_ = 8 \times 2$	2 10 16
Tommy says that $10 \times 2 = 22$ Is he correct? Explain how you know.	No Tommy is wrong because $10 \times 2 = 20$ Children could draw an array or a picture to explain their answer.

Eva says,  Is she correct? Explain your answer.	Yes, because 2 is even, and the 2 times-table is going up in 2s. When you add two even numbers the answer is always even.

The 5 Times-Table

Notes and Guidance

Children can already count in 5s from any given number. They will also have developed understanding of the 2 times-table.

This small step is focused on the 5 times table and it is important to include the use of zero. Children should see the = sign at both ends of the calculation to understand that it means 'equals to'.

Mathematical Talk

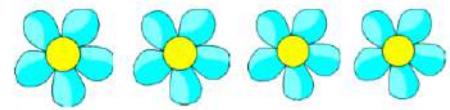
If there are 30 petals, how many flowers? Can you count in 5s to 30? How many 5s go into 30?

How many 5s go into 35?

What does each symbol mean?

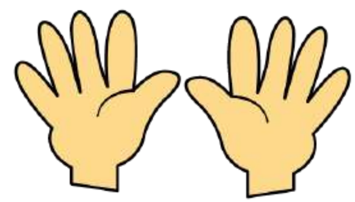
Varied Fluency

- How many petals altogether?



Write the calculation.

- There are 35 fingers.
How many hands?



$\_\_\_ \times 5 = 35$

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

$2 \times 5 \bigcirc 5 \times 2$

$3 \times 2 \bigcirc 4 \times 5$

$10 \times 5 \bigcirc 5 \times 5$

The 5 Times-Table

Reasoning and Problem Solving

Is Mo correct?

Explain your answer.

Mo is incorrect because some of the multiples of the five times-table are even, e.g. 10, 20, 30

Tubes of tennis balls come in packs of 2 and 5

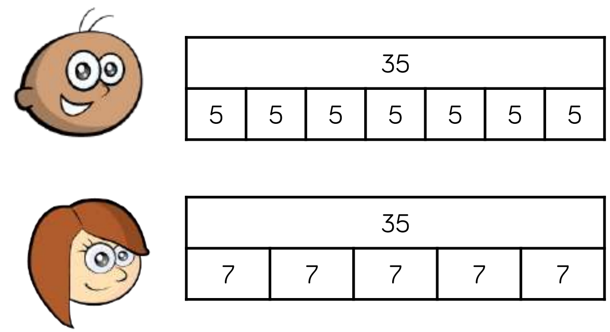
Whitney has 22 tubes of balls.

How many of each pack could she have?

How many ways can you do it?

Whitney could have:
4 packs of 5 and 1 pack of 2,
11 packs of 2 and 0 packs of 5,
2 packs of 5 and 6 packs of 2

Tommy and Rosie have both drawn bar models to show 7 × 5



What's the same and what is different about their bar models?

Draw your own bar model to represent 4 × 5

The total shown is the same.
Tommy's bar shows seven lots of 5 whereas Rosie's bar show five lots of 7

Children can choose either way to represent 4 × 5

The 10 Times-Table

Notes and Guidance

Children have counted in 10s from any given whole number. This small step is focused on the 10 times-table and it is important to include the use of zero.

Children should see the = sign at both ends of the calculation to understand what it means.

Mathematical Talk

What if there were 10 packs of crayons?

If there are 50 crayons altogether, how many packets are there? How do you know?

How many tens go into 30? Can you count in 10s to 30?

What does greater than mean? What does less than mean?

Varied Fluency

- How many crayons are there altogether?

There are ____ crayons altogether.

____ × 10 = ____

- Altogether there are 30 bottles, how many walls are there?

__ × 10 = 30

- Think of a multiplication fact for 10s to go in each box.

smallest		greatest
2 × 10		9 × 10

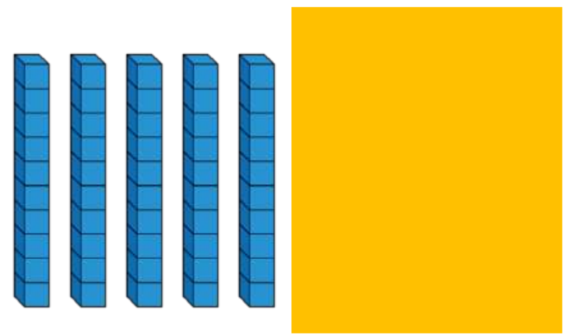
smallest		greatest
0 × 10		2 × 10

smallest		greatest
	1 × 10	6 × 10

smallest		greatest
	5 × 10	

The 10 Times-Table

Reasoning and Problem Solving

On sports day, Jack runs 10 metres, 7 times.  Which of these calculations do **not** describe this word problem? 10 + 7 7 × 10 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 10 + 10 + 10 + 10 + 10 + 10 + 10 Explain why.	10 + 7 is incorrect because he has run 10 metres, 7 times, not 10 metres then 7 metres. 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 is incorrect because he does not run 7 metres each time but 10 metres.
Some Base 10 is hidden. The total is less than 100 What could the calculation be?  ___ × 10 = ___ Tim says it could be 10 × 10 Is he correct? Explain your answer.	It could be 6 × 10 = 60 7 × 10 = 70 8 × 10 = 80 9 × 10 = 90 It can't be 10 × 10 because 100 is not less than 100, it is equal to 100.

Sharing Equally

Notes and Guidance

Children explore sharing as a model of division.
They use 1 : 1 correspondence to share concrete objects into equal groups.

Children also need to be given the opportunity to see when a number of objects cannot be shared equally into equal groups.

Mathematical Talk

How can I share the muffins equally?

How many muffins on this plate? How many on this plate? Are they equal? If I had 9 muffins what would happen?

How can I share the objects equally? How many equal groups am I sharing the objects into? Are the groups equal? Are there any left over?

Varied Fluency

R

- Share the muffins equally between the two plates.
Complete the sentence.
___ cakes shared equally between 2 is ___

- Collect 20 cubes. Use hoops to represent your friends.
Can you share the cubes between 5 friends?
20 shared between 5 equals ____
Can you share the cubes between 2 friends?
20 shared between 2 equals ____
Can you share the cubes between 10 friends?
20 shared between 10 equals ____

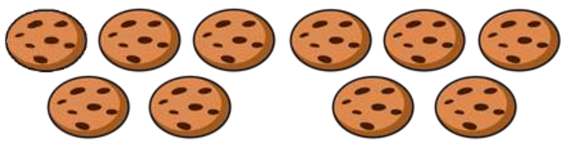
- Tim has 16 bananas.
He shares them equally between two boxes.
How many bananas are in each box?
Represent and solve the problem.

Sharing Equally

Reasoning and Problem Solving

R

Dora has 10 biscuits.



She wants to share them equally at her party.

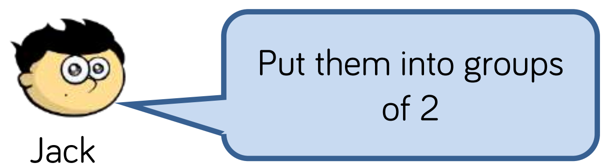
How many people could be at the party?

Possible answers:

There could be:
10 people
5 people
2 people
1 person (Dora)

There are 10 cakes and 2 boxes.

An equal amount needs to be put into each box.



Jack

Eva

Who is correct?
Explain your answer.

Possible answer:

Eva is correct. She has shared the cakes equally and put 5 into each box.

Make Equal Groups - Sharing

Notes and Guidance

Children divide by sharing objects into equal groups using one-to-one correspondence. They need to do this using concrete manipulatives in different contexts, then move on to pictorial representations.

Children will be introduced to the '÷' symbol. They will begin to see the link between division and multiplication.

Mathematical Talk

How many do you have to begin with?
How many equal groups are you sharing between?
How many are in each group?
How do you know that you have shared the objects equally?

___ has been shared equally into ___ equal groups.
I have ___ in each group.
___ groups of ___ make ____

Varied Fluency

- Share the 12 cubes equally into the two boxes.

  There are ___ cubes altogether.
  There are ___ boxes.
  There are ___ cubes in each box.

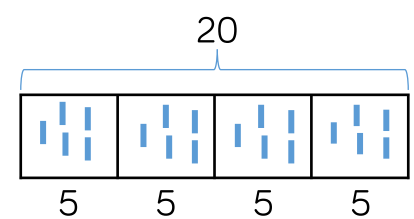
  

  Can you share the 12 cubes equally into 3 boxes?

- 24 children are put into 4 equal teams.
  How many children are in each team?

  Can you use manipulatives to represent the children to show how you found your answer?

- Ron draws this bar model to divide 20 into 4 equal groups.
  How does his model represent this?
  He writes $20 \div 4 = 5$

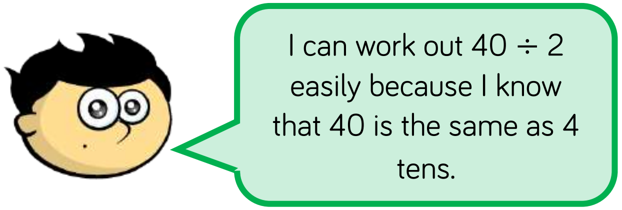
  

  What other number sentences could Ron create using his model?

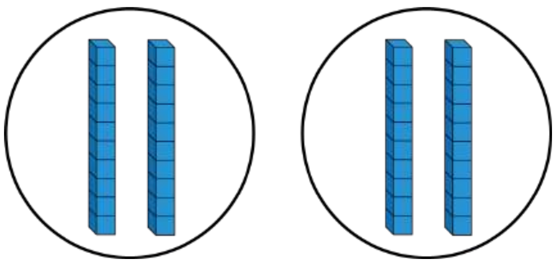
Make Equal Groups - Sharing

Reasoning and Problem Solving

Jack says,



This is what he does:



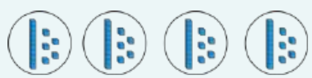
$40 \div 2 = 20$

Is it possible to work out $60 \div 3$ in the same way?
Prove it.

Is it possible to work out $60 \div 4$?
What is different about this calculation?

Possible answer :

For $60 \div 4$ the children will need to exchange 2 tens for 20 ones so they can put one 10 and 5 ones into each group.



Alex has 20 sweets and shares them between 5 friends.

Tommy has 20 sweets and shares them between 10 friends.

Whose friends will receive the most sweets?

How do you know?

Alex's friends get more because Tommy is sharing with more people so they will get fewer sweets each. Alex's friends will get 4 sweets each whereas Tommy's friends will only get 2 sweets each.

Make Equal Groups - Grouping

Notes and Guidance

Children start with a given total and make groups of an equal amount. They record their understanding in sentences, not through formal division at this stage.

Children can develop their understanding of equal groups by also being exposed to numbers which do not group equally.

Mathematical Talk

How can you tell if the groups are equal? How can you represent the equal groups? Do all numbers divide into equal groups of 2?

How do you sort the cubes into equal groups?

What would happen if there were 21 cubes?

Have I got equal groups?

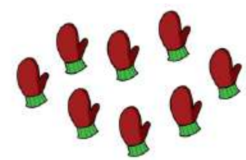
How do you know?

Does each group need to be arranged in the same way for it to be equal?

Varied Fluency

R

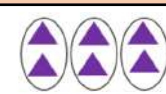
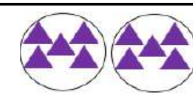
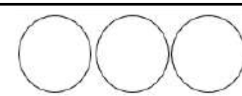
- How many equal groups of 2 can you make with the mittens?



There are ___ groups of 2 mittens.
If you had 10 mittens, how many equal groups of 2 mittens could you make?

- Take 20 cubes. Complete the sentences.
I can make ___ equal groups of 2
I can make ___ equal groups of 5
I can make ___ equal groups of 10

- Complete the table. Use equipment to help you.

Representation	Description
	There are ___ altogether. There are ___ equal groups of ___
	There are ___ altogether. There are ___ equal groups of ___
	15 has been sorted into 3 equal groups of 5
	___ has been sorted into ___ equal groups of ___

Make Equal Groups - Grouping

Reasoning and Problem Solving

Tommy and Jack each have the same number of sweets.  Tommy has 5 equal groups of 2 Jack has 1 equal group. How many sweets are in Jack's group?	Jack has 10 sweets in his group.

I am thinking of a number between 20 and 30 I can only make equal groups of 5 What must my number be? What happens when I try to make groups of 2 with it? What happens when I try to make groups of 10 with it?	Answer: 25 Children can use practical equipment to solve this and discover what happens. If you make equal groups of 2 with it there will be 1 left over. If you make equal groups of 10 with it there will be 5 left over.

Make Equal Groups - Grouping

Notes and Guidance

Children divide by making equal groups. They then count on to find the total number of groups.

They need to do this using concrete manipulatives and pictorially in a variety of contexts.

They need to recognise the link between division, multiplication and repeated addition.

Mathematical Talk

How many do you have to begin with?
How many are in each group?
How many groups can you make?

How long should your number line be?
What will you count up in?

_____ groups of _____ make ______

Varied Fluency

- Pencils come in packs of 20
  We need to put 5 in each pot.
  How many pots will we need?

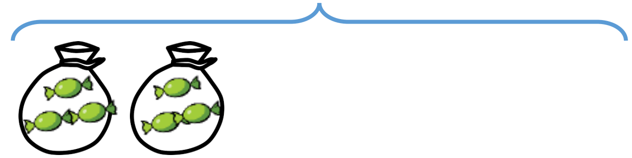
  

  There are ___ pencils altogether.
  There are ___ pencils in each pot.
  There are ___ pots.

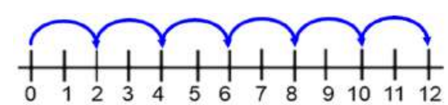
- Mrs Green has 18 sweets.
  She puts 3 sweets in each bag.
  How many bags can she fill?

  $\boxed{18} \div \boxed{3} = \boxed{}$

  18

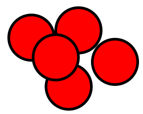
- Mo uses a number line to work out how many equal groups of 2 he can make from 12

  Use a number line to work out how many equal groups of 5 you can make from 30

Make Equal Groups - Grouping

Reasoning and Problem Solving

You have 30 counters.  How many different ways can you put them into equal groups? Write down all the possible ways.	10 groups of 3 3 groups of 10 6 groups of 5 5 groups of 6 2 groups of 15 15 groups of 2 1 group of 30 30 groups of 1
Amir has some counters. He makes 5 equal groups.  The amount he started with is greater than 10 but less than 35 How many counters could he have started with? How many will be in each group?	He could have 30 counters in 5 groups of 6 25 counters in 5 groups of 5 20 counters in 5 groups of 4 15 counters in 5 groups of 3

Divide by 2

Notes and Guidance

Children should be secure with grouping and sharing. They will use this knowledge to help them divide by 2

They will be secure with representing division as an abstract number sentence using the division and equals symbol.

Children should be able to count in 2s and know their 2 times table.

Mathematical Talk

What do you notice when you group these objects into twos?

Is there a link between dividing by 2 and halving?

What is different about sharing into two groups and grouping in twos?

Can we write a multiplication sentence as well as a division sentence? What do you notice?

Varied Fluency

- Complete the stem sentences.

I have ___ cubes altogether.
There are ___ in each group.
There are ___ groups.

$\square \div \square = \square$

$\square \times \square = \square$

- Group the socks into pairs.

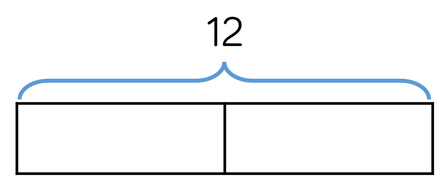
Complete the number sentences.

$\square \div \square = \square$

$\square \times \square = \square$

- Mo and Tommy have 12 sweets between them. They share them equally. How many sweets does each child get?

There are ___ sweets altogether.
There are ___ groups.
There are ___ in each group.

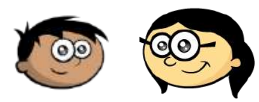


Complete the bar model and write a calculation to match.

Divide by 2

Reasoning and Problem Solving

I have 24p. I divide it equally between 2 friends. How much will they get each? I have 24p in 2p coins. How many 2p coins do I have? Consider the two questions above. What is the same and what is different?	The calculation is the same in both. In the first question we are sharing, whereas in the second question we are grouping.
Tommy and Annie have some counters. Tommy shares his counters into 2 equal groups. He has 15 in each group. Annie groups her counters in twos. She has 19 groups. Who has more counters and by how many? How did you work it out?	Tommy has 30 counters. Annie has 38 counters. Annie has 8 more. Children could have compared 15 and 19 and realised they could have done 2×4

Ron has shared some grapes equally between two friends.  Ron's friends Each friend receives fewer than 50 grapes. Complete the sentences to describe the number of grapes Ron started with. He must have started with… He could have started with… He can't have started with…	Possible answer: He must have started with an even number of grapes. He could have started with 40 grapes. He can't have started with 100 grapes.

Odd & Even Numbers

Notes and Guidance

Building on from Year 1, children should be able to recognise odd and even numbers.

They will use concrete manipulatives to explore odd and even numbers and the structure of these.

Mathematical Talk

Can you sort these objects (number pieces, ten frames, cubes, pictures etc) into an odd set and an even set?

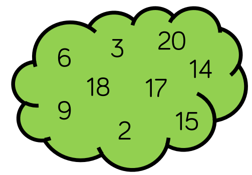
What makes these odd/even?

How do you find out if ___ is an odd or even number?

Can you find all the odd and even numbers on a 100 square? What do you notice?

Varied Fluency

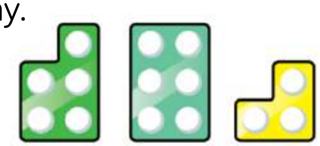
- Use counters to make each number and share them into two equal groups. How does this help you decide whether a number is odd or even? Show this in the table.



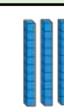
odd	even

Can you see any patterns?

- Which number pieces are odd? Explain why. Find or draw other odd and even pieces. What do you notice?



- Spot the mistakes:

odd	even
nine  1 6  3 	 10  eight 25 

Can you make your own odd and even sets?

Odd & Even Numbers

Reasoning and Problem Solving

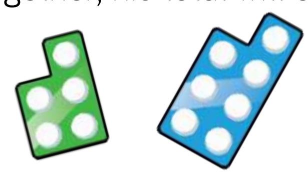
True or false?

12 is an odd number.

Prove your answer using concrete, pictorial and abstract representations. Explain each approach.

Children can use concrete or pictorial methods to show 12 is divisible by 2 and therefore it's false.

Tommy says that when he adds two odd numbers together, his total will be even.

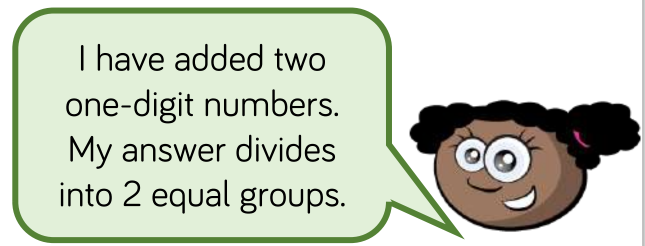


Is he correct? Convince me.

What else can you find out?

Tommy is correct because two odd numbers will always make an even total. Children can use any manipulatives to show this.

Whitney says,



What could Whitney's numbers be?

Is this the only possible answer?

Which numbers would not be possible?

Explain your answers.

Any two even one digit numbers or any two odd one digit numbers will give an even total.
E.g. $1 + 3 = 4$
$2 + 4 = 6$

However, an odd number added to an even number will give an odd total so Whitney could not have this combination.

Divide by 5

Notes and Guidance

During this step, children focus on efficient strategies and whether they should use grouping or sharing depending on the context of the question.

They use their knowledge of the five times table to help them divide by 5

They will continue to see the = sign both before and after the calculation.

Mathematical Talk

How can we represent the problem using objects/images?

How does knowing your 5 times table help when dividing by 5?

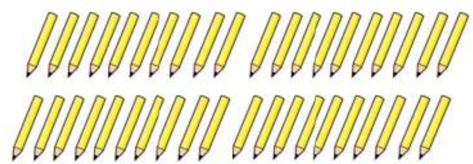
Circle all the multiples of 5 on a 100 square. What do you notice about the numbers? Can you explain the pattern? How does this help you to divide these numbers?

When would we count in 5s?

Varied Fluency

- Take 30 cubes.
  How many towers of 5 can you make?
  You can make ___ towers of 5
  ___ towers of 5 is the same as 30
  30 is the same as ___ towers of 5

- 40 pencils are shared between 5 children.



$\square \div \square = \square$

How many pencils does each child get?

- Group the 1p coins into 5s.
  How many 5p coins do we need to make the same amount of money?
  Draw coins and complete the missing information.

  - ___ lots of 5p = 20 one pence coins
  - ___ lots of 5p = 20p
  - 20p = ___ × 5p
  - 20p ÷ 5 = ___

Divide by 5

Reasoning and Problem Solving

A party bag contains 5 sweets.
A jar contains 5 party bags.

Ron has 75 sweets.

How many party bags will he need?

How many jars will he need?

15 party bags.
3 jars.

Use the number cards to make multiplication and division sentences.

How many can you make?

2 20 5
10 4

$4 \times 5 = 20$
$5 \times 4 = 20$
$20 \div 4 = 5$
$20 \div 5 = 4$
$5 \times 2 = 10$
$2 \times 5 = 10$
$10 \div 2 = 5$
$10 \div 5 = 2$
$20 \div 2 = 10$
$20 \div 10 = 2$
$2 \times 10 = 20$
$10 \times 2 = 20$

Divide by 10

Notes and Guidance

Children should already be able to multiply by 10 and recognise multiples of 10. They will need to use both grouping and sharing to divide by 10 depending on the context of the problem.

Children start to see that grouping and counting in 10s is more efficient than sharing into 10 equal groups.

Mathematical Talk

What can we use to represent the problem?

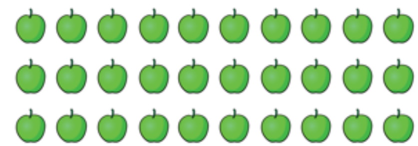
How does knowing your 10 times table help you to divide by 10?

Circle all the multiples of 10 on a hundred square. What do you notice? Can you explain the pattern?

How many groups of 10 are there in ___ ?

Varied Fluency

- Apples can be sold in packs of 10
  How many packs can be made below?



$\square \div \square = \square$

When 30 apples are sold in packs of 10, ___ packs of apples can be made.
Can you show this in a bar model?
Label and explain what each part represents.

- I have 70p in my pocket made up of 10p coins. How many coins do I have? Draw a picture to prove your answer.

- Fill in the missing numbers.

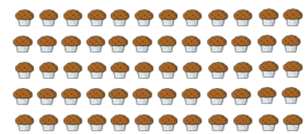
  - $70 \div 10 =$ ___
  - 6 tens $\div$ 1 ten = ___
  - $5 =$ ___ $\div 10$
  - There are ___ tens in 40

Divide by 10

Reasoning and Problem Solving

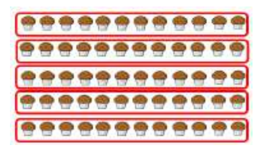
Mrs Owen has some sweets. She shares them equally between 10 tables. How many sweets could each table have? Find as many ways as you can. What do you notice about your answers?	They could have: $10 \div 10 = 1$ $20 \div 10 = 2$ $30 \div 10 = 3$ $40 \div 10 = 4$ $50 \div 10 = 5$ etc The tens digit is the same as the answer.
True or false? Dividing by 10 is the same as dividing by 5 then dividing by 2	True

Cakes are sold in boxes of 10
Jack and Alex are trying to pack these cakes into boxes.

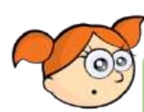


Jack says,

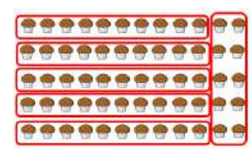
There are 5 groups of 10



Alex says,



There are 6 groups of 10



Who is correct? Explain how you know.

Alex is correct because there are 60 cakes and 60 divided by 10 is 6

Jack has incorrectly grouped the cakes, he might have counted the rows wrong. He hasn't put them in 10s. He incorrectly assumed there were 10 in each row.

Spring - Block 2

Statistics

Overview

Small Steps

Notes for 2020/21

- Make tally charts
- Draw pictograms (1-1)
- Interpret pictograms (1-1)
- Draw pictograms (2, 5 and 10)
- Interpret pictograms (2, 5 and 10)
- Block diagrams

This block leads on really nicely from multiplication and division.

Have fun with the children, gaining information about each other and creating pictograms and block diagrams practically.

Make Tally Charts

Notes and Guidance

Children are introduced to tally charts as a systematic method of recording data.

They should already be able to count in 5s and understand the vocabulary of total, altogether, more, less and difference.

Mathematical Talk

What do you notice about the groups? How would we count these?

How would you show 6, 11, 18 as a tally?

Why do we draw tallys like this?

When do we use tallys?

Varied Fluency

Complete the tally chart.

Favourite Colour	Tally	Total
Blue	𝍸 𝍷𝍷𝍷	
Red	𝍸 𝍸 𝍷𝍷	
Yellow	𝍷𝍷	
Green	𝍷𝍷𝍷	

What does the data tell you? Tell me the story.

Complete the tally chart for Year 2 and Year 3

Year Group	Tally	Total
Year 1	𝍸 𝍸	10
Year 2		19
Year 3	𝍸 𝍸 𝍸 𝍸 𝍷𝍷	
Year 4	𝍸 𝍸 𝍸 𝍷𝍷	17

Make a tally chart about one of the following topics:

- Equipment in class (scissors, glue etc.)
- Favourite sport
- Favourite fruit
- Ways of getting to school (walk, car, cycle etc.)
- A choice of your own

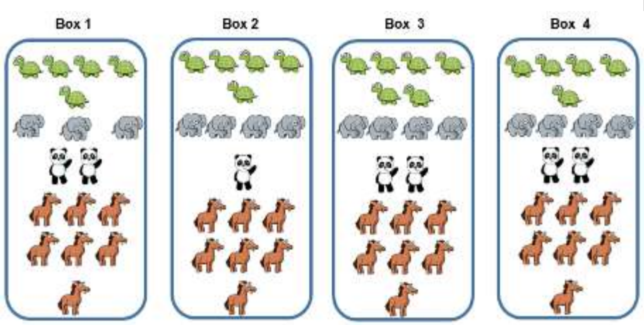
Make Tally Charts

Reasoning and Problem Solving

Dexter makes a tally chart of the animals he saw at the zoo

Animal	Tally
	𝍸
	IIII
	II
	𝍸 II

Tick one box below that shows all of the animals Dexter saw and explain why the others are incorrect.



Box 1 is incorrect because there are not enough elephants to match the tally chart.

Box 2 is incorrect because there are not enough pandas to match the tally chart.

Box 3 is incorrect because there are too many turtles.

Class 1 and Class 2 were each asked their favourite ice-cream flavours. Their results are shown in the tally charts.

Class 1	
Flavour	Total
Vanilla	𝍸 𝍸 𝍸
Chocolate	𝍸 𝍸 𝍸 𝍸
Strawberry	𝍸 II
Mint	I

Class 2	
Flavour	Total
Vanilla	𝍸 𝍸 II
Chocolate	𝍸 𝍸 𝍸 𝍸
Strawberry	𝍸
Mint	III

What is the same? What is different?

The same:
Both classes have 20 votes for chocolate. Both tally charts show that chocolate is the favourite flavour and mint is the least favourite flavour.
The order of preference for all four flavours is the same.
Different:
In Class 1, three more children like Vanilla. There are more children in Class 1 than Class 2. 2 more children chose mint in class 2

Draw Pictograms (1-1)

Notes and Guidance

Children use tally charts to produce pictograms. They build pictograms using concrete apparatus such as counters or cubes then move to drawing their own pictures.
They need to be able to complete missing column or rows.
They should use the same picture to represent all the data in the pictogram and line this up carefully.
It is important that children see pictograms both horizontally and vertically.

Mathematical Talk

How do you know how many images to draw?

What is the same and what is different about these two pictograms? (same data but shown horizontally and vertically)
Which pictogram is easier to read? Why?

What simple symbol could we draw to represent the data?
Why did you choose this?

Varied Fluency

Complete the pictogram.

Hair Colour		Total
Black	○ ○ ○ ○ ○	5
Blonde	○ ○ ○ ○ ○ ○ ○	
Brown		9
Ginger	○ ○ ○ ○	4

Key
○ = 1 person

Use the tally chart to help you complete the pictogram.

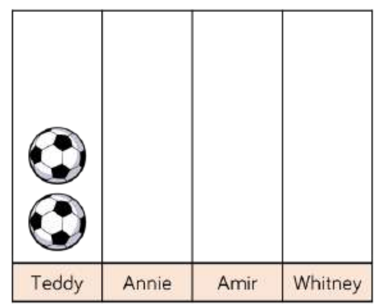
Fruit	Tally
Banana	𝍸 |
Grape	||||
Pear	𝍸 |||
Apple	|||

Fruit	
Banana	
Grape	
Pear	
Apple	○ ○ ○

Key
○ = ____

Complete the pictogram using the data given.

Name	Tally
Teddy	||
Annie	𝍸 ||||
Amir	𝍸
Whitney	𝍸 |

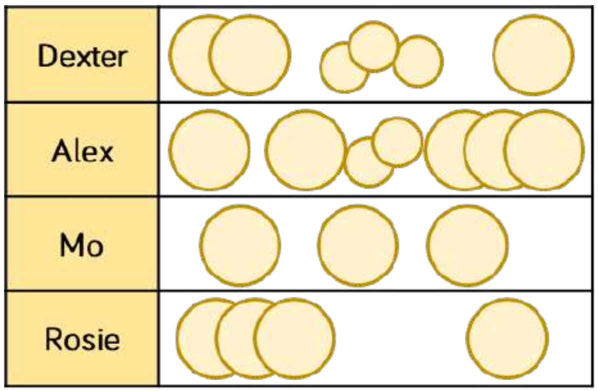


Key
⚽ = 1 goal

Draw Pictograms (1-1)

Reasoning and Problem Solving

Here is a pictogram showing the number of counters each child has.



How could you improve the pictogram?

Possible answer
Children show understanding that the pictogram is hard to read as the symbols are overlapping each other. The pictures must be lined up and evenly spaced. There are also different sized circles representing the data. The pictures need to be the same size. There isn't a key.

Use the clues below to help you complete the pictogram.

- More Caramel was sold than Bubblegum flavour, but less than Strawberry flavour.
- Mint was the most popular flavour.
- Vanilla was the least popular.

Flavour	= 1 ice cream	Total
Strawberry		
Vanilla		
Chocolate		
Mint		
Caramel		
Bubblegum		4

Can you find more than one way to complete the pictogram?

Various answers, e.g.
Strawberry – 8
Vanilla – 1
Chocolate – 4
Mint – 9
Caramel – 6
Bubblegum – 4

Interpret Pictograms (1-1)

Notes and Guidance

Children use their knowledge of one-to-one correspondence to help them interpret and answer questions about the data presented in pictograms.

It is important that children are able to compare data within the pictograms.

Mathematical Talk

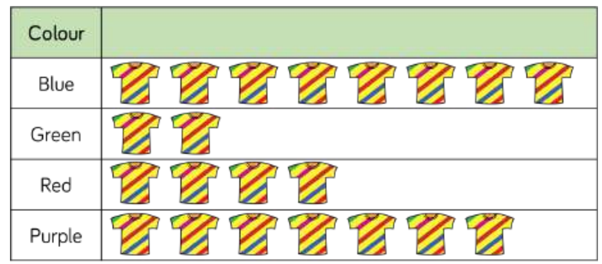
What is the pictogram showing us?

What can you find out from this pictogram?

Can you think of your own questions to ask a partner?

Varied Fluency

- Here is a pictogram to show Class 5s favourite t-shirts.



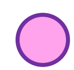
Key


= 1 T-shirt

What is the most popular colour t-shirt?
What colour is the least popular t-shirt?
How many more children chose blue t-shirts than red?
How many children are in Class 5?

- Here is a pictogram to show minibeasts collected by Class 5.

Key


= 1 minibeast

There are ____ ladybirds.
There are ____ centipedes and worms altogether.
There are ____ more worms than centipedes.
What else does the pictogram tell us?

Interpret Pictograms (1-1)

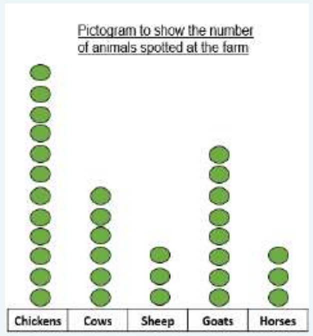
Reasoning and Problem Solving

Teddy writes these statements about his pictogram:

- There were more cows than sheep.
- There were the same number of sheep and horses.
- There were more chickens than any other animal.
- There were less cows than goats.
- There were 8 goats.

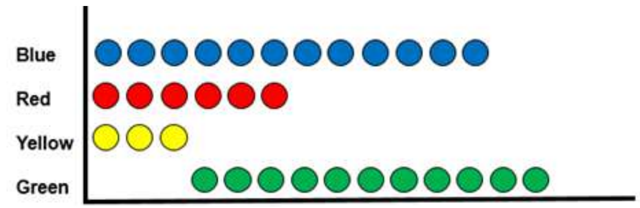
Can you draw a pictogram so that Teddy's statements are correct?
What title would you give it?

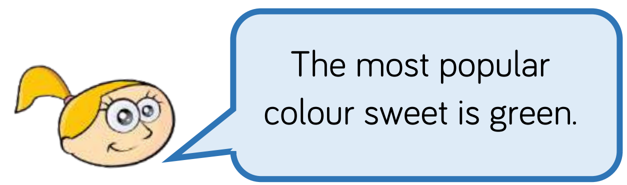
Possible answer



Children may have different numbers from this and still be correct.

Here is a pictogram.



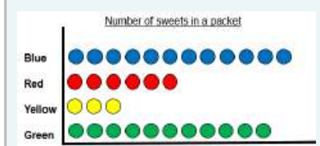


Do you agree with Eva?

Explain why and correct any mistakes.

Eva is wrong because the green sweets are not lined up correctly. There are 11 green and 12 blue.

It should look like this:



Draw Pictograms (2, 5 & 10)

Notes and Guidance

Children draw pictograms where the symbols represent 2, 5 or 10 items.

The children will need to interpret part of a symbol, for example, half of a symbol representing 10 will represent 5

Children count in twos, fives, and tens to complete and draw their own pictograms.

Mathematical Talk

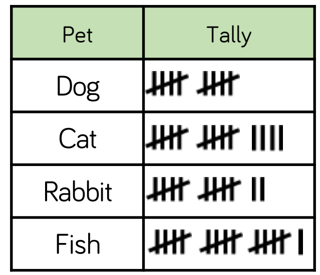
If a symbol represents 2, how can you show 1 on a pictogram? How can you show 5? How can you show any odd number?

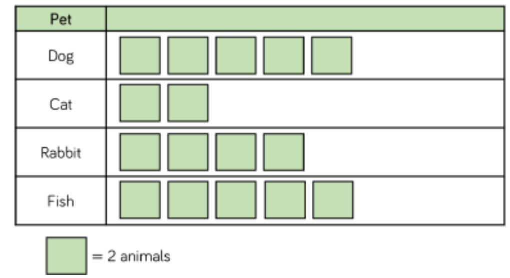
When would you use a picture to represent 10 objects?

Discuss with children that when using larger numbers, 1-1 correspondence becomes inefficient.

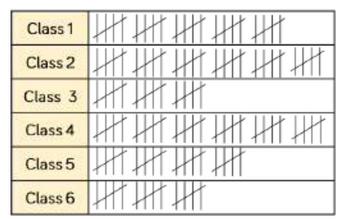
Varied Fluency

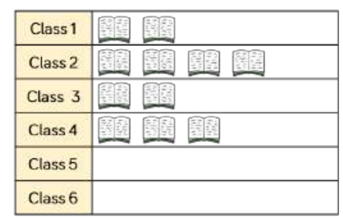
- Use the tally chart to complete the pictogram.





- Use the information to complete the pictogram about the number of books read in each class.

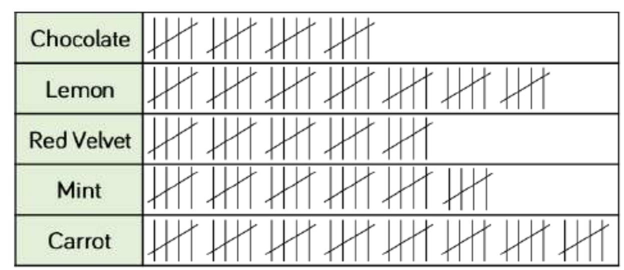




Key

 = 5 books

- Year 2 sell cakes at a bake sale. The tally chart shows the data.
Draw a pictogram to represent the data.



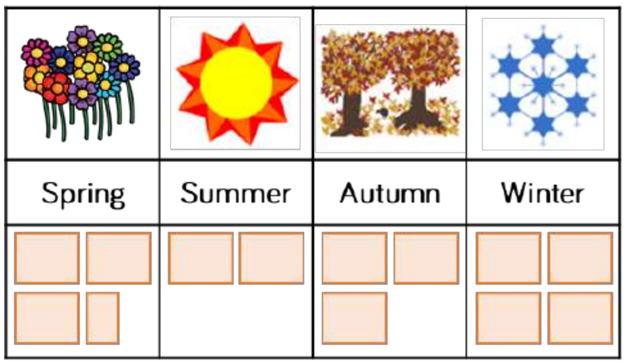
Draw Pictograms (2, 5 & 10)

Reasoning and Problem Solving

Create a pictogram to show who was born in what season in your class.

Use what you know about pictograms to help you.

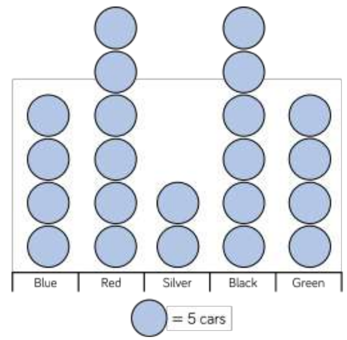
Here is an example.

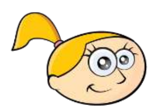


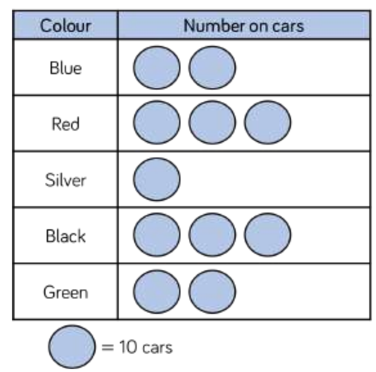
Key

= 2 children

Teddy and Eva both draw a pictogram to show how many cars they counted driving past their school.







What is the same? What is different? Whose pictogram do you prefer? Why?

Possible answer.

Same – both pictograms show the same information. Both easy to read. Both used circle. Both are in the same order.

Different – Eva counts in 10s, Teddy counts in 5s

Teddy's is vertical and Eva's is horizontal.

Interpret Pictograms (2, 5 & 10)

Notes and Guidance

To help children to fully understand pictograms, it is important they have collected their own data previously in tally charts and constructed larger scale pictograms practically.
Children also need to be able to halve 2 and 10

It is important the children are exposed to both horizontal and vertical pictograms.

Mathematical Talk

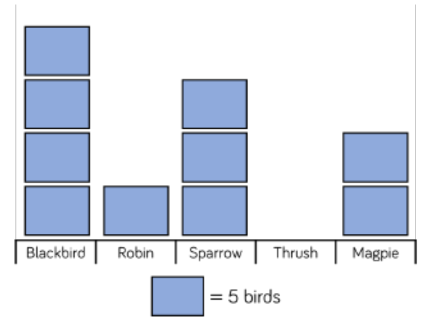
How can we represent 0 on a pictogram?

What does the pictogram show? What doesn't it show?

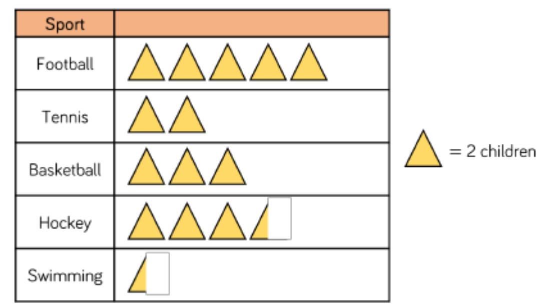
What is each symbol worth?

Varied Fluency

- How many more sparrows are there than robins?
  What is the total number of birds?
  How did you calculate this?
  Can you think of your own questions to ask a friend?



- Which is the most popular sport?
  How many children voted for football and swimming altogether?
  What could the title of this pictogram be?



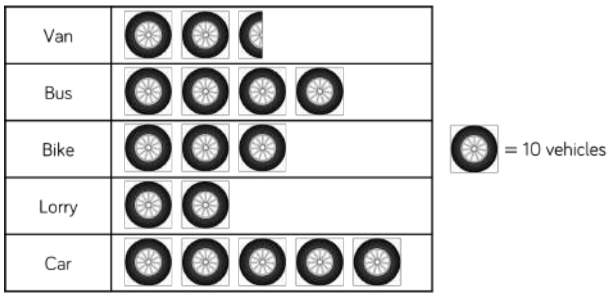
- Use the pictogram to decide if the statements are true or false.

Statement	True or False?
Horses were the least popular animal.	
The number of chickens seen was half the number of cows seen.	
The total amount of pigs and sheep is 70	
There were 8 cows on the farm.	
There were 10 fewer chickens than sheep.	

Interpret Pictograms (2, 5 & 10)

Reasoning and Problem Solving

Jack and Whitney have carried out a traffic survey.



Jack says;

If I add the number of lorries and bikes together then it will be equal to the number of cars

Is he right? Convince me.

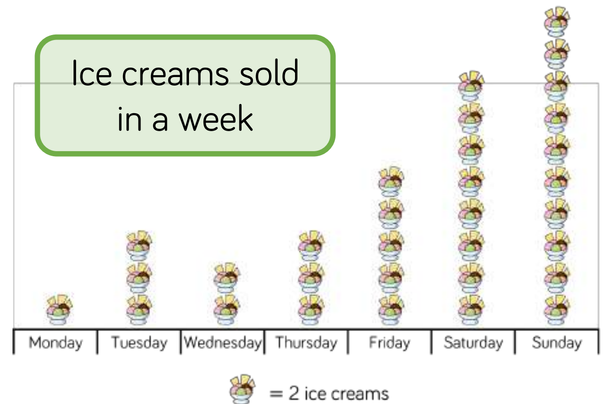
Whitney says;

To find the total number of vehicles I need to count the symbols. There are 16 and a half vehicles.

Is she correct? Explain your answer.

Jack is correct because there are 20 lorries and 30 bikes. That means there are 50 lorries and bikes altogether. This is the same as the number of cars.

Whitney is incorrect because she has ignored the key. That means there will be 165 cars, not 16 and a half.



Convince me

There are more ice-creams sold at the weekend than during the rest of the week.

True or False (Why?)

Three ice creams were sold on Tuesday.

Justify

If the staff needed to pick one day to have off during the week, which would be the best day and why?

There were 36 ice creams sold at the weekend and only 28 sold during the rest of the week.

There were not 3 ice creams sold on Tuesday, there were 6 sold. One symbol represents 2 ice creams.

The best day off would be Monday because that is the day they sold the least amount.

Block Diagrams

Notes and Guidance

Moving from concrete to pictorial, children build block diagrams using cubes and then move to drawing and interpreting block diagrams.

Children use their knowledge of number lines to read the scale on the chart and work out what each block represents.

Children ask and answer questions using their addition, subtraction, multiplication and division skills.

Mathematical Talk

Can you draw a block diagram to represent the data? What will each block be worth?

Can you make a block diagram to show favourite colours in your class?

Can you create your own questions to ask about the block diagram?

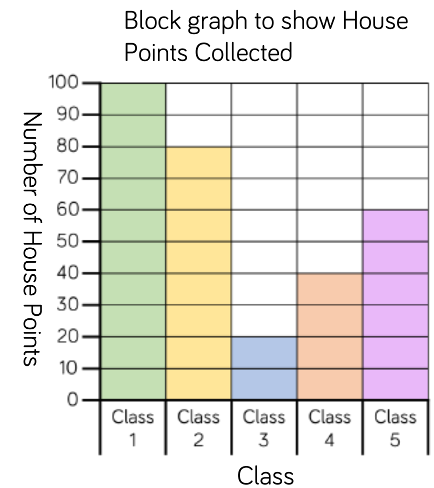
Varied Fluency

Class 4 are collecting data about favourite colours.

Colour	Number of children
Red	5
Green	8
Blue	7
Yellow	2

Make a block diagram using cubes to represent the data. Now draw the block diagram. What will the title be? Remember to label the blocks and draw a clear scale.

5 classes collected their house points. Here are their results.
Which class collected the most house points?
Which class collected the fewest house points?
How many more points did Class 2 get than Class 4?
How many fewer points did Class 3 get than Class 5?
How many points did Class 2 and Class 3 get altogether?



Block Diagrams

Reasoning and Problem Solving

Here are three tables of data.
Which set of data could you display using the block graph?
Which could use the pictogram?
Which could use the tally chart?
Explain your reasoning.

Data Set 1

Team	Goals scored
A	20
B	32
C	27
D	16

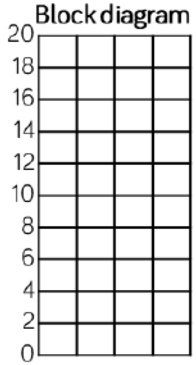
Data Set 2

Player	Points
1	20
2	65
3	80
4	45

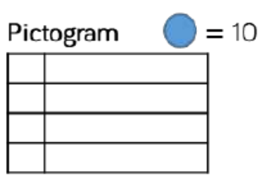
Data Set 3

Name	Score
Ron	20
Eva	12
Amir	6
Mo	16

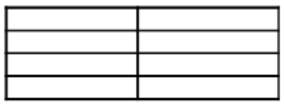
Block diagram



Pictogram



Tally Chart



Data Set 3 would best suit the block diagram because the numbers are all under 20

Data Set 2 would best suit the pictogram because the numbers are larger but all multiples of 5 or 10

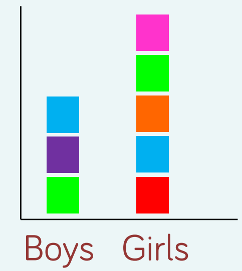
Data Set 3 would best suit the tally chart because some numbers are larger than 20 but not all multiples of 5 or 10

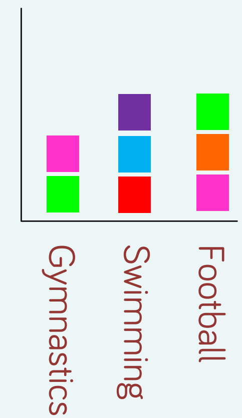
Split into groups.
Everyone needs to write their name on a sticky note.
Use your sticky notes to create a block diagram to answer each question.

- How many boys and how many girls are there in your group?
- Which month has the most birthdays for your group?
- What is your favourite sport?

What other information about your group could you show?

Possible examples:





White Rose Maths

Spring - Block 3

Shape

Overview

Small Steps

- Recognise 2-D and 3-D shapes
- Count sides on 2-D shapes
- Count vertices on 2-D shapes
- Draw 2-D shapes
- Lines of symmetry
- Sort 2-D shapes
- Make patterns with 2-D shapes
- Count faces on 3-D shapes
- Count edges on 3-D shapes
- Count vertices on 3-D shapes
- Sort 3-D shapes
- Make patterns with 3-D shapes

Notes for 2020/21

Children have briefly covered 2-D and 3-D shapes in Year 1. Now there is an opportunity to delve deeper into this concept.

Ensure correct mathematical language is used throughout to help equip children for the future. From this point on 'vertices' should used to describe corners of shapes.

Try to make this block as practical as possible and use outdoor space to explore shapes in nature.

Recognise 2-D and 3-D Shapes

Notes and Guidance

Before learning about their properties, children need to recognise and name both 2-D and 3-D shapes and to be able to differentiate between them. They begin to understand that 2-D shapes are actually flat and the manipulatives they handle in class are representations of the shapes. Children also need to be able to recognise 2-D shapes in different orientations and proportions.

Mathematical Talk

What is the difference between a 2-D and 3-D shapes?

What shape is this? If I turn it around, what shape is it now?

Can you draw around any of the faces on your 3-D shapes? Which 2-D shapes can you make?

Varied Fluency

- Match the names of the shapes to the pictures.

  Square Triangle Rectangle Circle

- Put a combination of 3-D shapes in a feely bag. Can you find the cube, the cone, the cylinder? What do you notice about each shape?

  How did you know that was the right shape?

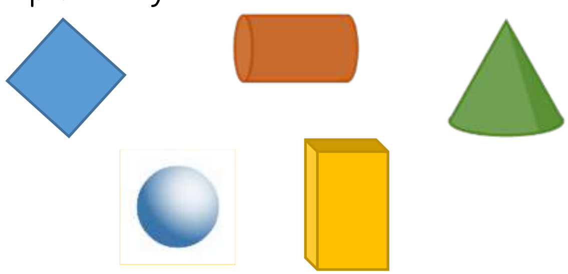
  What were you feeling for?

- Go on a shape hunt around school.
  Create a tally of the shapes you see.
  Can you see any pentagons?
  Can you see any octagons?
  Can you see any hexagons?
  What was the most common shape?

Recognise 2-D and 3-D Shapes

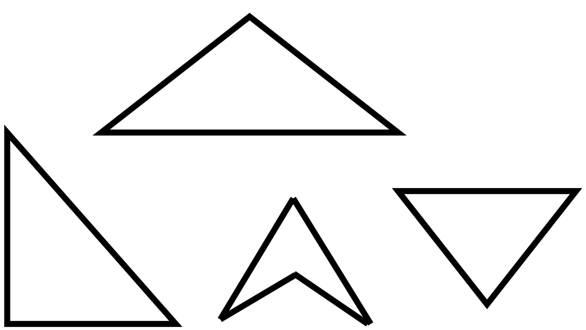
Reasoning and Problem Solving

Which shape is the odd one out?
Explain why.



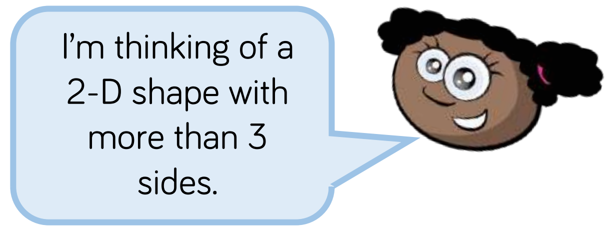
The square is the odd one because it is the only 2-D shape or flat shape.

Which shape is the odd one out?
Explain your reasoning.



Three of the shapes are triangles, one is not. Three of them have three sides, one has four.

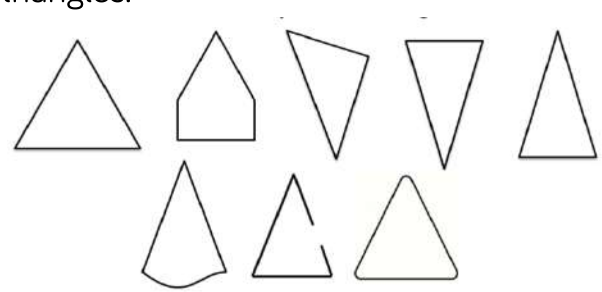
Other answers can be accepted with a clear explanation.



What shape could Whitney be thinking of?
Are there any other shapes it could be?
What shape is Whitney definitely not thinking about? How do you know?

Possible examples:
square
rectangle
pentagon
hexagon
octagon
Whitney is not thinking of a triangle because it only has 3 sides.

Use true or false to say which shapes are triangles.



True, false, true, true, true, false, false, false

Count Sides on 2-D Shapes

Notes and Guidance

Children should be encouraged to develop strategies for accurate counting of sides, such as marking each side as it has been counted.

Children also need to understand that not all same-sided shapes look the same, such as irregular 2-D shapes.

Mathematical Talk

What is a side?

How can you check that you have counted all the sides?

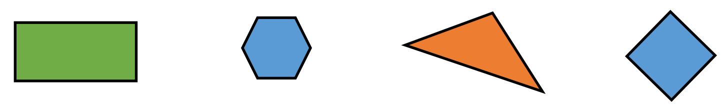
Do all four-sided shapes look the same?

Why do you think the shapes have the names that they do?

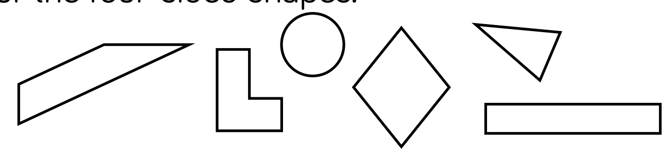
Varied Fluency

- Match the shapes to the number of sides.

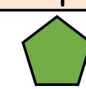
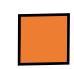
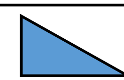
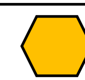
Six Four Three



- Colour the four-sided shapes.



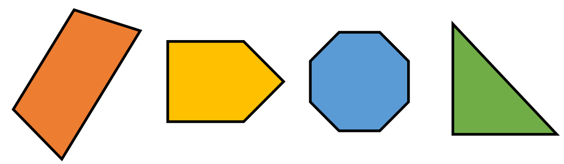
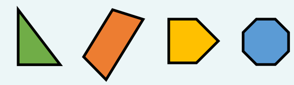
- Complete the table.

Name	Shape	Number of sides
Pentagon		
Rectangle		
Square		
Triangle		
Hexagon		

Count Sides on 2-D Shapes

Reasoning and Problem Solving

Here are 18 lollipop sticks. How many hexagons can you make?  How many octagons can you make? What other shapes can you make with 18 lollipop sticks?	Using one stick per side: 3 hexagons, 2 octagons with 2 lollipop sticks spare, 6 triangles, 4 squares or 3 pentagons. May also create shapes with more than one stick on each side.
Mo makes a rectangle using the sticks. How many identical rectangles could he make with 18 sticks? Make your own rectangle. How many sticks did you use? Is your rectangle the same as your friend's?	Mo could make 3 rectangles using 6 sticks. Talk about how rectangles can look differently.

If I put these shapes into order from the smallest number of sides to the largest, which shape would come third?  Where would a hexagon come in the list? Why?	triangle, quadrilateral, pentagon, octagon  The pentagon would be third. A hexagon would come after the pentagon and before the octagon because it has 6 sides which is more than 5 and less than 8.

Count Vertices on 2-D Shapes

Notes and Guidance

Children are introduced to the terms vertex and vertices. They understand that a vertex is where two lines meet at a point. They recognise that corners are vertices and will be able to identify and count them on shapes.

Ensure from this point forwards the word vertex is used in place of corner throughout all content.

Mathematical Talk

Show me a vertex.

Can you identify the vertices in this shape?

Would this be a vertex? Explain why.

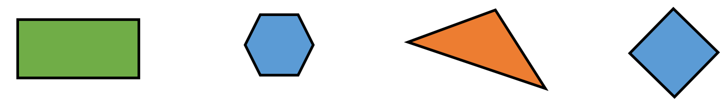
If my shape has ____ vertices, what could my shape be?

What couldn't it be?

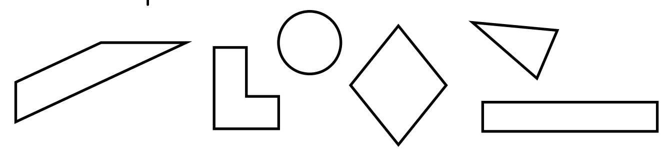
Varied Fluency

- Match the shapes to the number of vertices.

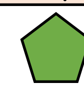
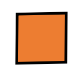
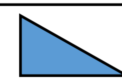
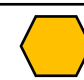
Six Four Three



- Colour the shapes with 4 vertices.



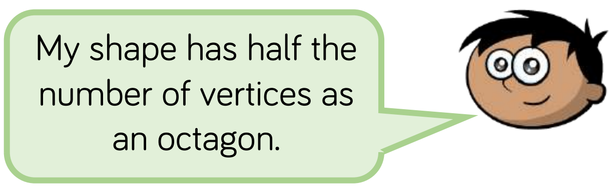
- Complete the table.

Name	Shape	Number of vertices
Pentagon		
Rectangle		
Square		
Triangle		
Hexagon		

Count Vertices on 2-D Shapes

Reasoning and Problem Solving

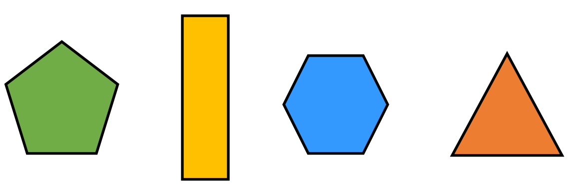
Amir says:



What shape could he have?

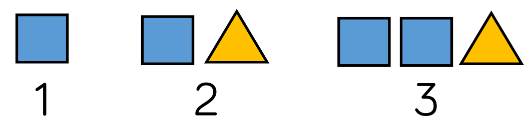
Square
Rectangle

Put these shapes in order based upon the number of vertices they have.



Triangle, rectangle, pentagon, hexagon

Jack has created a pattern using shapes.



How many vertices does each step in the pattern have?

What do you notice?

Can you predict how many vertices the next step in the pattern will have?

Is there more than one way to continue the pattern?

Can you create your own pattern and explore how the vertices change?

Possible answer:
4, 7, 11

The next step could have another square (15 vertices) or another triangle (14 vertices).

Draw 2-D Shapes

Notes and Guidance

Children use their knowledge of properties of shape to accurately create 2-D shapes. Children could use geo-boards to make shapes with elastic bands and look carefully at the number of sides and vertices.

Using geo-boards is a practical step to take before children draw their own shapes on dotted or squared paper.

Mathematical Talk

Compare your shape with a friend's shape. Is it in the same position? Is it the same size?

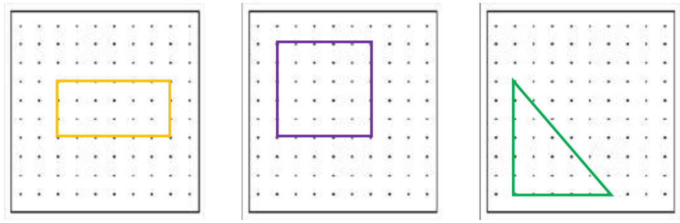
Where are you going to start drawing the shape?
In the middle of a side? At a vertex?
Which is the most efficient way?

Why is it important to use a ruler?

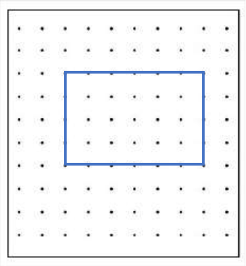
Is your shape an exact copy? How do you know?

Varied Fluency

- Use a geoboard to make different 2-D shapes. Can you make a rectangle? Can you make a square? Can you make a triangle?



- Can you draw a rectangle on dotted paper? Start at a vertex and use a ruler to draw your first straight side. How many straight sides will you need? Rotate the paper to help you draw the shape more accurately.
Try drawing other shapes in the same way.



- Choose a 2-D shape.
Build it on a geo-board.
Can you copy the shape onto dotted paper and squared paper?

Draw 2-D Shapes

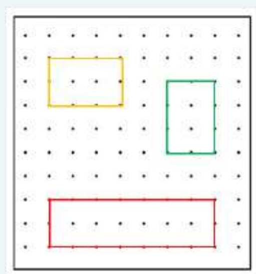
Reasoning and Problem Solving

Using geoboards, how many different rectangles can you make?

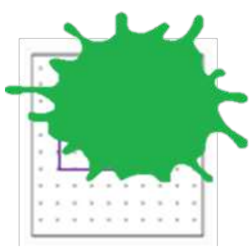
What's the same about the rectangles? What's different?

Has your friend made any different rectangles?

Possible answer:



What shape could be hiding under the spilt paint?



Prove your answer by drawing it.

Could be any 2-D shape.

Encourage children to think about irregular pentagons, hexagon, etc.

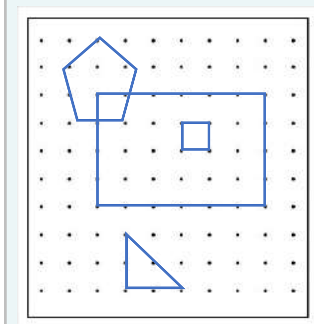
Draw a large rectangle on squared paper or dotted paper.

Draw a square inside the rectangle.

Draw a triangle below the rectangle.

Draw a pentagon that is bigger than the square.

Can you give instructions to your partner to help them draw different shapes?



Children may end up with a different picture from above however they should have four shapes drawn.

Lines of Symmetry

Notes and Guidance

Children are introduced to the concept of vertical lines of symmetry. They should be exposed to examples that are symmetrical and also examples that are not.

Children use a range of practical resources (mirrors, geoboards, paper folding) to explore shapes being halved along their vertical line of symmetry.

Mathematical Talk

Where is the vertical line of symmetry?

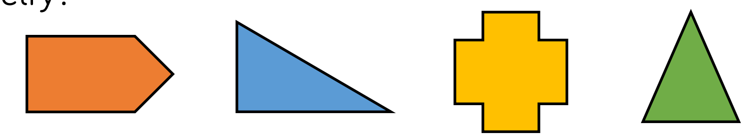
What does vertical mean?

Which is the odd shape out? How do you know?

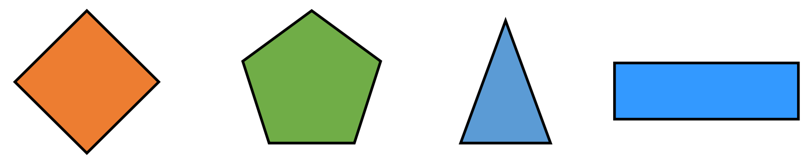
What resources could you use to check if a shape has a vertical line of symmetry?

Varied Fluency

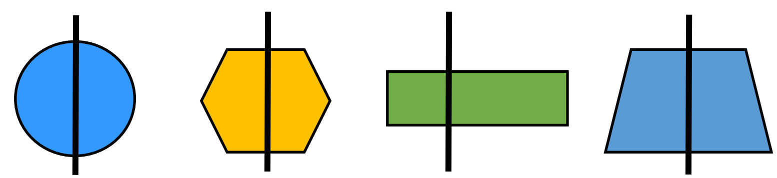
- Can you fold these shapes to find a vertical line of symmetry?



- Draw the vertical lines of symmetry on these shapes.

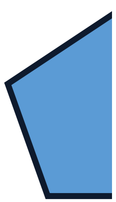
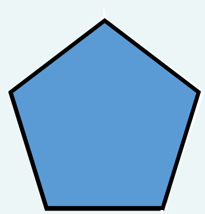


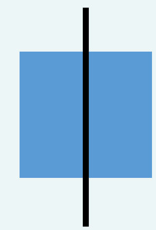
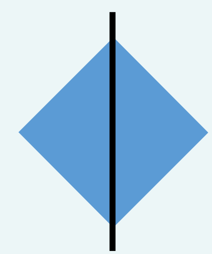
- Circle the shape with an incorrect line of symmetry. Can folding help you prove your answers.



Lines of Symmetry

Reasoning and Problem Solving

Can you draw more than one four-sided shape that has a vertical line of symmetry?	Possible answers: square, rectangle, kite.
Tommy has placed a mirror on the vertical line of symmetry. This is what he sees:   Can you complete the other half of the shape?	

Which 2-D shapes can be made when a vertical line of symmetry is drawn on a square?	Rectangle and triangle.  

Sort 2-D Shapes

Notes and Guidance

Children recognise and sort 2-D shapes including circle, square, triangle, rectangle, pentagon, hexagon and octagon using a range of different orientations.
Children should be encouraged to sort the shapes in more than one way. They can then describe how they have sorted them using key language including side, vertex and symmetrical.

Mathematical Talk

How have you sorted your shapes?

How do you know you have sorted your shapes correctly?

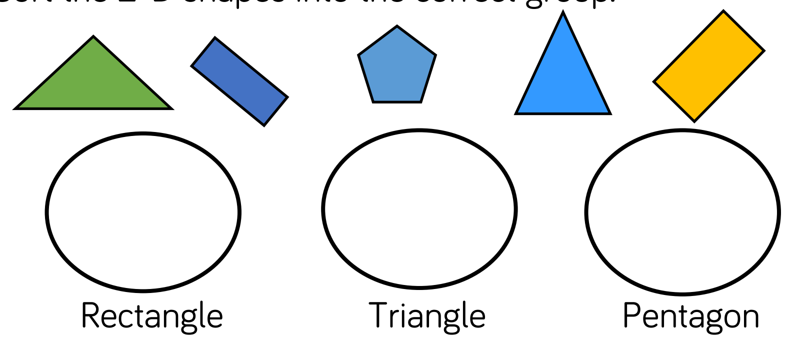
Can you sort the shapes in a different way?

Can you find a shape which is in the wrong place?

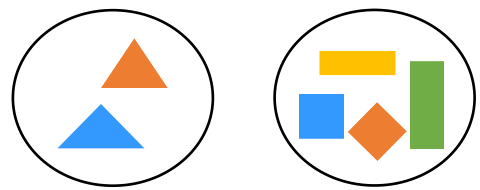
Can you see how these shapes have been sorted?

Varied Fluency

- Sort the 2-D shapes into the correct group:



- How have the shapes been sorted?



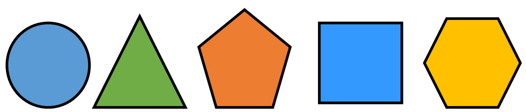
- Whitney sorted her shapes by the number of sides.
  What shapes could belong to each group?

4 sides	Not 4 sides

Sort 2-D Shapes

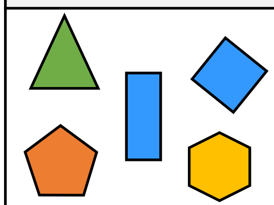
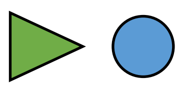
Reasoning and Problem Solving

Ron sorted the shapes in order of the number of sides. Has he ordered them correctly?
Explain why.



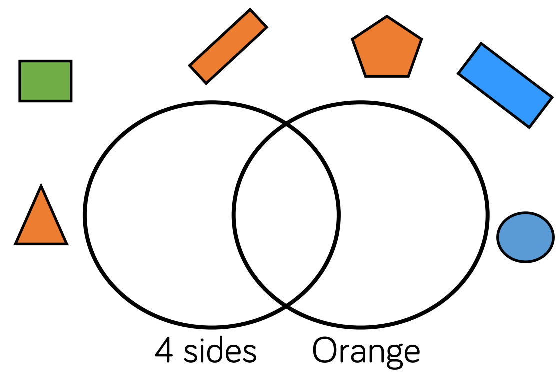
No because the square should be before the pentagon.

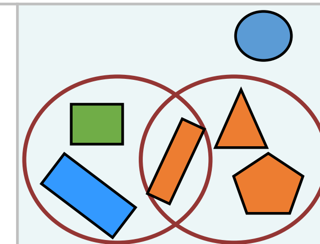
Which shape is in the wrong set?
Explain why.

Vertical line of symmetry	No vertical line of symmetry
	

The circle is in the wrong set because it does have a vertical line of symmetry.

Where should these shapes go in the Venn diagram?





Create your own labels and sort the shapes in a different way.

Possible labels:
Blue
Less than 4 vertices.

Make Patterns with 2-D Shapes

Notes and Guidance

Children use their knowledge of the properties of 2-D shapes to create patterns.

They are encouraged to place the shapes in different orientations when making patterns and recognise that it is still the same shape. In particular, squares do not become diamonds when turned sideways.

Mathematical Talk

Can you explain the pattern? How does circling the set of shapes that repeat help you see the pattern?

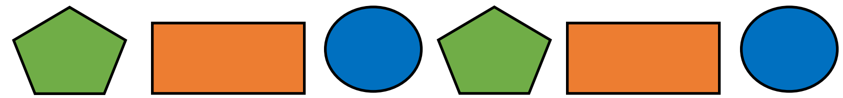
Continue the pattern. Which shape will be next?

How are these patterns similar? How are these patterns different?

How can you work out which shape will come __th ?

Varied Fluency

- Continue this pattern:



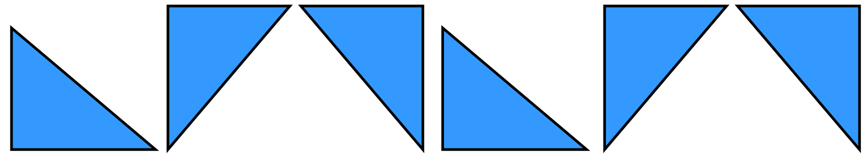
Can you circle the set of shapes that repeat?

What is the next shape in the pattern? What is the 9th shape in the pattern?

- Draw pictures to represent this pattern:

Square, circle, triangle, triangle, square, circle, triangle, triangle.

- How many times does the pattern repeat?
Which shape would be 10th?



Can you make your own repeating patterns using only one shape?

Make Patterns with 2-D Shapes

Reasoning and Problem Solving

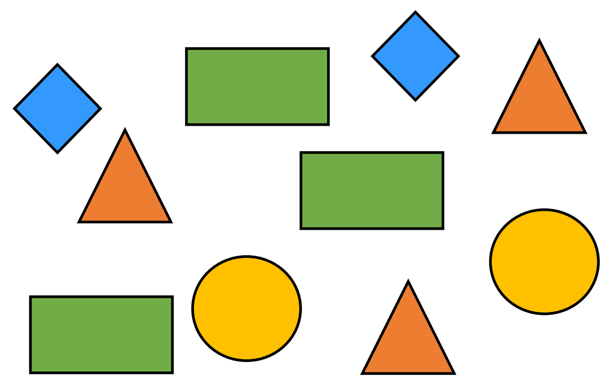
Dora says that the 12th shape in this pattern will be a triangle.

Is she correct?

How do you know?

The 12th shape will be a triangle. Children may physically continue the pattern to find the answer or recognise that the triangle is the 3rd and count in 3s.

How many different ways can you arrange these shapes to make a repeating pattern?



There are many ways to make different repeating patterns. Encourage children to orally describe the pattern they have created.

Can you translate this pattern using shapes?

Clap, clap, snap, clap, clap, snap, clap, clap ……

Possible answer:

Square, square, triangle or pentagon, pentagon, circle.

Count Faces on 3-D Shapes

Notes and Guidance

Children use their knowledge of 2-D shapes to identify the shapes of faces on 3-D shapes. To avoid miscounting the faces children need to mark each face in some way.
Children identify and visualise 3-D shapes from 2-D representations. Cones should be described as having 1 face and 1 curved surface; cylinders as having 2 faces and 1 curved surface and spheres having 1 curved surface.

Mathematical Talk

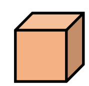
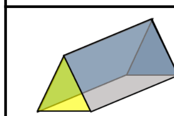
What do we mean by the 'face' of a shape?
What is the difference between a face and a curved surface?
What real life objects have 6 faces like a cube?
Does a cuboid always have 2 square faces and 4 rectangular faces?
Which 2-D shapes can you see on different 3-D shapes?
How can you make sure that you don't count the faces more than once?

Varied Fluency

- Look at these 3-D shapes:

Which 2-D shapes can you see on the surface of each one?

- Complete the table:

Shape	Name of shape	Number of flat faces	Draw the faces
			
			
			
			

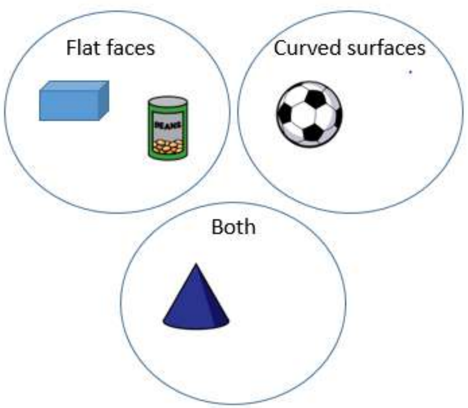
Count Faces on 3-D Shapes

Reasoning and Problem Solving

Teddy says my 3-D shape has 6 faces.
Mo says he must have a cube.
Is Mo correct?
Explain your answer.

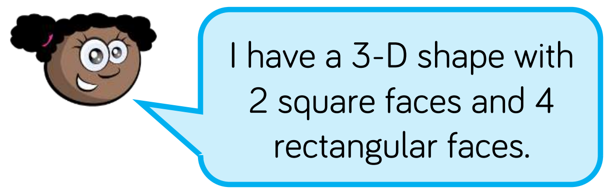
No because Teddy could have a cube or a cuboid.

Annie has sorted these 3-D shapes.
Can you spot her mistake?
Can you add another shape to each set?



The can should be in the 'both' set because it has flat faces and a curved surface.

Whitney says,



What shape does Whitney have?

Play this game with a friend. Describe the faces of a 3-D shape and they need to guess what it is.

Whitney has a cuboid.

Count Edges on 3-D Shapes

Notes and Guidance

Children use their knowledge of faces and curved surfaces to help them to identify edges on 3-D shapes. They learn that an edge is where 2 faces meet or where a face and a curved surface meet. To avoid over counting the edges children need to mark each edge in some way. Children identify and visualise the 3-D shape from a 2-D representation.

Mathematical Talk

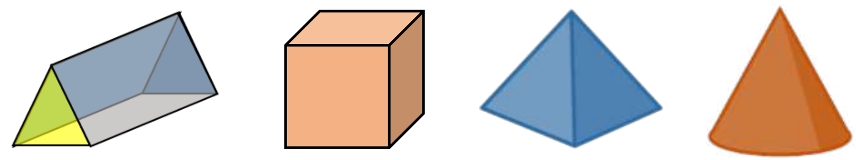
What do we mean by the 'edge' of a shape?

How can you make sure that you don't count the edges more than once?

What do you notice about the shapes with ____ edges?

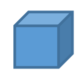
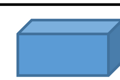
Varied Fluency

- Look at these 3-D shapes:



How many edges does each shape have?

- Complete the table:

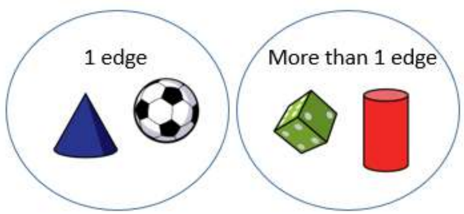
Shape	Name	Edges	Faces
			
			
			

- How many edges does this shape have?

Count Edges on 3-D Shapes

Reasoning and Problem Solving

Ron has sorted these shapes according to the number of edges.
Which shape is in the wrong place?
Explain why.



The sphere (football) is in the wrong place because it doesn't have any edges, it has one curved surface.

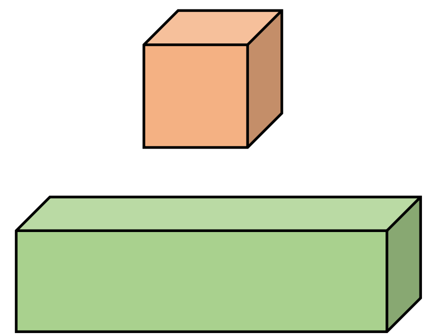
Eva says her 3-D shape has 12 edges.

Dora says she could have a cube, cuboid or square-based pyramid.

Is Dora correct?
Explain your answer.

Dora is not correct, because a square-based pyramid has 8 edges.

Compare these 3-D shapes.



What is the same and what is different?

Same – both have square faces, 6 faces, 12 edges, don't roll, can stack, no curved edges.

Different – name, colour, size, one only has square faces the other has squares and rectangles….

Count Vertices on 3-D Shapes

Notes and Guidance

Children use their knowledge of edges to help them to identify vertices on 3-D shapes. They understand that a vertex is where 2 or more edges meet. To avoid over-counting the vertices children need to mark each vertex in some way.

The point at the top of a cone can be referred to as an apex or a vertex.

Mathematical Talk

What is the difference between vertex and vertices?

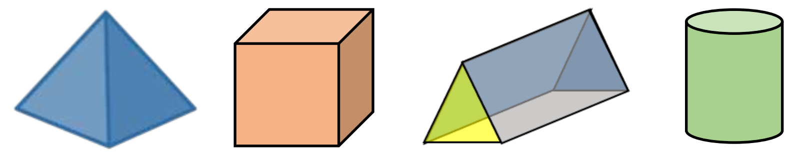
How can you make sure that you don't count the vertices more than once?

How many edges meet to make a vertex on a 3-D shape?

How many sides meet to make a vertex on a 2-D shape?

Varied Fluency

- Look at these 3-D shapes:



How many vertices does each shape have?

- Complete the table:

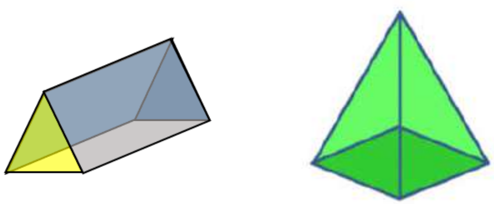
Shape	Name	Faces	Edges	Vertices
				
				
				

- Place 3-D shapes in order starting with the shape with the fewest vertices.

Count Vertices on 3-D Shapes

Reasoning and Problem Solving

What is the same about these 2 shapes?



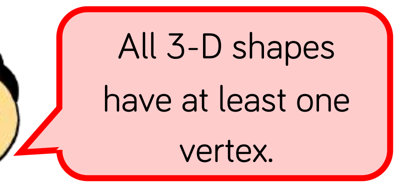
What is different about them?
Talk about faces, edges and vertices in your answer.

Example answer:

Same – both have a triangular face, both have 5 faces.

Different – name, colour, size, one has 6 vertices the other has 5 vertices, one has a rectangular face, one has a square face....

Jack says:



Is this true or false?
Explain why

False.

A sphere has no vertices.

Could also be an opportunity to talk about the words apex and vertex.

Alex has a shape with 8 vertices.

What 3-D shape could it be?

Cube or cuboid.

White Rose Maths

Sort 3-D Shapes

Notes and Guidance

Children use their knowledge of shape properties to sort 3-D shapes in different ways e.g. faces, shapes of faces, edges, vertices, if they roll, if they stack…

They should have access to a range of real life objects to sort and compare. Before sorting it may be useful to give children the opportunity to match the object e.g. a can of pop to a cylinder etc.

Mathematical Talk

How have you sorted your shapes?

How do you know you have sorted your shapes correctly?

Which method have you used to sort your shapes?

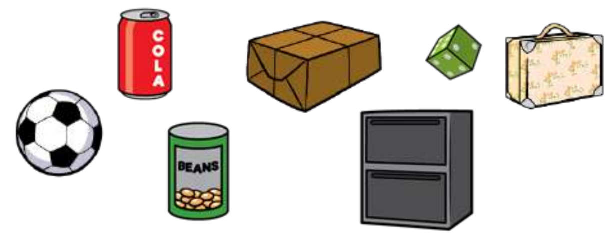
Can you sort your shapes in a different way?

Can your friend guess how you have sorted them?

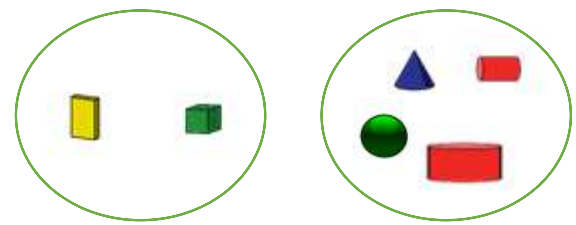
Can you group your solids by shape, type of faces and size?

Varied Fluency

- How could you sort these objects?
  Can you find some other classroom objects to add to each set?



- How are these shapes grouped?



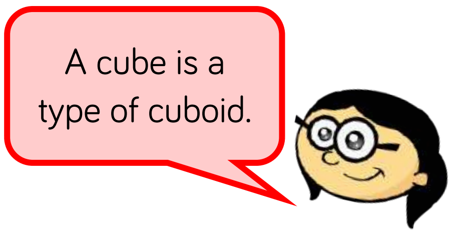
Could you group them in a different way?

- Sort the 3-D shapes on your table.
  Label the groups.
  Can you find more than one way?
  Remove the labels. Can someone guess how you sorted?

Sort 3-D Shapes

Reasoning and Problem Solving

Annie is sorting 3-D shapes.
She puts a cube in the cuboid pile.



Do you agree? Why?

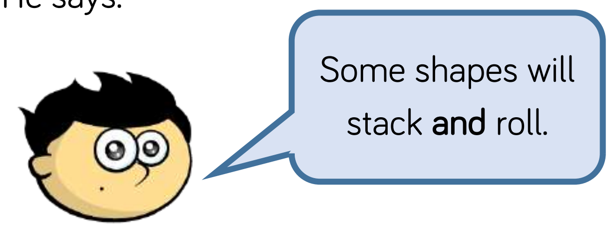
Annie is right.

They both have 6 faces.
They both have 12 edges.

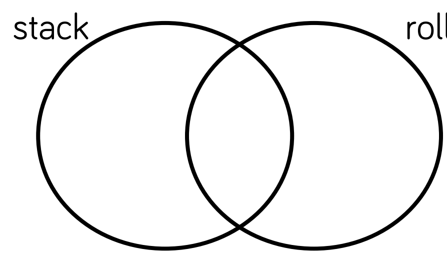
A cube is a special kind of cuboid where all faces are squares.

Jack is investigating which shapes stack and which shapes roll.

He says:



Is he correct?



Sort your shapes using the Venn diagram.
Explain what you notice about each set.
Do all shapes with flat surfaces stack?

Some shapes with flat faces will stack – they will need to have flat faces on opposite sides. (cubes, cylinders, cuboids)

Shapes with a curved surface will roll. (cone, sphere, cylinder)

Some shapes with a flat face cannot be stacked (square based pyramid, cone)

Make Patterns with 3-D Shapes

Notes and Guidance

Children use their knowledge of the properties of 3-D shapes to create patterns. They are encouraged to place the shapes in different orientations.

A wide range of examples of shapes should be used, including, construction shapes, cereal boxes, different sized balls etc.

Mathematical Talk

Where can you see real life patterns with 3-D shapes?

Can you explain your pattern to a partner?

Does the shape always have to be a certain way up?

Can you work out what shape would be the ___th?

Varied Fluency

- Use some different coloured cubes to make a repeating pattern. Can you describe the pattern to your partner?

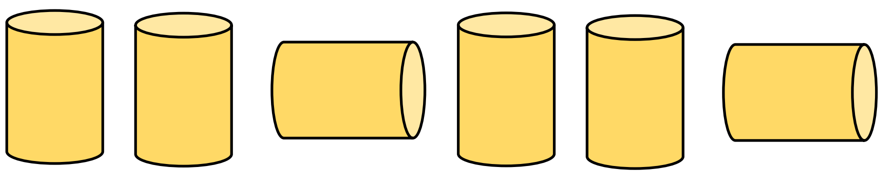
  Using colours? Using letters? Using sounds?

- Make a sequence of 3-D shapes.

  Can you build a similar pattern with real life objects?

  You could use food cans, boxes, balls, or other things in your classroom. Describe the pattern.

- How many times does the pattern repeat?
  What will the 10th cylinder look like?

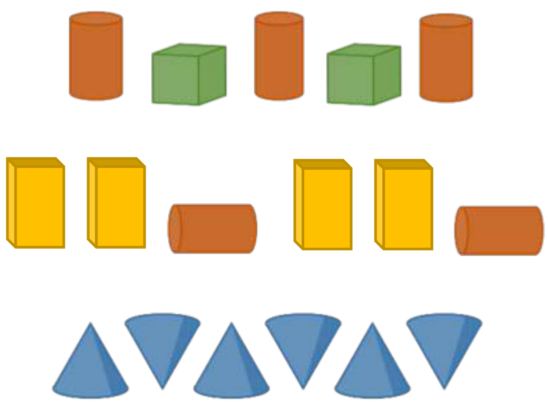


Can you make your own repeating patterns using only one 3-D shape?

Make Patterns with 3-D Shapes

Reasoning and Problem Solving

What is the same about these patterns?
What is different about these patterns?



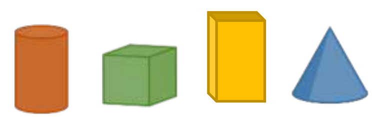
The first and second patterns use two shapes. Colour is a difference to note. In the 3rd pattern, one shape is used in different orientations. In the 2nd pattern, the shape is used twice each time.

Choose two 3-D shapes.
What different repeating patterns could be made?

Possible answer:
Cube, cylinder, cube….

Cube, cube, cylinder…

Using the 3-D shapes:



- Make a repeating pattern where there are more cones than cuboids.
- Make a repeating pattern where the third shape is always a cylinder.

Answer will depend on the shapes used.

Spring - Block 4

Fractions

Overview

Small Steps

- Make equal parts
- Recognise a half
- Find a half
- Recognise a quarter
- Find a quarter
- Recognise a third
- Find a third
- Unit fractions
- Non-unit fractions
- Equivalence of $\frac{1}{2}$ and $\frac{2}{4}$
- Find three quarters
- Count in fractions

Notes for 2020/21

Concrete manipulatives and real life representations are important in these early stages of learning with fractions.

Don't worry too much about formal learning at this stage, instead focus on activities and play based learning.

All of this content will be formalised and built upon in Year 3.

Make Equal Parts

Notes and Guidance

Children understand the concept of a whole as being one object or one quantity.

Children explore making and recognising equal and unequal parts. They should do this using both real life objects and pictorial representations of a variety of shapes and quantities.

Mathematical Talk

What is the whole? What are the parts?

How many parts is the object/quantity split into?

Are the parts equal? How do you know?

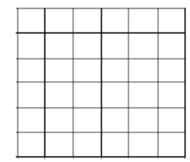
Do equal parts always look the same?

Is there more than one way to split the object/quantity into equal parts?

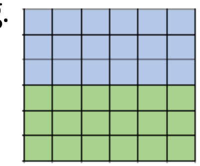
Varied Fluency

- Use different colours to show how this shape can be split into equal parts.

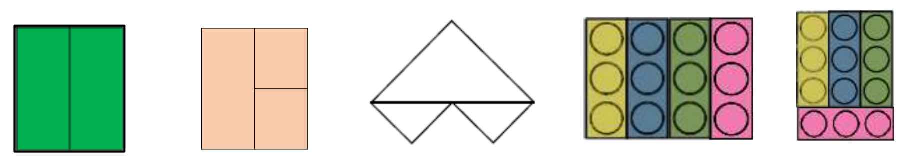
  How many ways can you find?



e.g.



- Look at the representations. Decide which show equal parts and which show unequal parts.



  Can you make some of your own representations of equal and unequal parts?

- Can you split the teddies into three equal groups?
  Can you split the teddies into three unequal groups?

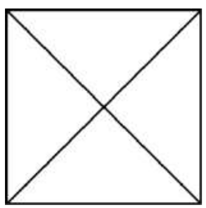
  How many ways can you split the teddies into equal parts?
  Be systematic in your approach.

Make Equal Parts

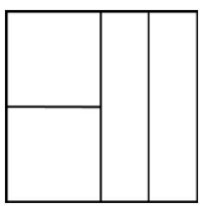
Reasoning and Problem Solving

Three children are splitting a square into equal parts.

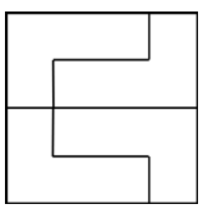
Teddy



Alex



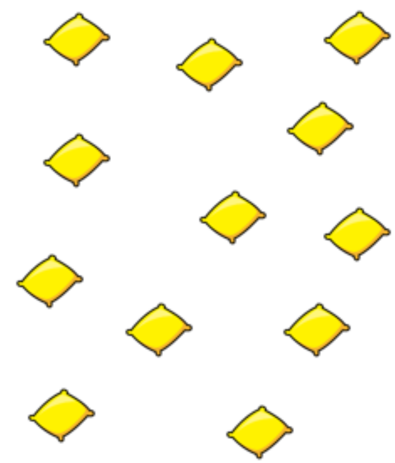
Mo



Who has split the square into equal parts? Explain why.

All children have split the square into equal parts. Children may need to cut out the pieces and manipulate them to prove why.

How many different ways can you put these beanbags into equal groups?



Children can sort the beanbags into groups of 1, 2, 3, 4, 6 and 12

Recognise a Half

Notes and Guidance

Children understand that halving is splitting a whole into two equal parts. They are introduced to the notation $\frac{1}{2}$ for the first time and will use this alongside sentence stems and 'half' or 'halves'.
They should be introduced to the language of numerator, denominator and what these represent.
Children must explore halves in different contexts, for example, half of a length, shape or set object.

Mathematical Talk

How many equal parts has the shape/object/length been split into?

What fraction is this part worth?

In the notation $\frac{1}{2}$, what does the 1 represent? What does the 2 represent?

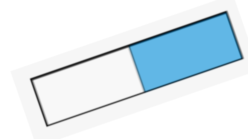
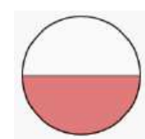
Varied Fluency

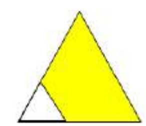
- The whole gummy bear is split into _____ equal parts.

  Each part is worth a _________ .

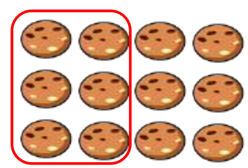
  This can be written as $\frac{\square}{\square}$

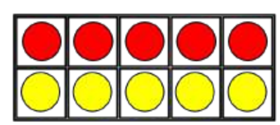
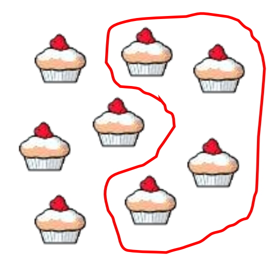
- Which pictures show $\frac{1}{2}$?



- Which pictures show $\frac{1}{2}$?

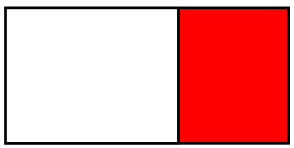


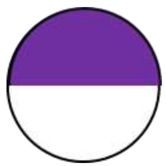



Recognise a Half

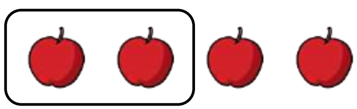
Reasoning and Problem Solving

Odd One Out





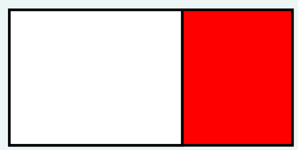
$\frac{1}{2}$



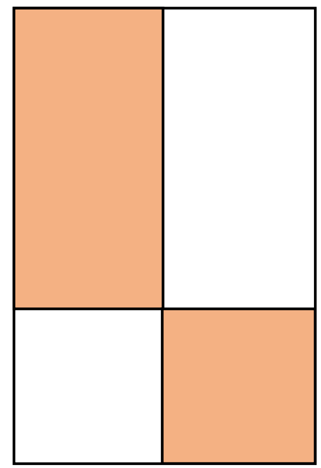
One half

Which is the odd one out?
Explain your answer.

Children need to link their explanation to the shape not having two equal parts.



Rosie says the shaded part of the shape does not show a half because there are four parts, not two equal parts.



Do you agree? Explain why.

Possible answer:
I disagree because you can swap the red and white squares/rectangles and you would have two equal parts with one part shaded.

Find a Half

Notes and Guidance

In this small step children find a half of a set of objects or quantity.

Links should be made here to dividing by 2. Children may need to use the concept of sharing to find a half. Paper plates, hoops and containers can be used to share objects into 2 equal groups.

Mathematical Talk

How did you halve the sweets?

What is the value of the whole? What is the value of half of the whole? What do you notice?

What do you notice about your answers?

How can you use your answer to a half of 4 to help you work out a half of 40?

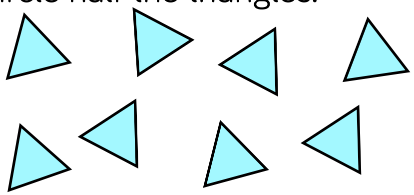
Varied Fluency

- Share 20 beanbags equally between two containers, then complete the stem sentences.

The whole is ____. Half of ____ is ____.

- Circle half the cakes.

Circle half the triangles.

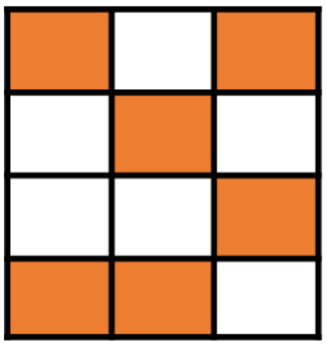


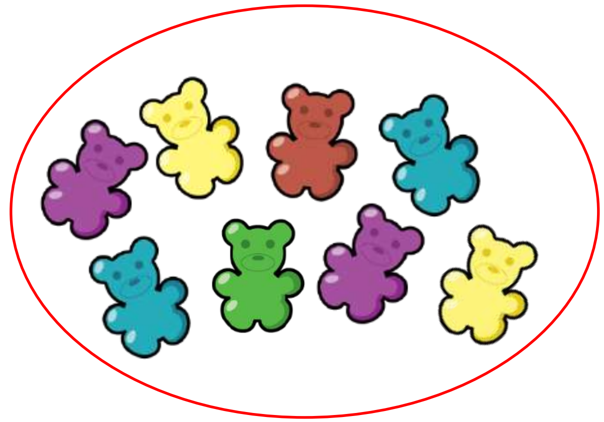
- Fill in the blanks. Use counters to help you if needed.

$\frac{1}{2}$ of 4 = $\square$	$\frac{1}{2}$ of 40 = $\square$
$\frac{1}{2}$ of 6 = $\square$	$\frac{1}{2}$ of 60 = $\square$
$\frac{1}{2}$ of 8 = $\square$	$\frac{1}{2}$ of 80 = $\square$

Find a Half

Reasoning and Problem Solving

Dora is asked to shade half of her shape. This is what she shades.  Is she correct? Explain why.	Yes because there are 12 squares altogether and 6 squares are shaded. 12 is the whole, half of 12 is 6
I am thinking of a number. Half of my number is more than 10 but less than 15. What could my number be?	22, 24, 26, 28

Annie has some gummy bears. She circles half of them.  How many gummy bears did she have at the start?	Annie started with 16 gummy bears.

Recognise a Quarter

Notes and Guidance

Children extend their knowledge of the whole and halves to recognise quarters of shapes, objects and quantities.

They continue to work concretely and pictorially, understanding that they are splitting the whole into 4 equal parts and that each part is one quarter.

Mathematical Talk

How many equal parts have you split the whole into if you have split it into quarters?

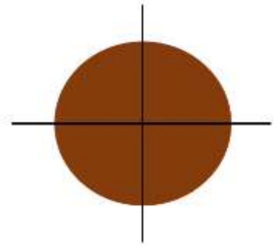
In $\frac{1}{4}$ what does the 1 represent? What does the 4 represent?

Can you shade one quarter in different ways? How do you know that you have shaded one quarter?

How many quarters make a whole?

Varied Fluency

- Four friends are sharing a cake.

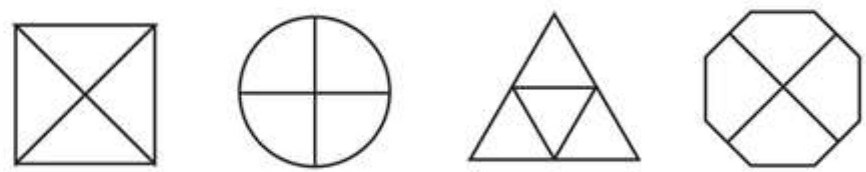


The cake is split into _____ equal parts.

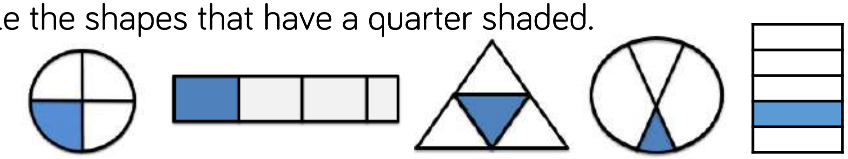
Each part is worth a ________ .

This can be written as $\frac{\square}{\square}$

- Shade $\frac{1}{4}$ of each shape.



- Circle the shapes that have a quarter shaded.

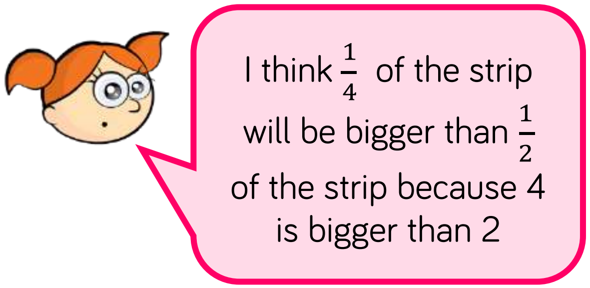


Which shapes do not have a quarter shaded? How do you know?
Draw the shapes again and split them into quarters correctly?

Recognise a Quarter

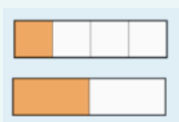
Reasoning and Problem Solving

Alex is folding two identical paper strips.



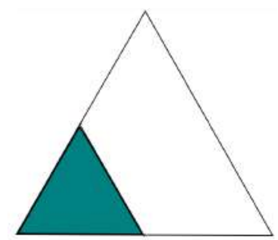
Use paper strips to prove Alex is incorrect.

Possible answer:
When the whole is the same, one quarter will be smaller because it is one of four equal parts compared to a half which is one of two equal parts.



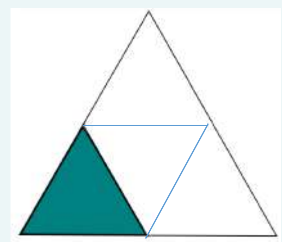
True or False?

$\frac{1}{4}$ of the shape is shaded.



Explain your answer.

Children will need to split the shape into four equal parts in order to show that this is true.



Giving children paper to fold will help them understand this concept.

Find a Quarter

Notes and Guidance

Children find quarters of shapes, objects and quantities. They begin by physically sharing amounts into four equal groups, or drawing around quantities then move towards working in the abstract. The link between the concrete, pictorial and abstract representations should be made explicit.
Support children in seeing the relationship between half of an amount and a quarter of an amount.

Mathematical Talk

What is the whole? What is a half? What is a quarter?

Can you circle a quarter in a different way?

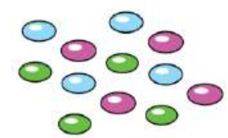
How do you know you have found $\frac{1}{4}$?

What do you notice about half of 12 and one quarter of 12? Can you explain what has happened?

If a quarter is _____ then the whole is _____

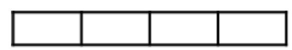
Varied Fluency

Share the smarties equally between 4 people.



The smarties are split into ____ equal parts.

Each part is worth a _________ .



This can be written as $\frac{\square}{\square}$

Circle one quarter of the cars.

One quarter of ____ is ____

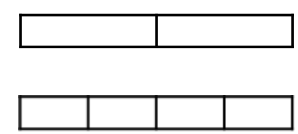
____ is $\frac{1}{4}$ of ____

Complete:

$\frac{1}{2}$ of 12 = $\square$ $\frac{1}{4}$ of 12 = $\square$

$\frac{1}{2}$ of 20 = $\square$ $\frac{1}{4}$ of 20 = $\square$

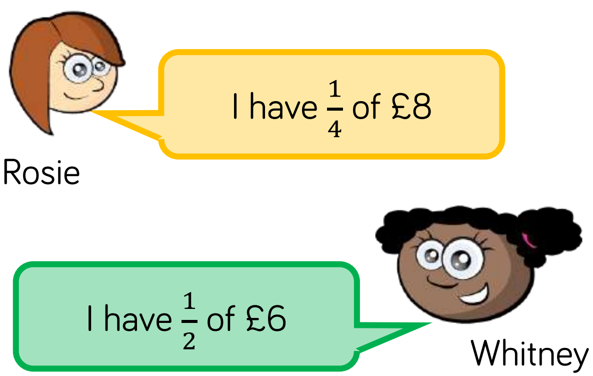
$\frac{1}{2}$ of 8 = $\square$ $\frac{1}{4}$ of 8 = $\square$



Find a Quarter

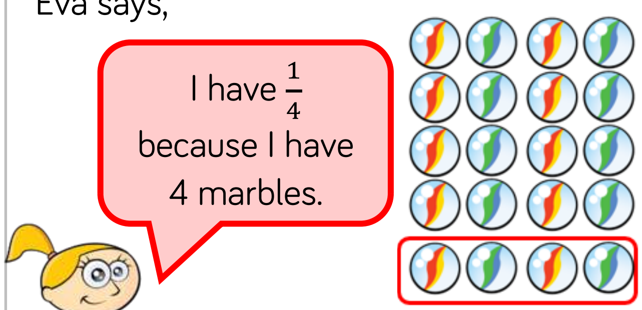
Reasoning and Problem Solving

Who has more? Explain why.



Whitney has more because half of £6 is £3, whereas a quarter of £8 is only £2

Eva says,



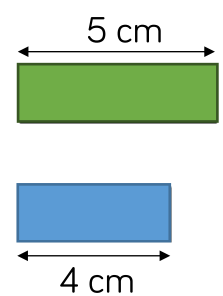
Do you agree? Explain why.

This is incorrect, one quarter means 4 equal groups not just 4
One quarter of the marbles would be 5

Mo has two ribbons. He cuts $\frac{1}{4}$ from each ribbon.

$\frac{1}{4}$ of ribbon A

$\frac{1}{4}$ of ribbon B



How long were Mo's whole pieces of ribbon?

Which ribbon was the longest? How much longer?

Ribbon A was 20 cm

Ribbon B was 16 cm

Ribbon A was 4cm longer.

Recognise a Third

Notes and Guidance

Children apply understanding of fractions to finding thirds. They continue to use the language of 'whole' and 'equal parts' and understand that one third is equal to one part out of three equal parts.

They write one third as a fraction and explain what each of the digits represents in the fractional notation.

Mathematical Talk

How many equal parts have you split the whole in to if you have split it into thirds?

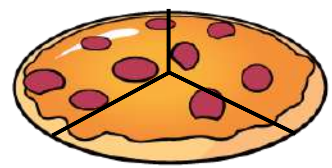
In $\frac{1}{3}$ what does the digit 1 represent? What does the digit 3 represent?

Can you shade $\frac{1}{3}$ in a different way? How do you know that you have shaded $\frac{1}{3}$?

How many thirds make a whole?

Varied Fluency

Three friends are sharing a pizza.

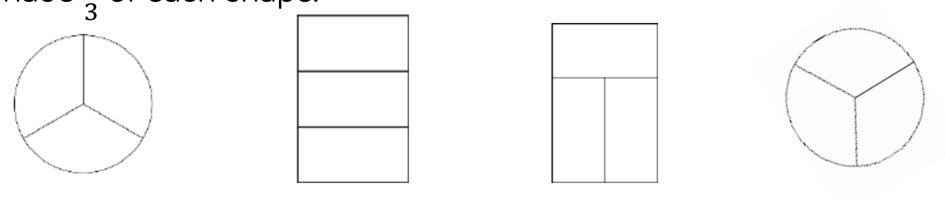


The pizza is split into _____ equal parts.

Each part is worth a ________ .

This is the same as $\frac{\square}{\square}$

Shade $\frac{1}{3}$ of each shape.



What is the same? What is different?

Which shapes represent one third?

Explain why the other circles do not represent one third.

Recognise a Third

Reasoning and Problem Solving

Dora says,

I have one third of a pizza because I have one slice and there are three slices left.

Do you agree? Explain your reasoning.

Dora is incorrect. She has one quarter of a pizza because there were four slices altogether and she has one of them. There would need to only be three slices altogether for her to have one third.

Alex, Annie and Whitney each show a piece of ribbon.

Whitney shows $\frac{1}{2}$ of her whole ribbon.

Alex shows $\frac{1}{4}$ of her whole ribbon.

Annie shows $\frac{1}{3}$ of her whole ribbon.

Whose whole piece is the longest?
Whose is the shortest?
Explain why.

Alex's piece will be the longest because she will have four parts altogether. Whitney's piece will be the shortest because she will only have two parts.

Find a Third

Notes and Guidance

Children build on their understanding of a third and three equal parts to find a third of a quantity.

They use their knowledge of division and sharing in order to find a third of different quantities using concrete and pictorial representations to support their understanding.

Mathematical Talk

How many objects make the whole?

Can we split the whole amount into three equal groups?

What is a third of ____ ?

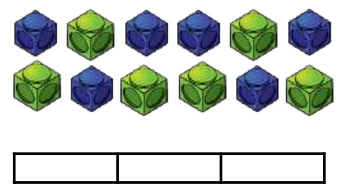
What is staying the same? What is changing?

How does changing the whole amount change the answer?

Is the answer still worth a third? Explain why?

Varied Fluency

- Use the cubes to make three equal groups.



There are ____ cubes altogether.

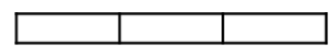
One third of _____ is _____

$\frac{\square}{\square}$ of ____ is ____

- Rosie is organising her teddy bears. She donates $\frac{1}{3}$ of them to charity. How many bears does she have left?

- Complete:

$\frac{1}{3}$ of 9 = $\square$ $\frac{1}{3}$ of 15 = $\square$



$\frac{1}{3}$ of 12 = $\square$ $\frac{1}{3}$ of 18 = $\square$

Find a third

Reasoning and Problem Solving

Annie has a piece of ribbon.

She cuts it into three equal parts.

One third of the ribbon is 6 cm long.

How long would half the ribbon be?

Half the ribbon would be 9cm.
(6 × 3 = 18cm
Half of 18 = 9cm)

A bar model would be a particularly useful pictorial representation of this question.

Ron is thinking of a number.

One third of his number is greater than 8 but smaller than 12.

What could his number be?

27, 30, 33

Unit Fractions

Notes and Guidance

Children understand the concept of a unit fraction by recognising it as one equal part of a whole. They link this to their understanding of recognising and finding thirds, quarters and halves.
Children also need to understand that the denominator represents the number of parts that a shape or quantity is split into.

Mathematical Talk

How can we represent these unit fractions in different ways?

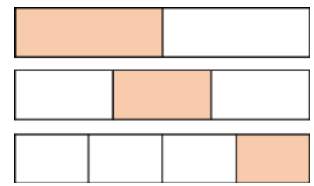
Why do we call them a unit fraction? Where can we see the unit?

Show me $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ of the model/counters etc. What is the same? What is different?

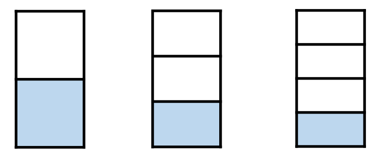
Which unit fraction is bigger/smaller if the whole is the same?

Varied Fluency

- What is the same and what is different about each bar model?



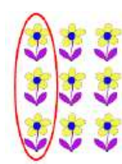
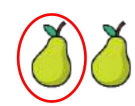
- What fraction is shaded in each diagram?



What do you notice? Complete the sentence.

The __________ the denominator the ___________ the fraction.

- Match the unit fraction to the correct picture.

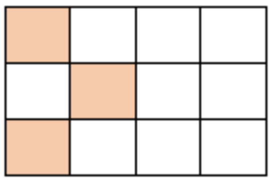

$\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$

Unit Fractions

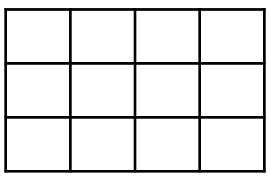
Reasoning and Problem Solving

True or False?

This shows $\frac{1}{4}$



Can you shade the same shape so that it shows $\frac{1}{3}$?



True.
There are 12 squares altogether and 3 are shaded.
One quarter of 12 is 3

Any 4 squares shaded.

I am thinking of a number.

?

One third of my number is 12

Which will be greater, one half of my number or one quarter of my number?

Use cubes or a bar model to prove your answer.

The whole number is 36

One half is 18
One quarter is 9

One half of the number will be greater.

Non-Unit Fractions

Notes and Guidance

Children are introduced to the non-unit fractions $\frac{2}{3}$ and $\frac{3}{4}$ for the first time.

They also need to look at fractions where the whole is shaded and how these fractions are written. Children see that the numerator and denominator are the same when the fraction is equivalent to one whole.

Mathematical Talk

How many quarters make a whole? How many thirds make a whole? What do you notice?

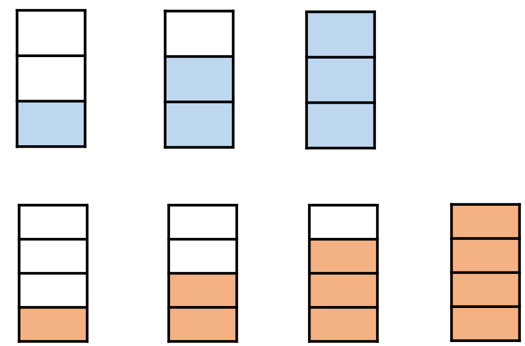
How many quarters are there in $\frac{3}{4}$?

In $\frac{3}{4}$ what does the digit 3 represent? What does the digit 4 represent?

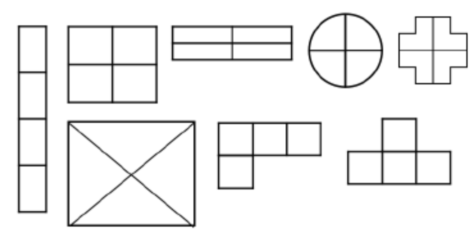
Give me an example of a unit fraction and a non-unit fraction.

Varied Fluency

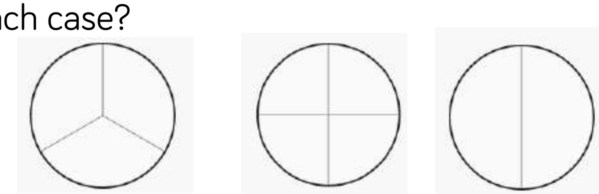
- What fraction is shaded in each diagram?



- Shade $\frac{3}{4}$ of each shape.



- Shade in the whole of each circle. What fraction is represented in each case?



Non-Unit Fractions

Reasoning and Problem Solving

Alex says,

I have shaded $\frac{2}{2}$ of the shape.

What mistake might Alex have made?

She has shaded two quarters of the shape. She may have thought that the numerator represents the number of parts that are shaded and the denominator represents the number of parts that aren't. She doesn't realise the denominator represents the whole.

Sort the fractions into the table.

	Fractions equal to one whole	Fractions less than one whole
Unit fractions		
Non-unit fractions		

$\frac{3}{4}$ $\frac{2}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{2}{3}$ $\frac{4}{4}$ $\frac{3}{3}$ $\frac{1}{2}$

What do you notice?

Are there any boxes in the table empty?

What fraction could you write here?

Top left: Empty

Top right: $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{2}$

Bottom left: $\frac{2}{2}$, $\frac{3}{3}$ and $\frac{4}{4}$

Bottom right: $\frac{3}{4}$ and $\frac{2}{3}$

There are no unit fractions that are equal to one whole. $\frac{1}{1}$ would fit here.

Equivalence of $\frac{1}{2}$ and $\frac{2}{4}$

Notes and Guidance

Children explore the equivalence of two quarters and one half of the same whole and understand that they are the same.

Children tackle this practically, using strips of paper and concrete apparatus (e.g. counters, Cuisenaire rods, number pieces).

Mathematical Talk

What does equivalent mean? What symbol do we use?

Are these two fractions equal? (half and two quarters)

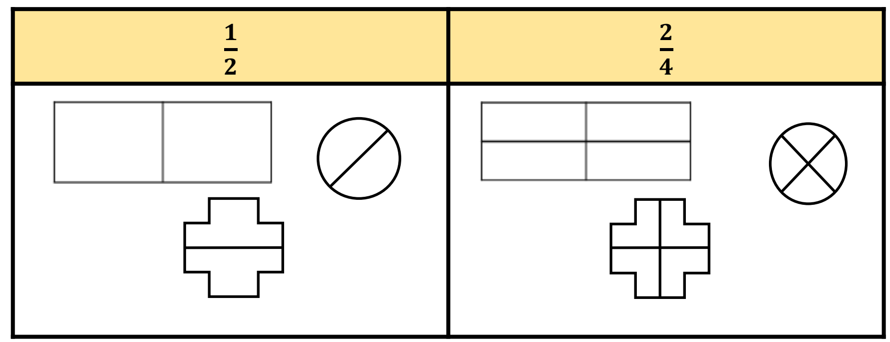
Are the numerators the same? Are the denominators the same?

How many quarters are equivalent to a half?

Varied Fluency

- Using two identical strips of paper, explore what happens when you fold the strips into two equal pieces and four equal pieces.
  Compare one of the two equal pieces with two of the four equal pieces. What do you notice?

- Shade one half and two quarters of each shape.

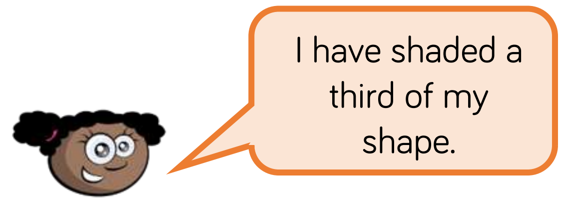
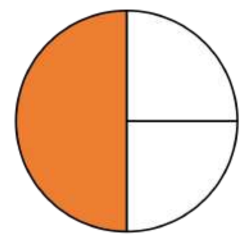


- Give children an amount of counters or concrete objects, can you find one half of them? Can you find two quarters of them? What do you notice?

Equivalence of $\frac{1}{2}$ and $\frac{2}{4}$

Reasoning and Problem Solving

Tommy has a jar of 12 cookies. He gives half of them to Alex, and $\frac{2}{4}$ of them to Mo.  Who gets the most cookies?	They both get the same amount. They will each get 6 cookies.
Using red and blue cubes, build two towers to convince me that $\frac{1}{2}$ and $\frac{2}{4}$ are equal.	Answers vary depending on the amount of cubes used. Key point is that the towers should be the same height.

Whitney says:   Do you agree? Explain why. Why do you think Whitney thinks this?	Whitney has shaded half or 2 quarters of her shape. She thinks that she has shaded one third because one part out of three is shaded, but the parts are not equal.

Find Three Quarters

Notes and Guidance

Children use their understanding of quarters to find three quarters of a quantity.

They work concretely and pictorially to make connections to the abstract.

Children should be encouraged to spot patterns and relationships between quarters of amounts.

Mathematical Talk

How many quarters make a whole?

Can you represent this in a bar model?

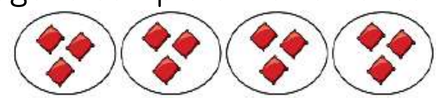
How many equal parts is $\frac{3}{4}$?

Can you spot any patterns?

What has stayed the same? What has changed? What do you notice?

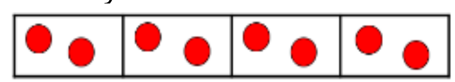
Varied Fluency

- Amir shares 12 beanbags into 4 equal groups.
  Use the image to complete the sentences.



One quarter of 12 is equal to _____
Two quarters of 12 is equal to _____
Three quarter of 12 is equal to _____
Four quarters of 12 is equal to _____

- Use counters and a bar model to help you find $\frac{3}{4}$ of 8 and $\frac{3}{4}$ of 16. What do you notice?



- Use counters, cubes, or bar models to help you fill in the blanks:

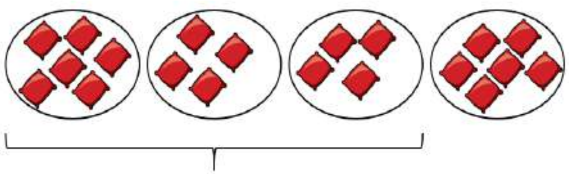
$\frac{1}{4}$ of 24 = $\square$	$\frac{1}{4}$ of 4 = $\square$	$\frac{1}{4}$ of $\square$ = 5
$\frac{2}{4}$ of 24 = $\square$	$\frac{3}{4}$ of 4 = $\square$	$\frac{3}{4}$ of $\square$ = 15
$\frac{3}{4}$ of 24 = $\square$	$\frac{1}{4}$ of 8 = $\square$	$\frac{1}{4}$ of $\square$ = 2
$\frac{4}{4}$ of 24 = $\square$	$\frac{3}{4}$ of 8 = $\square$	$\frac{\square}{4}$ of 8 = 6

Find Three Quarters

Reasoning and Problem Solving

Amir is using beanbags and hoops to find three quarters of 20

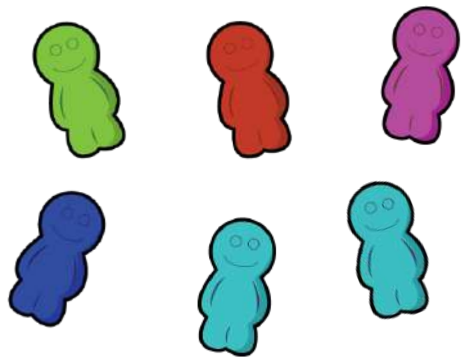
Can you spot his mistake?



$\frac{3}{4}$ of 20 = 14

Amir hasn't created equal groups. 20 should be shared into 4 equal parts. There should be 5 beanbags in each hoop so three quarters of 20 is 15 not 14

Eva eats three-quarters of her sweets. She eats these sweets.



How many sweets does Eva have left?

Eva has 2 sweets left.
Encourage children to do this practically.

Count in Fractions

Notes and Guidance

Using their knowledge of halves, thirds and quarters, children count in fractions from any number up to 10.

They begin to understand that fractions can be larger than one whole.

Teachers can use a number line, counting stick or hoop to support them in counting in fractions.

Mathematical Talk

Which number are you starting on?

How many parts are there in your fraction whole?

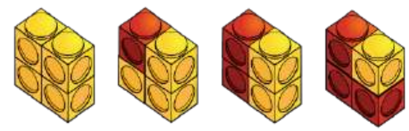
Which fraction will come next?

What patterns can you spot?

Continue the pattern: $\frac{1}{3}$, $\frac{2}{3}$, 1, $1\frac{1}{3}$, $1\frac{2}{3}$, 2, $2\frac{1}{3}$, $2\frac{2}{3}$,

Varied Fluency

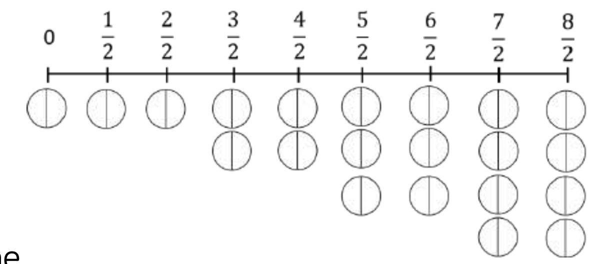
- What would the next image in the sequence look like?



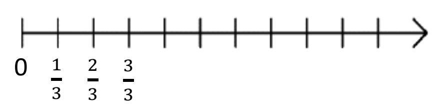
What do you notice about the fraction of yellow cubes?
Can you count the fractions represented?

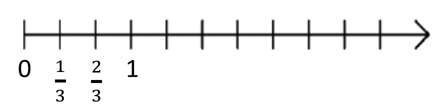
- In groups of 4, give each child an identical strip of paper. Fold each of them into 2 equal parts. Count how many halves there are on two strips of paper, on three strips, on 4 strips. Predict: how many halves will there be on six, seven, eight strips?

- Shade the correct number of parts for each fraction.



- Complete each number line.
What's the same, what's different?

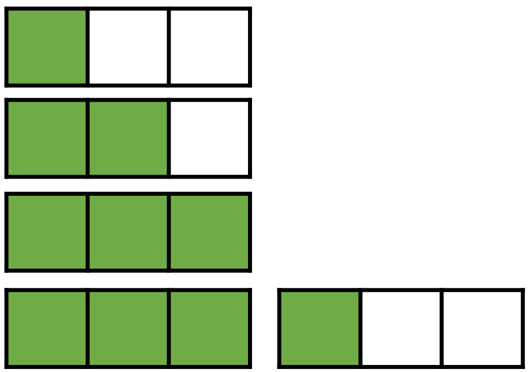




Count in Fractions

Reasoning and Problem Solving

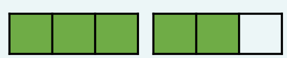
Look at this pattern.



What would come next?
Write the next fraction and draw the representation.

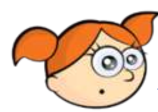
What would be the 8th fraction in the pattern?

Five thirds, $\frac{5}{3}$
Children may think that the later models are in sixths, it is important to stress that the whole one is still made up of three and so we are still counting in thirds.



The 8th fraction would be $\frac{8}{3}$ or $2\frac{2}{3}$

Alex and Whitney are counting in quarters.



Alex

One quarter, two quarters, three quarters, four quarters…

One quarter, one half, three quarters, one whole…

Whitney

Who is correct? Explain your answer.

They are both correct. Two quarters is equivalent to one half and four quarters is equivalent to one whole.

Summer Scheme of Learning

Year 2

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

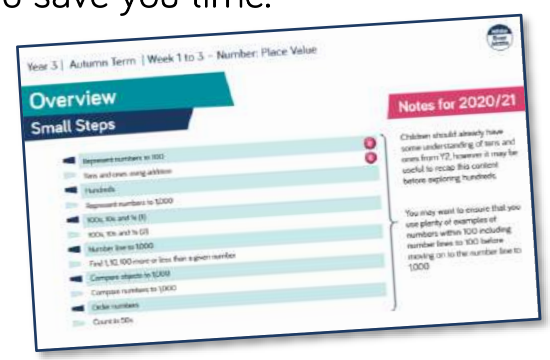
2020 will go down in history. The world has changed for all of us.

We want to do as much as we can to support children, teachers, parents and carers in these very uncertain times.

We have amended our schemes for 2020/21 to:

- ★ highlight key teaching points
- ★ recap essential content that children may have forgotten
- ★ flag any content that you might not have covered during the school closures period.

We hope these changes will add further value to the schemes and save you time.



Lesson-by-lesson overviews

We've always been reluctant to produce lesson-by-lesson overviews as every class is individual and has different needs. However, many of you have said that if blended learning becomes a key feature of school life next year, a weekly plan with linked content and videos could be really useful.

As always, we've listened! We've now produced a complete lesson-by-lesson overview for Y1 to Y9 that schools can use or adapt as they choose. Each lesson will be linked to a free-to-use home learning video, and for premium subscribers, a worksheet. This means that you can easily assign work to your class, whether they are working at home or in school.

Inevitably, this lesson-by-lesson structure won't suit everyone, but if it works for you, then please do make use of this resource as much as you wish.

Teaching for Mastery

These overviews are designed to support a mastery approach to teaching and learning and have been designed to support the aims and objectives of the new National Curriculum.

The overviews:

- have number at their heart. A large proportion of time is spent reinforcing number to build competency
- ensure teachers stay in the required key stage and support the ideal of depth before breadth.
- ensure students have the opportunity to stay together as they work through the schemes as a whole group
- provide plenty of opportunities to build reasoning and problem solving elements into the curriculum.

For more guidance on teaching for mastery, visit the NCETM website:

https://www.ncetm.org.uk/resources/47230

Concrete - Pictorial - Abstract

We believe that all children, when introduced to a new concept, should have the opportunity to build competency by taking this approach.

Concrete – children should have the opportunity to use concrete objects and manipulatives to help them understand what they are doing.

Pictorial – alongside this children should use pictorial representations. These representations can then be used to help reason and solve problems.

Abstract – both concrete and pictorial representations should support children's understanding of abstract methods.

Need some CPD to develop this approach? Visit www.whiterosemaths.com for find a course right for you.

Supporting resources

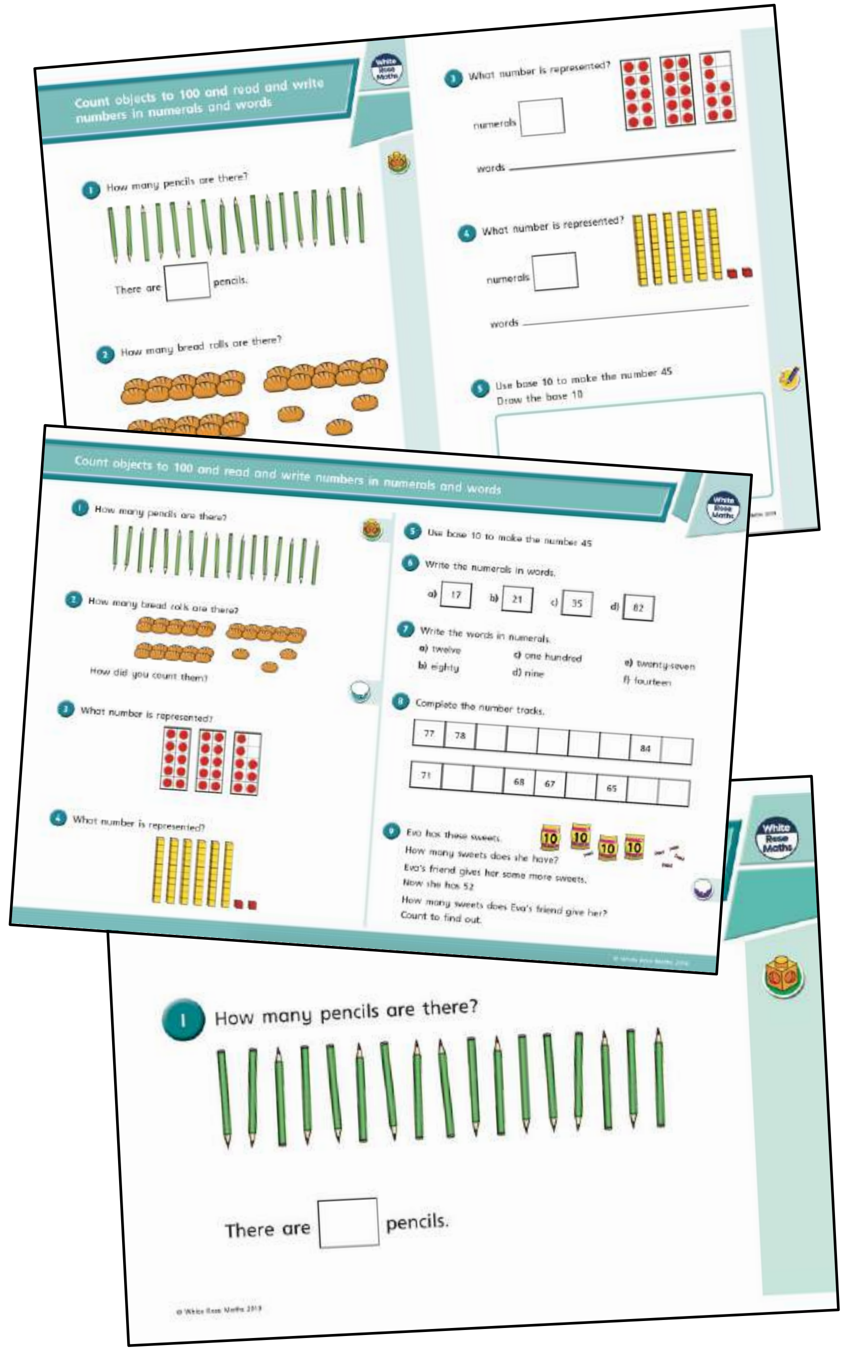
NEW for 2019-20!

We have produced supporting resources for every small step from Year 1 to Year 8.

The worksheets are provided in three different formats:

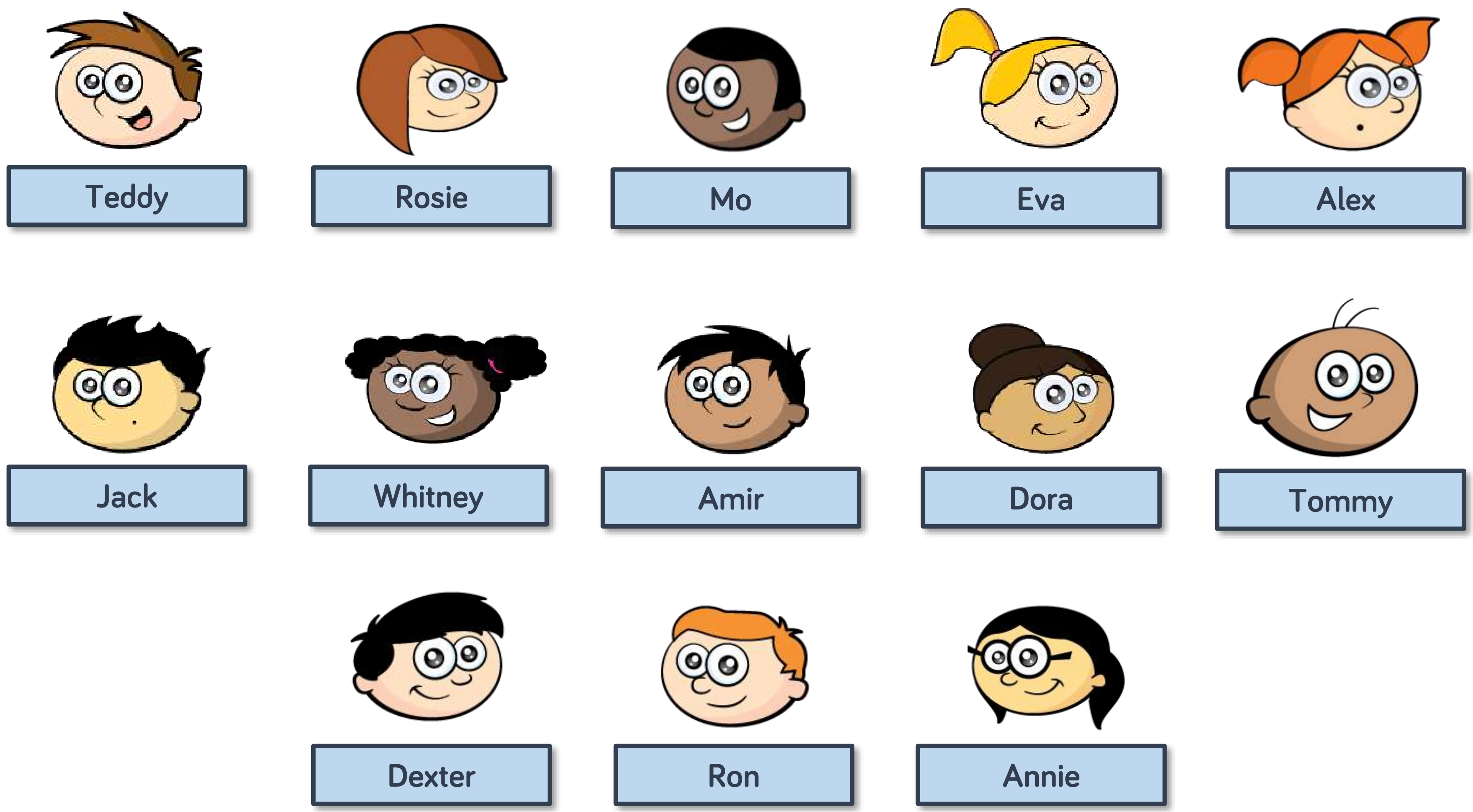
- Write on worksheet – ideal for children to use the ready made models, images and stem sentences.
- Display version – great for schools who want to cut down on photocopying.
- PowerPoint version – one question per slide. Perfect for whole class teaching or mixing questions to make your own bespoke lesson.

For more information visit our online training and resources centre resources.whiterosemaths.com or email us directly at support@whiterosemaths.com



Meet the Characters

Children love to learn with characters and our team within the scheme will be sure to get them talking and reasoning about mathematical concepts and ideas. Who's your favourite?



	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Number: Place Value			Number: Addition and Subtraction					Measurement: Money		Number: Multiplication and Division	Consolidation
Spring	Number: Multiplication and Division				Statistics		Geometry: Properties of Shape			Number: Fractions		
Summer	Measurement: Length and Height		Geometry: Position and Direction		Consolidation and problem solving		Measurement: Time		Measurement: Mass, Capacity and Temperature			Consolidation

Summer - Block 1

Length & Height

Overview

Small Steps

- Compare lengths and heights (R)
- Measure lengths (1) (R)
- Measure lengths (2) (R)
- Measure length (cm)
- Measure length (m)
- Compare lengths
- Order lengths
- Four operations with lengths

Notes for 2020/21

It is important to spend time recapping what is meant by length and height.

Children should revisit the idea of measuring length with non-standard units such as cubes before moving on to measure length in centimetres and metres.

Compare Lengths & Heights

Notes and Guidance

Children use and understand the language of length such as long, longer, short, shorter, tall, taller. They recognise this language will change depending on what type of length they are describing and comparing.

Children understand that height is a type of length. They should also be exposed to lengths that are equal to one another.

Mathematical Talk

Which person is taller/shorter?
Which pencil is shorter/longer?

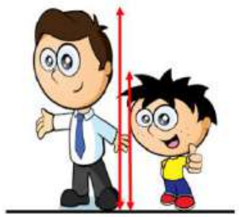
Are we measuring the height or length of something?
What is the same? What is different?

How many different sentences can you make to compare the vehicles? Say them to your partner.

Varied Fluency

R

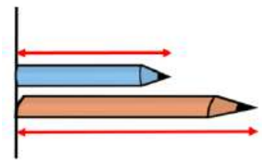
- Use the words **taller** and **shorter** in the sentence stems to compare the height of the man and the boy.



The man is ______ than the boy.

The boy is ______ than the man.

- Use the words **longer** and **shorter** in the sentence stems to compare the length of the blue pencil and the orange pencil.



The blue pencil is ______ than the orange pencil.
The orange pencil is ______ than the blue pencil.

Which pencil is the longest? Which pencil is the shortest?

- Compare the vehicles using the words to help you.

length	height
longer	same
taller	shorter

Compare Lengths & Heights

Reasoning and Problem Solving

R

Rosie, Alex and Mo are comparing the height of Mrs Rose and Jack.

Rosie

Mrs Rose is tall than Jack.

Alex

Jack is short than Mrs Rose.

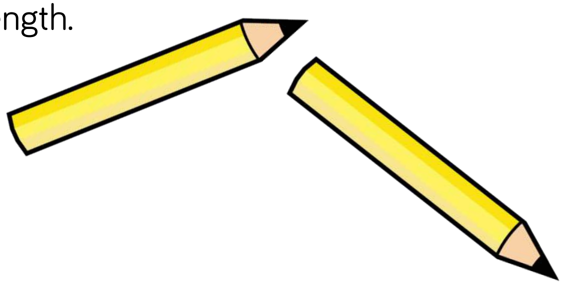
Mo

Mrs Rose is longer than Jack.

Can you improve their sentences to make them more accurate?

Possible answer:
Rosie – Mrs Rose is **taller** than Jack.
Alex – Jack is **shorter** than Mrs Rose.
Mo – Mrs Rose is **taller** than Jack.
Taller is a better word than longer because we are comparing height.

Eva thinks the pencils are the same length.



How can Eva check if she is correct?

Eva needs line up one end of the pencils and see which is longer.

Using classroom equipment, can you find an object which is longer than your rubber but shorter than your pencil?

Can you find a friend who is shorter than you but taller than your other friend?

Children could explore other items and situations where they are asked to compare more than two objects.

Measure Length (1)

Notes and Guidance

Children use non-standard units, such as cubes, hands and straws to measure length and height. Ensure children understand the units they use need to be of equal length. Children recognise that longer, non-standard units are more suitable for measuring the length and height of longer/taller objects. Children need to understand that non-standard units should be exactly in line with one end of the object with no gaps between them to get an accurate measurement.

Mathematical Talk

What other things could you use to measure how long a pencil is?

What could you use to measure how tall you are? Is it easier to measure someone lying down or standing up?

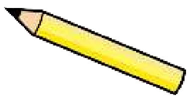
What could you use to measure the length of your classroom?

Why is it important to measure in a straight line?

Varied Fluency

R

- Use cubes to measure the length of objects around your classroom. Write a sentence for each object.



The pencil is ☐ cubes long.

The ☐ is ☐ cubes long.

- Mr White is 5 sticks tall.
Choose a suitable piece of equipment to measure how tall your friend is.

- Which is longer – your maths book or a lunch box?

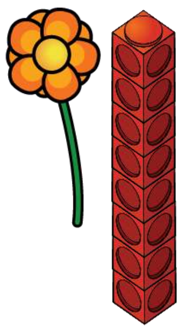
The ☐ is longer than the ☐.

Choose a unit to measure the objects to check you are correct.

Measure Length (1)

Reasoning and Problem Solving

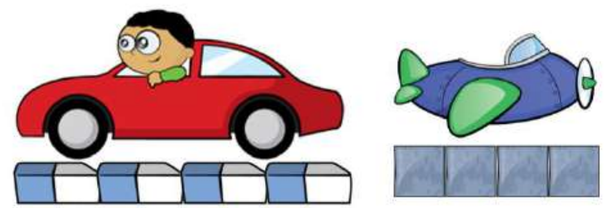
True or false?



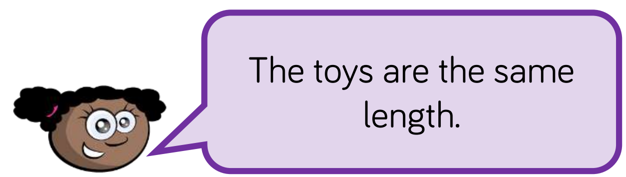
The flower is 8 cubes tall.
Explain your answer.

False because the cubes should be level with the bottom of the flower.
The flower is about 6 cubes tall.

Whitney measures the length of two toys.



She says,



Do you agree with Whitney?
Explain your answer.

Whitney is wrong. Both toys are 4 units long, but the rubber and the cubes are different lengths so the toys are not the same length.

Measure Length (2)

Notes and Guidance

Children build on prior knowledge of measuring length and height using non-standard units and apply this to measuring using a ruler.

They should be able to understand that objects can vary in length and size, so a standard unit of measurement is required.

It is important that children know to measure from 0 cm.

Mathematical Talk

What do the numbers on the ruler mean? (1 cm etc.)

Where should we place the object to start measuring it?

Does the ruler look like anything else we have used? (number line)

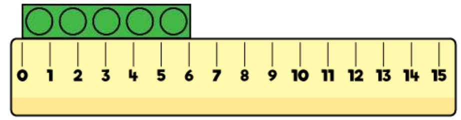
Can you count how many cm the ______ measures?

How does using a ruler help us to compare objects?

Varied Fluency

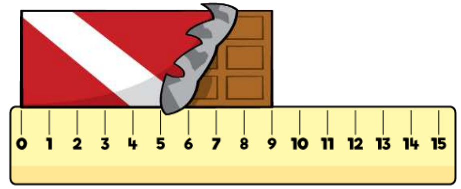
R

- How long is the building block?



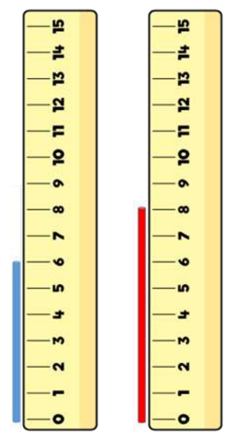
The building block is ☐ cm.

- What is the length of the chocolate bar?



The chocolate bar is ☐ cm.

- Which straw is the tallest?



The blue straw is ☐ cm tall.

The red straw is ☐ cm tall.

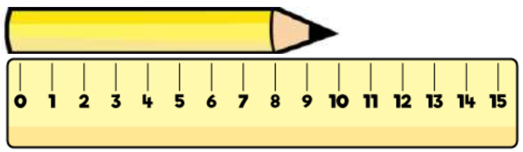
The ☐ straw is the tallest.

The ☐ straw is the shortest.

Measure Length (2)

Reasoning and Problem Solving

Teddy measures the length of the pencil.



He says,

The length of the pencil is 10 cm.

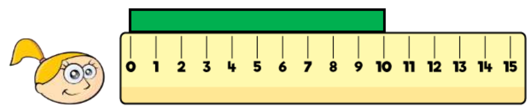
Do you agree with Teddy?
Explain why.

Teddy is wrong because he has started measuring from the end of the ruler not from 0

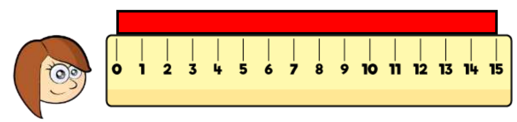
Eva, Dexter and Rosie are comparing ribbons that they have.
Unfortunately, Dexter has lost his ribbon.

He says,

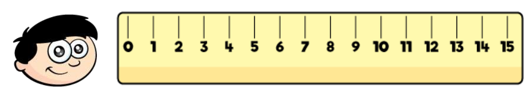
My ribbon is shorter than Rosie's, but longer than Eva's.



Eva



Rosie



Dexter

How long could Dexter's ribbon be?

Possible answers:

11 cm
12 cm
13 cm
14 cm

Measure Length (cm)

Notes and Guidance

Children measure to the nearest centimetre using a ruler or tape measure.

They measure both length and height and focus on the importance of measuring from 0 rather than the end of the ruler or tape measure.

Mathematical Talk

What is the length?

How can the numbers on the ruler help us?

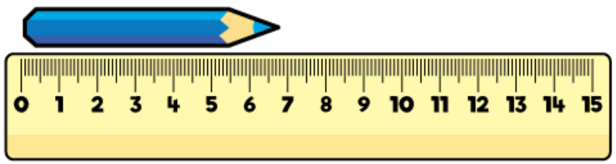
How do you know you have drawn a line that is 5cm long? How can you check?

Why is it important to start measuring from 0 on the ruler?

Varied Fluency

- Choose a variety of objects and practice measuring them using a centimetre ruler.
  Remember to line up the object to the 0 mark on the ruler.

  e.g. How long is the pencil to the nearest centimetre?



- How tall is the glass?

  What other objects can you find to measure the height of?

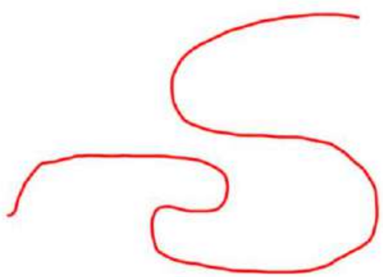
- Draw a line that is:

  - 5 cm long
  - 8 cm long
  - Longer than 4 cm but shorter than 7 cm.

Measure Length (cm)

Reasoning and Problem Solving

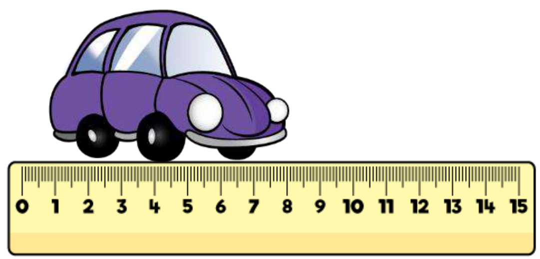
How long is this piece of string?
How could you find out?



Does the length change if you change the orientation?

The length will not change if you change the orientation so it will be easier to measure if you put it in a straight line.

Mo has used the ruler to measure the length of the car.



Mo says the car is 8 centimetres long.
Do you agree?
Explain your answer.

Mo is incorrect because he has not lined the car up with the 0 marker. If he had measured from 0 he would see that the car is 7 cm long.

Measure Length (m)

Notes and Guidance

Children begin to measure larger objects using metres. They think about whether it is better to measure items in centimetres or metres and discuss the reasons why.

Children do not yet convert from metres to centimetres; however they may see that 100 centimetres is the same as 1 metre and measurements can be written as mixed units e.g. the child is 1 metre and 25 centimetres tall.

Mathematical Talk

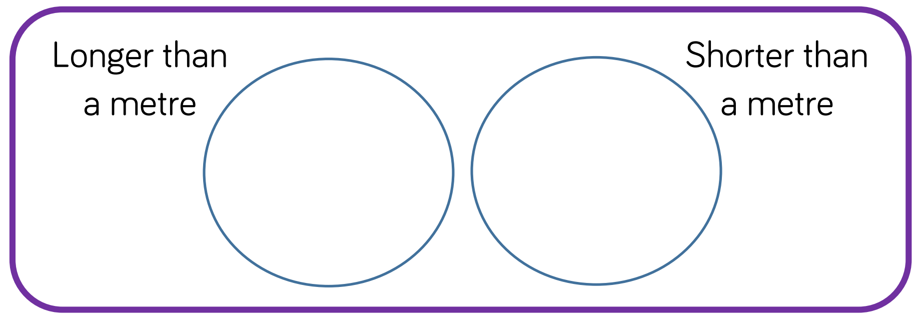
When would it be appropriate to use metres?

Why is more efficient to use metres instead of centimetres for longer objects/distances?

What equipment would you use to measure longer objects/distances?

Varied Fluency

- Use a metre stick to measure objects in your classroom and place them into the groups.



Can you find anything that is exactly one metre?

- Use a metre stick to count up in 10 cm blocks. What do you notice about 100 cm?
  Possible responses: it is the same a metre, 1 m is written, it is the end of the stick.

- Measure the length of the school hall.
  Record the length in metres and centimetres, e.g. 15 metres and 13 centimetres.

Measure Length (m)

Reasoning and Problem Solving

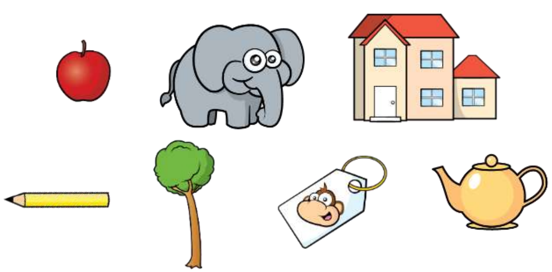
Usain Bolt can run 100 m in 9.58 seconds (just under 10 seconds).

How far do you think you can run in 10 seconds? Do you think it will be more or less than 100 m?

Measure how far you and your friends can run in 10 seconds.
Record your answers in metres and centimetres.

Children will have a variety of answers. They could measure using different equipment including metre sticks and trundle wheels.

Circle the objects that you would measure in metres. Tick the objects that you would measure in centimetres.

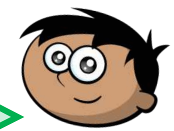


Circle elephant, school and tree

Amir has a metre stick.

He wants to measure the length of his classroom.

I can't measure the length of the classroom because my metre stick isn't long enough.



Explain to Amir how he could measure the length of his classroom.

Amir can measure the length of the classroom by putting a marker at the end of the metre stick and then starting again at that point, moving his metre stick as he measures.

White Rose Maths

Compare Lengths

Notes and Guidance

Children compare lengths of objects using comparison language and symbols. They use language such as longer than, shorter than, taller than, longest, shortest and tallest.

Children only compare using the same unit of length in a question. However, the same number but different unit of measure could also be used to check that children understand metres are bigger than centimetres.

Mathematical Talk

Which is longer: 10 centimetres or 10 metres?

Which symbols can we use to compare lengths?

What is the difference between using taller than and longer than? When would we use taller than instead of longer than?

Varied Fluency

- Compare the lengths using **longer than**, **shorter than**, or **the same as**.

15 cm is		60 cm
Sixty metres is		60 m
96 m is		69 m
80 cm is		80 m

- Use <, > or = to complete the statements.

7 metres	◯	17 metres
18 cm	◯	18 m
32 cm	◯	32 centimetres

- Choose 2 objects from your classroom. Estimate the length of each object. Then measure both objects and compare the lengths using <, > or =
Try this again, but this time measuring your friends' heights.

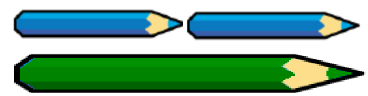
Compare Lengths

Reasoning and Problem Solving

Compare the measurements using <, > or =

55 cm + 10 cm	◯	55 cm – 10 cm	>
42 m + 6 m	◯	42 m + 7 m	<
6 cm – 5 cm	◯	6 m – 5 m	<
80 m – 5 m	◯	70 m + 5 m	=

A green pencil is twice as long as a blue pencil.



Using this, complete the statements using **longer than**, **shorter than** or **equal to**.

3 green pencils are ______ 2 blue pencils

2 green pencils are ______ 5 blue pencils

4 green pencils are ______ 8 blue pencils

3 green pencils are longer than two blue pencils.
2 green pencils are shorter than 5 blue pencils.
4 green pencils are equal to 8 blue pencils.

Order Lengths

Notes and Guidance

Children order more than two lengths from shortest to longest and vice versa. This will help them recap their understanding of ordering numbers to 100

Children will order given lengths as well as ordering objects by measuring each length themselves.

They will use the language of shorter, shortest, longer and longest to describe the order.

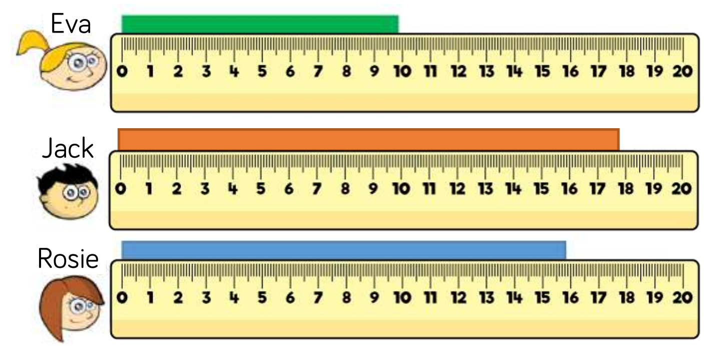
Mathematical Talk

How is ordering lengths similar to ordering numbers on a number line? Can we use a number line to help us?

Can we estimate which object is the longest before measuring?

Varied Fluency

Eva, Jack and Rosie are comparing the length of ribbons. Complete the sentences.



__________ has the longest ribbon.

__________ has the shortest ribbon.

__________ 's ribbon is shorter than _________'s.

__________'s ribbon is longer than _________'s.

Choose five objects in your classroom.
Measure them using a ruler.
Order the objects from longest to shortest.
Write at least three sentences to describe the objects using the words **longer**, **longest**, **shorter** and **shortest**.

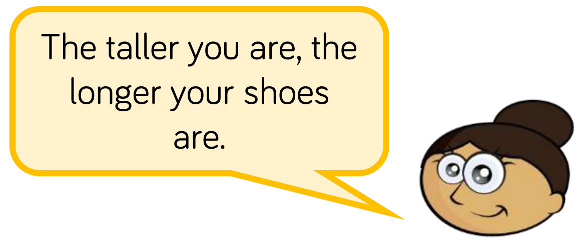
White Rose Maths

Order Lengths

Reasoning and Problem Solving

Four children are measuring their heights. Eva is taller than Rosie, but not as tall as Mo. Dexter is taller than Mo. Write down their names in order of their heights, starting with the shortest.	Shortest: Rosie Eva Mo Tallest: Dexter

Dora says,



Measure the height of people in your class and measure the length of their shoes.

Is Dora correct?

Children will find different results depending on their class.

Four Operations with Lengths

Notes and Guidance

Children draw on their skills of the four operations and apply their understanding to length.

They solve one-step and two-step problems relating to length and use concrete and pictorial representations to calculate efficiently.

Mathematical Talk

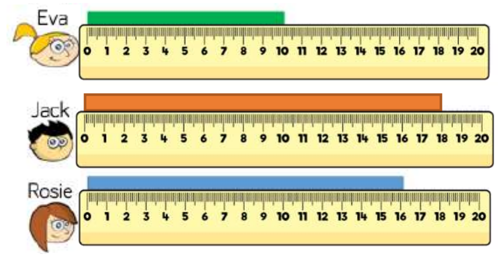
Can you draw a bar model to help to decide which operations to use?

What are the key words in the question?

Can you ask and answer any different questions using the objects and information given?

Varied Fluency

Eva, Jack and Rosie each have a piece of ribbon.



- How much longer is Jack's ribbon than Eva's?
- Jack and Rosie put their ribbons together. How long are they altogether?
- Eva cuts three more ribbons of the same length as hers. What is the total length of all four ribbons?
- Eva cuts her ribbon in half. What is the length of each piece?

Teddy has a toy train and a toy plane.
The train is 28 cm long. The plane is 16 cm longer.
How long is the plane?

The toy train is double the length of a toy car.
How long is the toy car?

Draw bar models to help you.

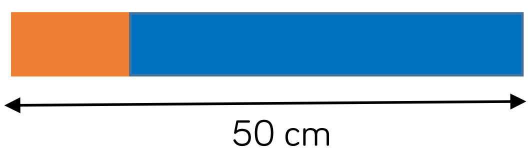
Four Operations with Lengths

Reasoning and Problem Solving

Here is a strip of orange paper.

A blue strip is four times longer than a orange strip.

The strips are joined end to end.



How long is the orange strip?

How long is the blue strip?

The orange strip is 10 cm long and a blue strip is 40 cm long.

There are 3 teddies in a box.

The brown teddy is 15 cm taller than the yellow teddy.

The yellow teddy is 3 cm shorter than the pink teddy.

The pink teddy is 42 cm tall.

How tall are the brown and yellow teddies?

How much taller is the brown teddy than the pink teddy?

The yellow teddy is 39 cm tall.

The brown teddy is 54 cm tall.

The brown teddy is 12 cm taller.

White Rose Maths

Summer - Block 2

Position & Direction

Overview

Small Steps

- Describe position (1) R
- Describe position (2) R
- Describe movement
- Describe turns
- Describe movement and turns
- Making patterns with shapes

Notes for 2020/21

Time should be spent ensuring that children are able to confidently describe position before moving on to look at movements and turns.

The concept of position is quite difficult to grasp especially when taught remotely so children might need to spend a little longer on the basics.

Describe Position (1)

Notes and Guidance

Children use 'left', 'right', 'forwards' and 'backwards' to describe position and direction. They will describe the position of objects and shapes from different starting positions.

You could use board games such as Snakes and Ladders and Twister to explore positional language.

Where possible, this concept should be explored practically.

Mathematical Talk

What are the different directions we can move in?

How would I get to the ……..?

How could you describe the movement?
How could we record the movement?

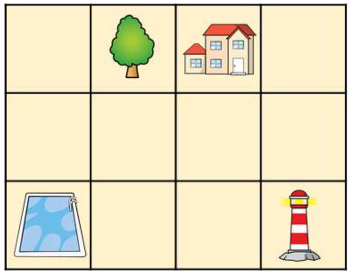
How would I get from the ……. to the ……..?

Varied Fluency

R

- Use cones to mark out a route for a partner. Describe the route your partner needs to take using the words 'left', 'right', 'forwards' and 'backwards'.

- Use a grid to move a bot to different places. Use the words 'left', 'right', 'forwards' and 'backwards' to describe the movements.



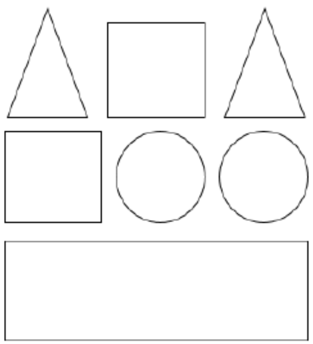
- Complete the sentences using 'left' and 'right' to describe the position of the coins.

The £1 coin is to the ______ of the 1p coin.
The 50p coin is to the _______ of the 1p coin.
The 2p coin is to the ______ of the 50p coin.

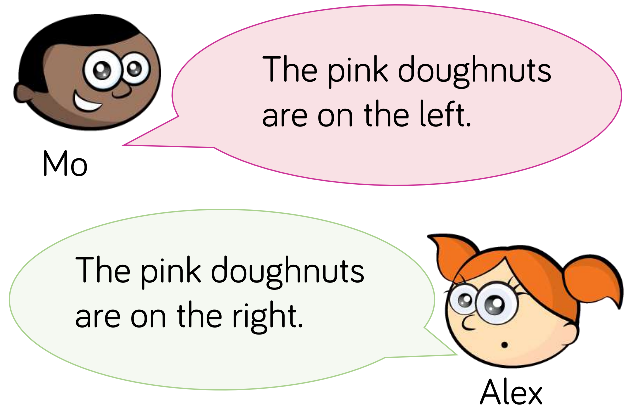
Describe Position (1)

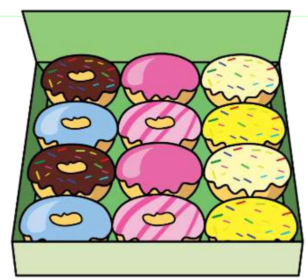
Reasoning and Problem Solving

Use the clues to colour the shapes.



- The circle in the middle is blue.
- The circle on the right is red.
- The shape up from the right circle is green.
- The shape down from the circles is green.
- The square to the left of the green triangle is red.
- The four-sided shape up from the rectangle is blue.
- The triangle on the left is red.





Who is correct?
Explain how you know.

Both children could be correct because they have not stated what the pink doughnuts are left or right in relation to.

The pink doughnuts are on the left of the yellow doughnuts and the pink doughnut are on the right of the blue and brown doughnuts.

Describe Position (2)

Notes and Guidance

Children will build upon directional language 'left' and 'right' to assist with describing position. They will describe position using: 'top', 'in between', 'bottom', 'above' and 'below'. Children explore the position of objects and shapes from different starting points.

Where possible, this concept should be explored practically both in and out of the classroom.

Mathematical Talk

Where is the _____ in relation to you?

What is _______ of you?

What is _______ of this object?

How can we describe the position of _____?

Can you create your own instructions to build a tower?

Varied Fluency

R

Think about where you are sitting in the classroom.
What can you see around you? Complete the table.

In front of me	Behind me	To the left of me	To the right of me

Use objects in your classroom or outside area to complete the sentences. Use the words: 'top', 'middle', 'bottom', 'above' and 'below' to describe the position.

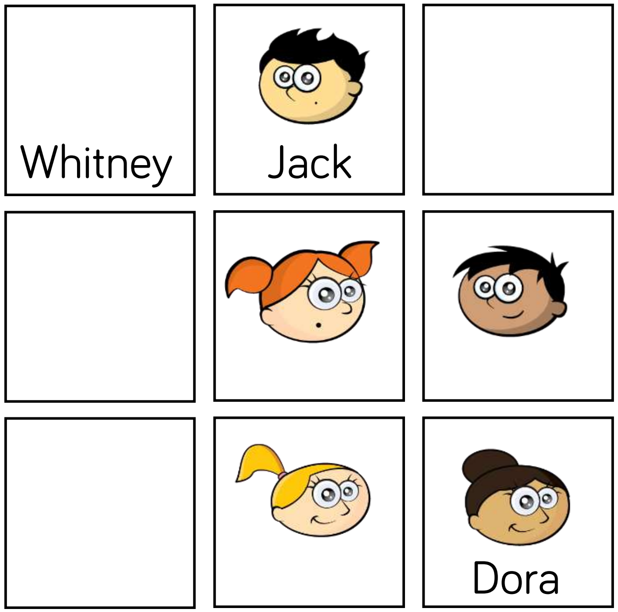
The ________ is above ________.
The ________ is below ________.
In between ________ and ________ is ________.
Above ________ is ________ and ________.
There is nothing between ________ and ________.

Use 5 cubes to build a tower.

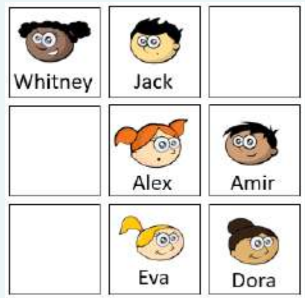
- Start with a yellow cube.
- Place a blue cube on top of the yellow cube.
- Place a white cube below the yellow cube.
- Place a red cube on the top of the tower.
- Place the green cube in between the yellow and white cube.

Describe Position (2)

Reasoning and Problem Solving



Jack is directly above Alex.
Eva is directly below Alex.
________ is to the right of Eva.
There is no-one above Amir.
What are the missing names?
Add people to complete the grid and describe where they are.



How many different ways can you describe the position of the 2p coin?

Possible answers may include:

The 2p coin is:

Below the 50p

Above the 10p

In between the £1 and 5p

To the **left** of the 5p

To the **right** of the £1

Describing Movement

Notes and Guidance

Children use language 'forwards', 'backwards', 'up', 'down', 'left' and 'right' to describe movement in a straight line.

Children will practically follow and give directions with a partner before writing directions for routes and recording routes on 2-D grids. Teachers need to discuss the direction objects are facing, in order to correctly complete left and right movements.

Mathematical Talk

How far have you/has your partner moved?
In what direction have you/has your partner moved?

What direction are we facing in at the start? Why is this important?

Can you describe the movements made by ____?

How could we record these movements?

Varied Fluency

- Using the words forwards, backwards, left and right, give your partner some instructions to follow when moving around the classroom/playground.

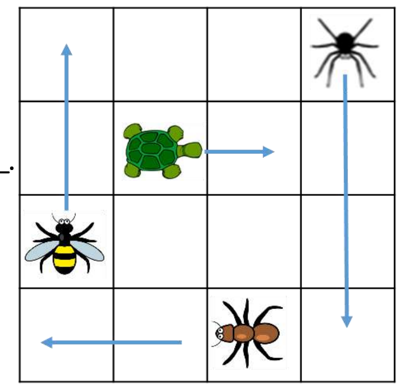
- Complete the stem sentences to describe the movements made.

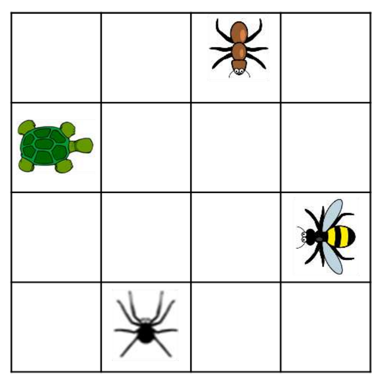
The  has moved 1 square ________.

The  has moved ___ squares _______.

The _____ has moved 2 squares up.

The ____ has moved ___ squares down.



- 

Record these movements on the grid using arrows.

The  moves 1 square right.

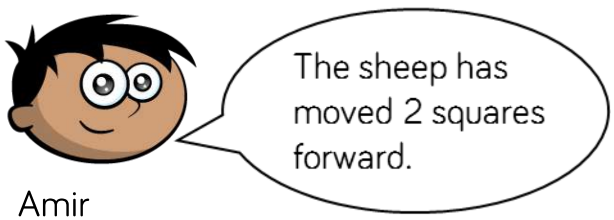
The  moves 3 squares forward.

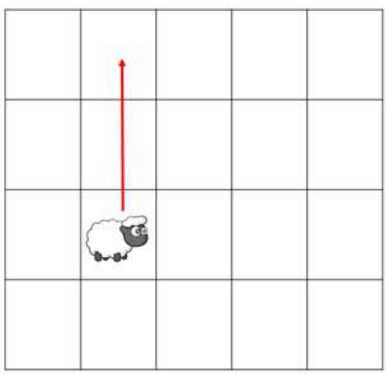
The  moves 1 square down.

The  moves 1 square up.

Describing Movement

Reasoning and Problem Solving



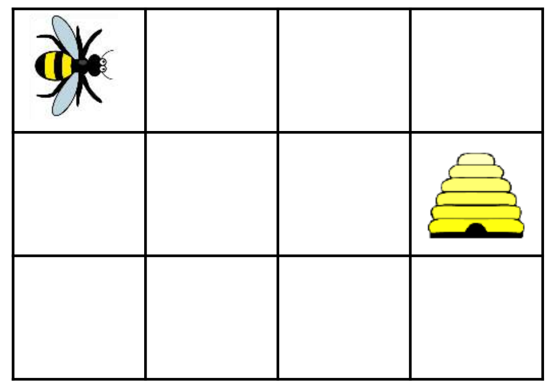


Is Amir correct?
Explain your reasoning.

Amir is incorrect. The sheep has moved 2 squares to the left because of the way it was facing to begin with.

How many different routes can you write for the bee to get to the hive?

Use the words forwards, backwards, left and right.



Possible answers:
Forward 3, Right 1.

Right 1, Forward 3.

Right 2, Forward 3, Left 1.

Right 1, Forward 3.

Right 2, Forward 2, Left 1, Forward 1.

There are more routes for the children to find.

Describing Turns

Notes and Guidance

Children describe turns using the language ‘full turn’, ‘half turn’, ‘quarter turn’, ‘three-quarter turn’, ‘clockwise’ and ‘anticlockwise’.

It is important to encourage the children to take into consideration which direction the object/person is facing to begin with.

Mathematical Talk

What direction was the turn?

Describe the turn that the number shapes have made?

Could there be more than one answer? Why?

Varied Fluency

- Turn a figure.

  Ask your partner to describe the turn using the language, ‘full turn’, ‘half turn’, ‘quarter turn’, ‘three-quarter turn’, ‘clockwise’ and ‘anticlockwise.

- Match the turn to the description.

A full turn.

A quarter turn clockwise.

A half turn anticlockwise.

- Describe how the triangle has turned each time.

The triangle has made a _____turn ______.

The triangle has made a _____ turn ______.

The triangle has made a _____ turn ______.

Describing Turns

Reasoning and Problem Solving

Look at the number shape below:  How could the number shape have turned? Describe all possibilities.	Possible answers: No turn Quarter/half/ three-quarter or full turn clockwise. Quarter/half/ three-quarter or full turn anticlockwise.
Always, Sometimes, Never If two objects turn in different directions they will not be facing the same way.	Sometimes. It depends on how far the objects are turned – quarter, half, three quarters or full.

Describing Movement & Turns

Notes and Guidance

Children use their knowledge of movement and turns to describe and record directions.

They need to be aware of the direction the object is facing before it is turned.

Children may explore movement and turns further using ICT or during P.E.

Mathematical Talk

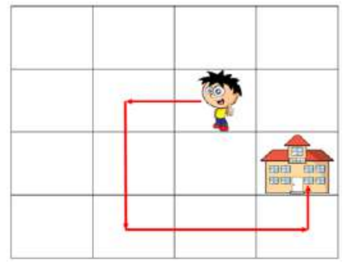
Which direction is ____ facing to begin with? Why is this important?
Is ____ moving or just changing direction? How do you know?

How can we record the directions given?

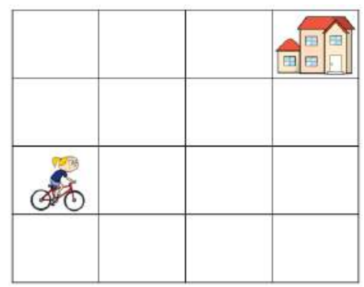
Are there any other routes that could be taken?

Varied Fluency

- Describe the route Dennis takes to school.

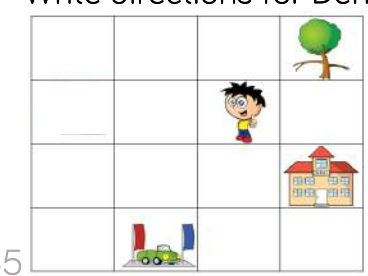


- Draw the route to show these directions.



Forward 1 square. Turn left.
Forward 1 square, quarter turn anti-clockwise.
Forward 1 square. Make a quarter turn clockwise.
Forward 1 square. Make a three quarter turn anti-clockwise. Forward 3

- Write directions for Dennis to get to each place on the map.

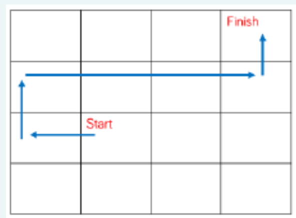


Describing Movement & Turns

Reasoning and Problem Solving

How many different routes can you find to get from start to finish.
Use the words 'forwards', 'backwards', 'clockwise', 'anti-clockwise' and 'quarter turn'.

Children will find a range of routes.
For example:



Turn a quarter anticlockwise.
Forward 1
Turn a quarter clockwise.
Forward 1
Turn a quarter clockwise.
Forward 3
Turn a quarter anticlockwise.
Forward 1

Is Whitney correct?

A quarter turn clockwise is the same as a three-quarter turn anticlockwise.

Convince me.

Possible answer:
Whitney is correct.

A quarter turn clockwise is the same as a three-quarter turn anticlockwise.

Children may use objects/small people to show their reasoning.

Making Patterns with Shapes

Notes and Guidance

Children build on previous knowledge of patterns and repeating patterns from Year 1

They now describe and create patterns that involve direction and turns.

Children use the language ‘clockwise’, ‘anti-clockwise’, ‘quarter’, ‘half’ and ‘three quarters’ to describe patterns.

Mathematical Talk

What is happening in the pattern?

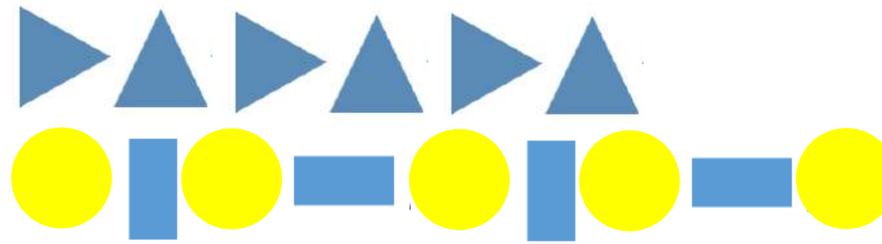
What would the next shape look like?

How would you describe its position?

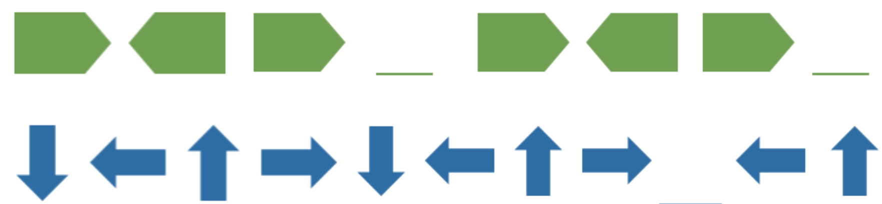
How can we work out the missing shape?

Varied Fluency

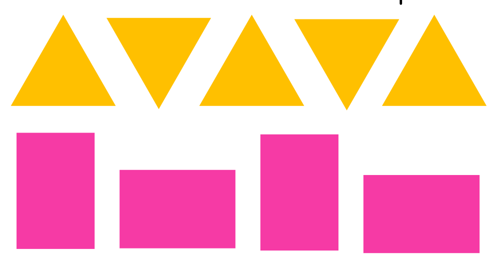
- Continue these patterns by adding the next 3 shapes.



- Fill in the missing shapes to complete the patterns.



- Describe the turn for each pattern.

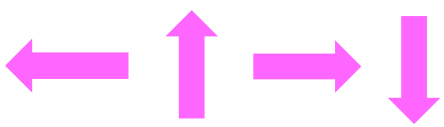


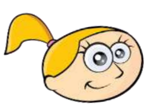
Making Patterns with Shapes

Reasoning and Problem Solving

How many different patterns can you create using this shape?

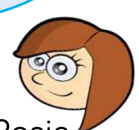
Possible answers:





Eva

The rule is turn the shape a quarter turn.



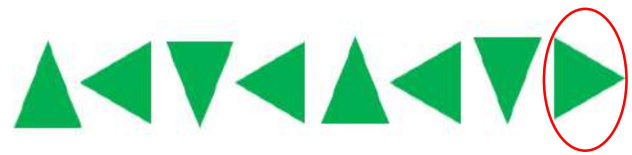
Rosie

The rule is turn the shape three quarters.

Who is correct?

Eva and Rosie could both be correct as no direction is given. Eva may be turning clockwise and Rosie anticlockwise.

Spot the mistake in each pattern. Explain why they are incorrect.



The 4th shape should be pointing right.

Or the 8th shape should be pointing left.

The 5th shape has not made half a turn.

White Rose Maths

Summer - Block 3

Time

Overview

Small Steps

- Telling time to the hour R
- Telling time to the half hour R
- O'clock and half past
- Quarter past and quarter to
- Telling time to 5 minutes
- Writing time R
- Hours and days
- Find durations of time
- Compare durations of time

Notes for 2020/21

Children may have missed the time block in Year 1 making this their first formal experience of telling the time.

Children should revisit the basics specifically focusing on telling the time to the hour and half hour before looking at the two combined.

Time to the Hour

Notes and Guidance

Children are introduced to telling the time to the hour using an analogue clock. They learn the language of o'clock and understand the hour hand is the shorter hand and the minute hand is the longer hand.
Children read the time to the hour and know when the minute hand is pointing upwards to the number 12 it is an o'clock time, and understand that they need to look at the hour hand to see which hour it is.

Mathematical Talk

There are two hands on the clock.
What is the same about each hand? What is different about each hand compared to the other?

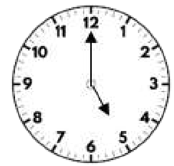
Looking at all three clock faces, what is the same about the hands? What is different about them?

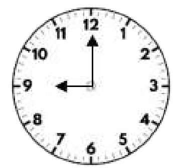
Where will the hour hand be at ____?
Where will the minute hand be at ____?
Can you show me _______?

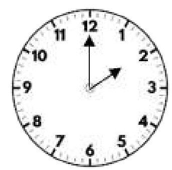
Varied Fluency

R

- Match the times to the clocks.





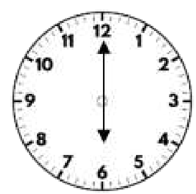


9 o'clock

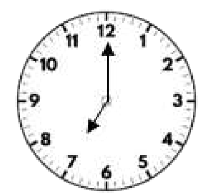
Two o'clock

5 o'clock

- Complete the times.



The time is ___ o'clock



The time is ___ o'clock

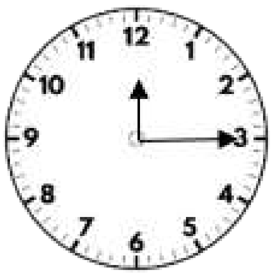
- Draw the hour hand and minute hand on clock faces to show the times:

Eight o'clock 1 o'clock Twelve o'clock

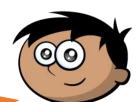
Time to the Hour

Reasoning and Problem Solving

R



The time is 3 o'clock.

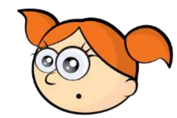


Amir

Can you spot Amir's mistake?

Amir has read the hour hand and the minute hand the wrong way round. At three o'clock the longer minute hand should be pointing at 12 and the shorter hour hand should be pointing at 3

When it is 11 o'clock both hands point at 11



Alex

Is Alex correct?
Explain your reasoning.

Alex is incorrect. If the time is eleven o'clock, the hour hand should be pointing at 11 and the minute hand should be pointing at 12

Time to the Half Hour

Notes and Guidance

Children are introduced to telling the time to the half hour. They learn the language half past.

They understand that, at half past the hour, the minute hand has travelled half way around the clock from the twelve and is pointing at the six and the hour hand is half way between the hours e.g. half way between one and two or half way between nine and ten.

Mathematical Talk

Which is the hour hand? Which is the minute hand? How do you know?

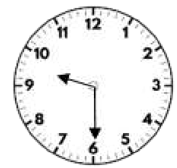
Where does the minute hand point to at half past? Can you see that the minute hand has travelled halfway around the clock? Could you show this to your partner?

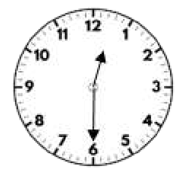
Can you show me _______?

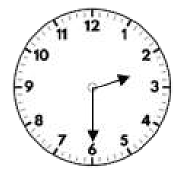
Varied Fluency

R

Match the times to the clocks.





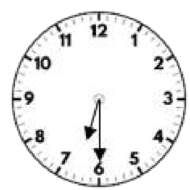


Half past twelve

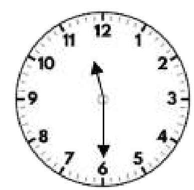
Half past 2

Half past nine

Complete the times.



The time is half past ___



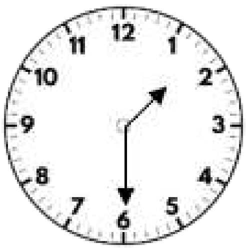
The time is half past ___

Draw the hour hand and the minute hand on clock faces to show these times:

Half past 1 | Half past four | Half past 8

Time to the Half Hour

Reasoning and Problem Solving



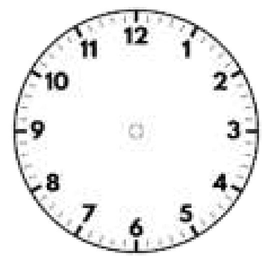
Tommy

Can you spot Tommy's mistake?

Tommy has read the minute hand as showing the number of minutes past the hour, rather than understanding that the minute hand pointing to 6 means half past. The time is half past one.

Read the instructions and draw the hands on the clock.

- The minute hand is pointing at the six.
- The hour hand is half way between 10 and 11



What time is it?

The time is half past 10

O'clock and Half Past

Notes and Guidance

Children recap the Year one objective of telling the time to the hour and half past the hour.

Children should be given the opportunity to create times using individual clocks with moveable hands.

Children read and write times from clocks.

Mathematical Talk

What do the numbers represent on the clock face?
Which is the hour hand? Which is the minute hand?

Where will the hour hand be at ____ ?
Where will the minute hand be at ____?
What do you notice about the minute hand at half past?

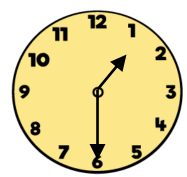
Can you show me _______?

Varied Fluency

- Match the events to the approximate times they happen.
  Can you show the time on your clock?

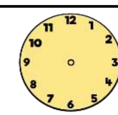
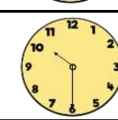
9 o'clock	Lunchtime
Half past 10	Go to school
12 o'clock	Home time
Half past 3	Playtime

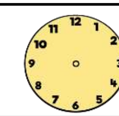
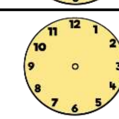
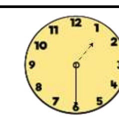
- What time is it?



It is ______ past ______

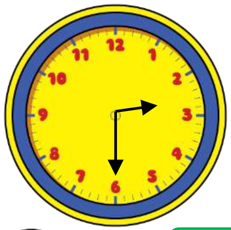
- Complete the tables.

5 o'clock	
	

Half past 4	
1 o'clock	
	

O'clock and Half Past

Reasoning and Problem Solving

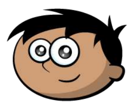


Who is telling the time correctly?

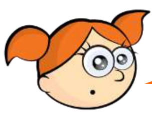
The time is half past 6

Dora

The time is half past 3



Amir



The time is half past 2

Alex

Can you spot the mistakes they've made?

Alex is correct. Dora has confused the minute hand with the hour hand.
Amir has not noticed that the hour hand has not gone past 3 yet.

It is half past 11 so the hour hand should be on the 11

Is Alex correct?
Explain your reasoning.

Alex is incorrect. If the time is half past 11 the hour hand should be half way between the 11 and 12

Oh no! The minute hand has fallen off the classroom clock!

Lunchtime is at 12:00

Have the children missed their lunchtime?

Unfortunately, the children have missed their lunch. The hour hand is halfway between 12 and 1 so the time is 12:30

Quarter Past & Quarter To

Notes and Guidance

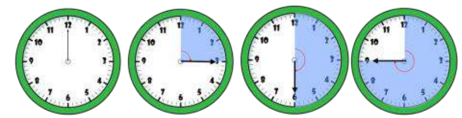
Children read and draw the times ‘quarter to’ and ‘quarter past’. They use their knowledge of fractions and turns to identify quarter past and quarter to.
Children should recognise that the hour hand moves along with the minute hand. Therefore when the time is quarter past the hour, the hour hand will be just past the hour and when the time is quarter to, the hour hand will be just before the hour.

Mathematical Talk

Where are the hands pointing to?
Can we divide the clock face into four equal parts? Can we link this to fractions?
If the minute hand is pointing at 3, how many minutes have passed the hour?
If the minute hand is pointing at 9, how many minutes until the next hour?
Show me quarter past/to….

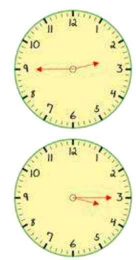
Varied Fluency

- Look at the clocks.

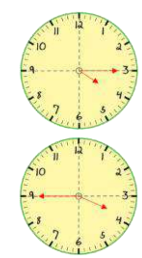


Discuss how the minute hand has travelled. Identify when the time is quarter past the hour and quarter to the hour. Give the children individual clocks with moveable hands and ask them to make quarter to/past times.

- Match the clocks to the correct time.



Quarter to four
Quarter past four
Quarter to three
Quarter past three

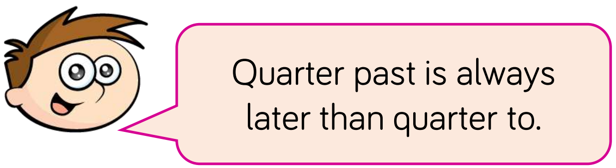


- Complete the table.

The minute hand is pointing to ____ The hour hand is just after ____ The time is *quarter ____ seven*		The minute hand is pointing to three. The hour hand is just after six. The time is *quarter past six.*	
The minute hand is pointing to ____ The hour hand is just before ____. The time is *quarter ____ two.*		The minute hand is pointing to nine. The hour hand is just ____ twelve. The time is *quarter to twelve.*	

Quarter Past & Quarter To

Reasoning and Problem Solving



Do you agree with Teddy?
Explain why.

It depends on the hour of the times given. For example: quarter to 12 is later than quarter past 11
If the hour remains the same than Teddy is correct.

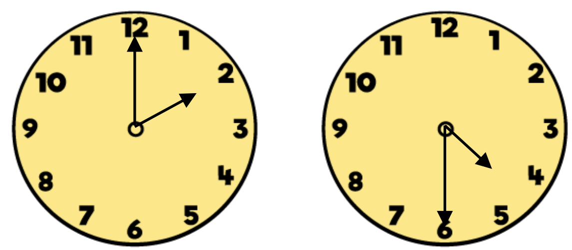
How many quarters of an hour are between 7 o'clock and 9 o'clock.

Explain how you found the answer.

There are 8 quarters of an hour between 7 o'clock and 9 o'clock.

The train to Blackpool leaves at quarter past and quarter to every hour.

Make a list of the times of the trains Oliver can catch if he gets to the train station between 2 o'clock and half past 4



Oliver could catch the following trains:
Quarter past 2
Quarter to 3
Quarter past 3
Quarter to 4
Quarter past 4

Telling Time to 5 Minutes

Notes and Guidance

Children read and show analogue time to 5-minute intervals. Children should be confident at counting from 0 to 60 in steps of 5 so they can then apply this to counting around the clock in fives and use this method to work out what time is shown.

Children need to recognise that once the minute hand gets past 6 the time is described as 'to' the next hour, rather than 'past' the hour.

Mathematical Talk

How many minutes are there between each pair of numbers on a clock?
How many different ways can you count round the clock?
Where will the minute hand be at _____? Where will the hour hand be at ______?
How do we know whether it is a 'past' or a 'to' time?
Can you show ______ past/to ______?

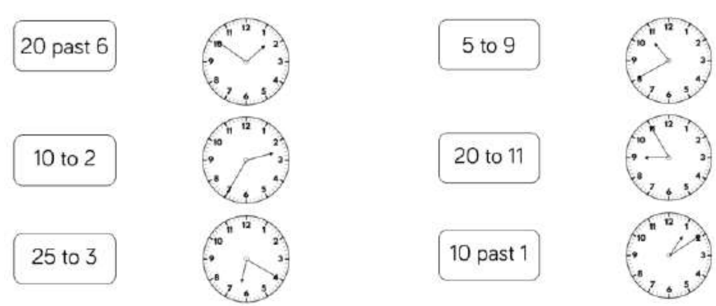
Varied Fluency

- Using a demonstration clock, ask the children to count round in minutes. When the minute-hand is pointing to a number, record how many minutes have passed the hour in a table. What do they notice? Will this pattern continue?

Minute hand pointing to	Minutes past the hour
1	5
2	10
3	15

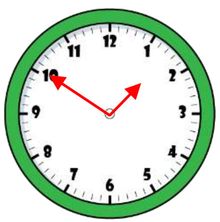
- Show the children times to 5-minute intervals on a large clock. Ask the children to identify what time is being shown. Give the children individual clocks with moveable hands. Ask the children to make times to 5 minute intervals.

- Match the times to the correct clock.



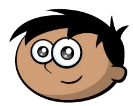
Telling Time to 5 Minutes

Reasoning and Problem Solving



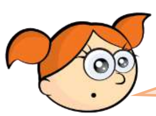
It is ten to one.

Dora



It is ten past ten.

Amir

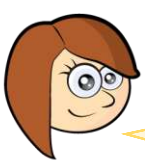


It is ten to two.

Alex

Who is correct? Explain your answer.

Alex is correct. Dora has said the hour before not the next hour. Amir has confused his minute and hour hands.

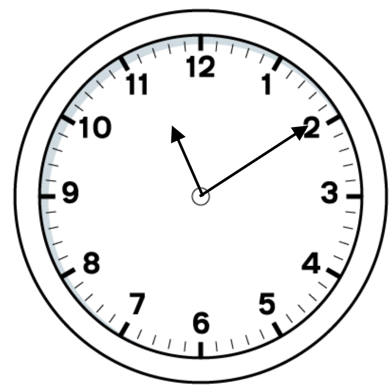


Four lots of 5 minutes is the same as quarter of an hour.

Do you agree with Rosie? Explain why.

Rosie is incorrect. Four 5 minutes are the same as 20 minutes.

Sophia starts her Maths questions at 10 past 11



Each question takes her 5 minutes to complete.
She completes 7 questions.

What time does Sophia finish her Maths questions?
Explain how you found the answer.

Sophia finishes her Maths questions at quarter to 12

Children may use a clock to count round seven lots of 5 minutes.

Children may do $5 \times 7 = 35$ and count 35 minutes round the clock.

Writing Time

Notes and Guidance

Children explore the difference between seconds, minutes and hours. They decide which activities would be measured in each unit of time.
Children explore suitable equipment e.g. stopwatches or sand timers to measure durations of time. They carry out activities and use suitable equipment to measure how long each activity takes e.g. timing how long it takes to run around the playground using a stopwatch.

Mathematical Talk

Would you measure the activity in hours, minutes or seconds?

How many star jumps do you think you can do in 10 seconds?

Let's count to 20 seconds in our heads, stand up when you think we reach 20 seconds. How close were you?

Varied Fluency

R

Using a stopwatch, record how many times you can do these activities in 20 seconds.

- Star jumps
- Write your name
- Hops on the spot

Can you think of any activity which takes 20 seconds?

Would you measure the duration of the activities in seconds, minutes or hours? Sort the activities into three groups: seconds, minutes and hours.

Brushing teeth	Reading a book	Saying the alphabet
Holiday flight	Playing outside	Sleeping at night

Complete the sentences using seconds, minutes or hours.
- Playtime is about 20 ________ long.
- The school day is about 6 ______ long.

Writing Time

Reasoning and Problem Solving

R

Are the units of time chosen sensible for these activities?

- A football match measured in seconds.
- A lap around the school playground measured in minutes.
- A birthday party measured in hours.

Explain your answers.

Not sensible- a football match is measured in minutes because to use seconds would involve very large numbers.

Dependent on the school playground, could be sensible, or it could be more sensible to measure in seconds.

Sensible - parties can last at least 2 hours.

Dora has a clock without an hour hand.

She says,

> I can measure how long it takes someone to run around the playground 10 times using my clock.

Do you agree with Dora?
Explain your answer.

I agree, Dora can still measure time in minutes using her clock.
The minute hand moving the distance from one increment to another shows one minute has passed.
The minute hand moving one complete turn shows that one hour has passed.

Hours and Days

Notes and Guidance

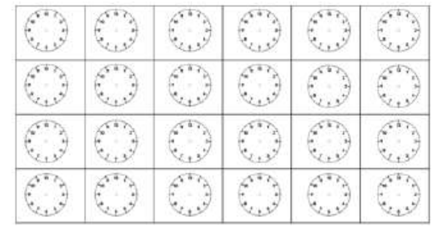
Children learn that there are 24 hours in a day and 60 minutes in an hour.
Children use clocks to convert minutes to hours and minutes.
Children should be encouraged to use their knowledge of counting in fives to help them convert.

Mathematical Talk

How many hours are there in a full day?
How many minutes are in an hour and a half? How could we calculate this?
Could we count in half an hours? How many half an hours are in one hour?
How many half an hours will there be in two hours?

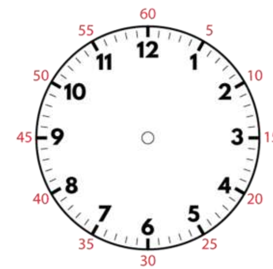
Varied Fluency

- Starting from midnight show every hour on the clocks for a full day.

  There are ☐ hours in a day.

- Using the clock, show how many minutes there are in 1 hour.
  1 hour = ______ minutes
  How many minutes would there be in 2 hours?

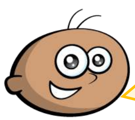
  

- Match the bars to the times.

60 minutes	90 minutes
60 minutes | 60 minutes	70 minutes
60 minutes | (half-length part)	120 minutes
60 minutes | 10	2 hours
	1 hour

Hours and Days

Reasoning and Problem Solving

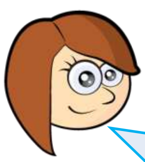


Tommy

There must be 12 hours in a day because we start from midnight and go up to 12 o'clock then start again from 1

Do you agree with Tommy? Explain why.

I disagree because there are 12 hours am and 12 hours pm therefore equaling 24 hours in a day.

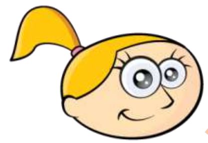


Rosie

If you add three hours onto the current time, the amount of minutes to/past the hour do not change.

Do you agree with Rosie? Prove it.

I agree. The hour hand will change but the minutes will stay the same.



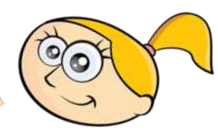
Eva

The day starts at 12 o'clock and ends at 12 o'clock.

Here are Eva's calculations for working out how many hours there are in a day.

12	6	12	6	12
1	7	1	7	
2	8	2	8	
3	9	3	9	
4	10	4	10	
5	11	5	11	

I counted them up, and there are 25 hours in a day.



What mistake has Eva made?

Eva has counted 12 o'clock three times.

The final twelve on her list is the start of the next day.

Find Durations of Time

Notes and Guidance

Children identify the start and end time of an event. They use these times to work out how long an event lasted. Children should understand this is the duration of an event. Children use individual clocks and number lines to help them work out the duration of an event. They can count in steps of 5 minutes to help them.

Mathematical Talk

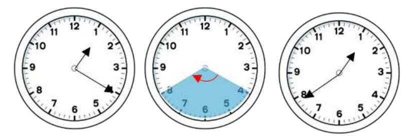
What is the start time? What is the end time?
How can we show this on the clock?
How long did the event last?

How did you work out the duration?
Are there any other methods for working out duration?

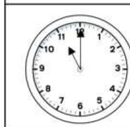
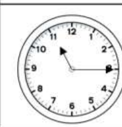
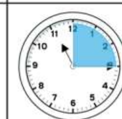
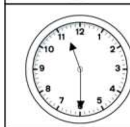
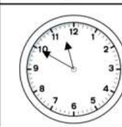
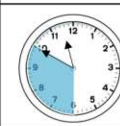
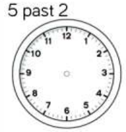
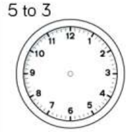
Varied Fluency

- How much time has passed from the start to end time?

Start Duration End



- Complete the table.

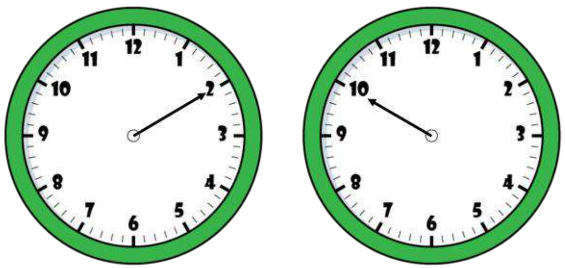
Start	End	Time passed	Duration
			____ minutes
			____ minutes
5 past 2 	5 to 3 		____ minutes

- Jack leaves school at quarter past 3
He arrives home at five to 4
How long was Iqbal's journey?

Find Durations of Time

Reasoning and Problem Solving

Oh no! The hour hand has fallen off the class clock!



Start End

The clock shows the start and end time of a film.

How long do you think the film lasted?

The film could have lasted 40 minutes, but children may reason that most films last more than an hour, so it is more likely to be an hour and 40 minutes or two hours and 40 minutes.

Aimee is planning her birthday. She wants to plan something to do from 9am to 5pm.

Here are the things she wants to do:
- Visit the zoo (3 hours)
- Go to Pizza Palace (1 hour and a half)
- Have breakfast (half an hour)
- Play party games (1 hour)
- Watch a film (2 hours)

Create a timetable for Aimee's day. Compare it to your friends – is it the same?

There are 8 hours in Aimee's day so children could create different combinations for Aimee's day.

White Rose Maths

Compare Durations of Time

Notes and Guidance

Children compare times using 'longer' and 'shorter'. They order times from longest to shortest and vice versa.
Children then compare durations of time taken by particular events.
They could explore ways to work out durations of time most efficiently, including using empty number lines and using their knowledge that there are 60 minutes in an hour.

Mathematical Talk

Which is longer 2 minutes or 1 hour?
How can you order the times?
How many minutes does each TV show last?
How can we count the minutes efficiently?
How much longer is ………. than ……………?
How can we efficiently work out the length of time each person works?

Varied Fluency

- Circle the longest time.

1 hour	40 minutes	Half an hour
55 minutes	Three quarters of an hour	35 minutes

Can you order the times from longest to shortest?

- Use the table to complete the sentences.

TV Show	Starts	Ends
Pop World	3 o' clock	Twenty to 4
Animal Patrol	Half past 6	Five to 7
Super Cars	Quarter past 8	Five past 9

_____________ is the shortest TV show.

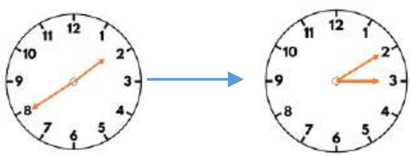
__________ is longer than __________ and ___________

- Joe works from half past 10 until 3 o' clock.
Emma works from 9 o' clock until half past 12
Who works the longest amount of time?

Compare Durations of Time

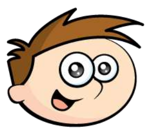
Reasoning and Problem Solving

The clocks show the start and end time of the film Super Dog.



The film Crazy Cat starts at quarter past 1 and ends at quarter to 3

Teddy says,



Super Dog must be the longest film, because it ends the latest.

Do you agree with Teddy?
Explain why.

I do not agree with Teddy, because both films last exactly the same length of time – 1 hour and 30 minutes.

Rosie has an hour for her lunch break. If she takes 10 minutes to eat her lunch, does she have enough time to complete all of the playground activities?

Activity	Duration
Skipping	7 minutes
Ball skills	10 minutes
Treasure hunt	21 minutes
Trim trail	19 minutes

How do you know?

Rosie doesn't have time to complete all of the activities. Completing all of the activities would take 57 minutes. If she spends 10 minutes eating her lunch, she would only have 50 minutes left.

White Rose Maths

Summer - Block 4

Mass, Capacity & Temperature

Overview

Small Steps

- Introduce weight and mass R
- Measure mass R
- Compare mass
- Measure mass in grams
- Measure mass in kilograms
- Introduce capacity and volume R
- Measure capacity R
- Compare volume
- Millilitres
- Litres
- Temperature

Notes for 2020/21

Children should revisit the idea of mass and capacity initially focusing on non-standard units such as cubes and jugs respectively. They will then look more formally at measuring using standard units.

Practical activities are encouraged to support understanding.

Introduce Weight & Mass

Notes and Guidance

Children are introduced to weight and mass for the first time. They may already have some understanding of heavy and light from their own experience of carrying objects.
Children should begin by holding objects and describing them using vocabulary such as heavy, light, heavier than, lighter than before using the scales to check.
The children may believe that larger objects are always heavier and this misconception should be explored.

Mathematical Talk

Hold two objects, which is heavier/lighter? How do you know? How can we prove this?

Are larger objects always heavier than smaller objects?

If the balance scale is down, what does that tell us?

If the balance scale is up, what does that tell us?

If the balance is level, what does that tell us?

Which of these objects is heavier? How do you know? How will this be shown on the weighing scale?

Varied Fluency

R

- Choose two objects. Which is heavier? Which is lighter?
Can you be a human weighing scale?
Now use the weighing scale to check.

Which object is heavier? Which object is lighter?
The _______ is heavier/lighter than the ________ .

- Fill in the missing gaps to make the sentences correct.

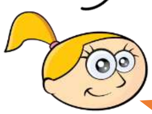
The _______ is heavier than the _______.
The _______ is lighter than the _______.
The _______ is equal to the _______.

- Collect different objects from around your classroom. Use a balance scale to find the heaviest object.
Can you find 2 objects that are equal in mass?

Introduce Weight & Mass

Reasoning and Problem Solving

The class are seeing whether the balloon or apple will weigh more.


Eva

The balloon will be heavier because it is bigger than the apple.

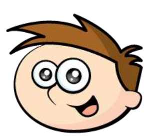
The balance will be level because they are both red.


Whitney


Mo

The apple will go down because it is lighter.

The balloon will go up because it is lighter.


Teddy

Teddy is correct. However his explanation needs to be clearer. Children should practice using vocabulary such as heavier than and lighter than when comparing objects alongside talking about the movement of the scale.

Children should be encouraged to explain why the others are incorrect.

I'm thinking of an object. It is heavier than a pencil, but lighter than a dictionary.

What object could Jack be thinking of?
Prove it.
How many objects can you think of?

Children will use a balance scale to find objects that are heavier than a pencil, then check that their chosen objects are lighter than the dictionary.

Measure Mass

Notes and Guidance

Children begin by using a variety of non-standard units (e.g. cubes, bricks) to measure the mass of an object.
They see that when the scale is balanced, the number of non-standard units can be used to determine the mass.
E.g. One apple weighs ____ bricks.
Children may find that it is difficult to balance objects exactly using non-standard units. For example an object may be heavier than 3 bricks, but lighter than 4 bricks.

Mathematical Talk

When the scales are balanced, what does this mean?
How many ______ weigh the same as one ________?

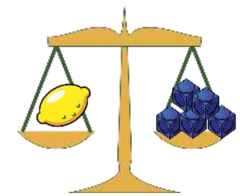
If I add one more cube to this side, what will happen? How do you know? What if I take a cube away?

Which classroom objects are the best units to measure with? Why?

Varied Fluency

R

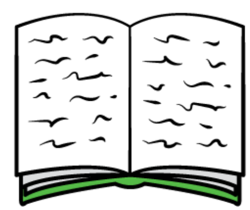
- Use the non-standard units to measure each item on your table.



The _______ weighs the same as _______ cubes.

- Weigh an object using cubes and then weigh the same object using different non-standard units.
Record your findings.
What do you notice?
Which non-standard unit was the best to use? Why
Which non-standard unit was not good to use? Why?

- Which non-standard units would be the best to measure the mass of a heavy book?



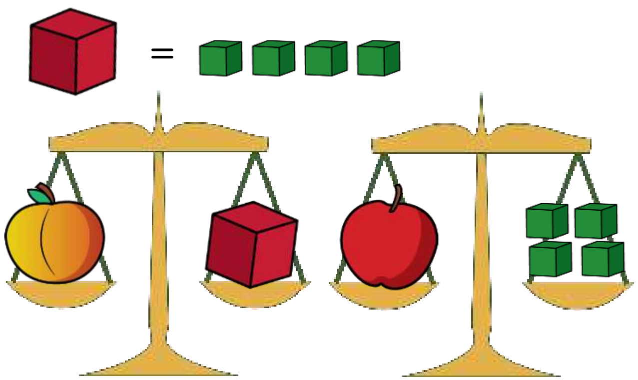
Counters
Wooden blocks
Pencils

Why?

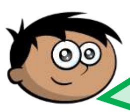
Measure Mass

Reasoning and Problem Solving

R



Amir says,



The apple is heavier than the peach, because it weighs 4 cubes.

Teddy says,

The apple and the peach weigh the same.

Who do you agree with?
Explain why.

Possible answer:
I agree with Teddy, because 1 brick weighs the same as 4 cubes so the apple and the peach weigh the same.

How many cubes does the teddy bear weigh?
Explain how you know.

The teddy bear weighs 5 cubes. I can take 1 cube off of each side of the scale and it will still balance.

Compare Mass

Notes and Guidance

Children recap on Year 1 learning by comparing the mass of different objects. They will initially use balance scales to compare the mass of two or more objects.

Children compare mass using < and > and order objects based on their masses.

Mathematical Talk

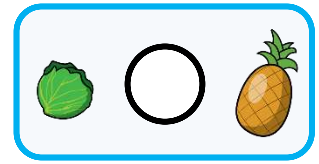
Look at the scale, which side is lower?
What does this tell us about the objects?

Which object is heavier? Which object is lighter?

Can you hold the objects and predict which is heavier?
Is a largest object always the heaviest?

Varied Fluency

- Using the words 'more' and 'less' and the > or < symbols, describe the mass.



The lettuce weighs ______ than the pineapple.

- Choose three objects. Use the balance scales to order them from heaviest to lightest?

The _______ is heavier than the _______ but lighter than the _____.
The _______ is lighter than the _______ but heavier than the _____.

- Complete the sentences:

4 bananas weigh the same as ___ doughnuts.
2 bananas weigh the same as ___ doughnuts

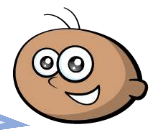
Can you write sentences using 'more' or 'less' using the image?

White Rose Maths

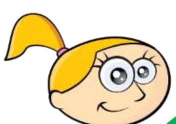
Compare Mass

Reasoning and Problem Solving

Apples weigh more than bananas.



Tommy

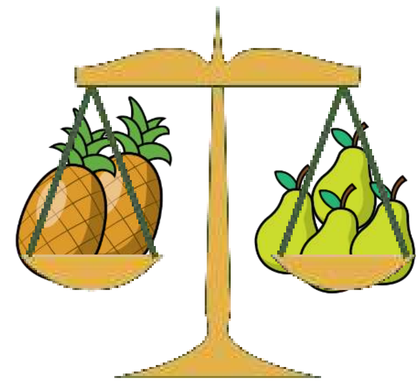


Eva

Two doughnuts weigh the same as two bananas.

Do you agree?
Explain why.

3 bananas weigh the same as two apples, so Tommy is correct - an apple must weigh more than a banana.
1 banana weighs the same as 2 doughnuts so Eva is incorrect.



One pear weighs 10 cubes.
How many cubes will balance one pineapple?
Explain how you know.

1 pineapple weighs 20 cubes.

Always, sometimes or never true?

The larger the box, the heavier it is.

Sometimes. Children can explore this using different sized boxes.

Measure Mass (g)

Notes and Guidance

In Year 2, the children use standard units of mass (grams) for the first time. They continue to use balance scales before moving on to use standard weighing scales.
Children apply their counting in 2s, 5s and 10s skills to reading scales accurately. They should see a variety of scales with different intervals. Give children the opportunity to feel the mass of gram weights so they can use this for estimation.

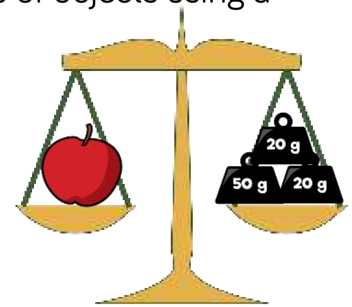
Mathematical Talk

When the balance scales are level, what does this tell us?
What symbol could we use? (=)
What is the mass of the _____?
What would two ______weigh?
How could you tell is something was lighter or heavier than 10g?
How much heavier is the _____ than the _____? How could you work it out?

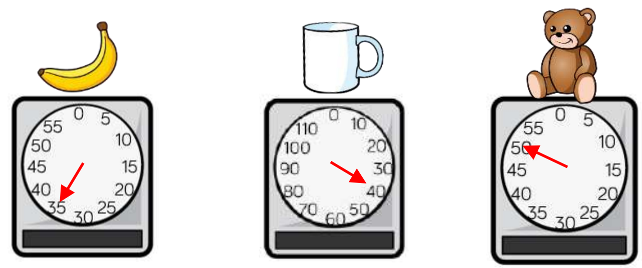
Varied Fluency

- Use gram weights to measure the mass of objects using a balance scale.

The _____ weighs _______ grams.



- Use scales to record the mass of objects in grams.

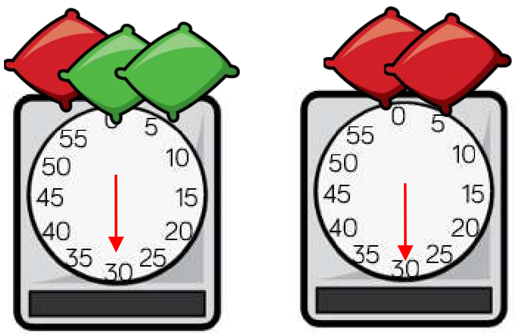


- Order the items from heaviest to lightest.

White Rose Maths

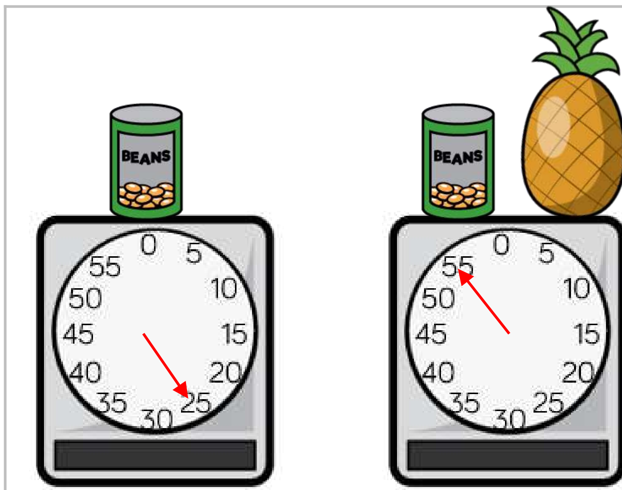
Measure Mass (g)

Reasoning and Problem Solving

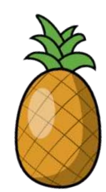


Which is heavier, the red or the green beanbag?
Explain why.

The red beanbag weighs more because it weighs the same as **two** green beanbags.



The  weighs ☐ g.

The  weighs ☐ g.

The tin of beans weighs 25 g and the pineapple weighs 30 g

Measure Mass (kg)

Notes and Guidance

Children use their knowledge of measuring mass in grams to start to measure mass in kilograms.
They apply counting in 2s, 5s and 10s to measure on different scales.
Give children the opportunity to feel the mass of kilogram weights and real life objects that weigh 1 kg so they can use this to estimate.

Mathematical Talk

Which is heavier, one gram or one kilogram?
What else do you think we might measure in kilograms?

How much do you think that you weigh? Would you measure this in grams or kilograms? Shall we estimate and then weigh ourselves?

Can you make up some different questions about the suitcases? What words can you use to compare?

Varied Fluency

- Find the mass of the sweets and the beans.

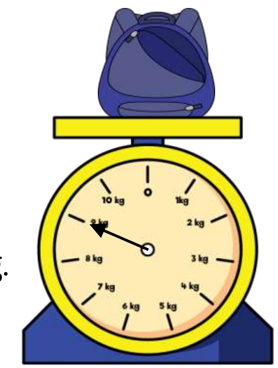
The sweets weigh ____kg

The beans weigh ____g.

- Read the scales to find the mass of each.

The bag weighs ____ kg.

The person weighs ____ kg.



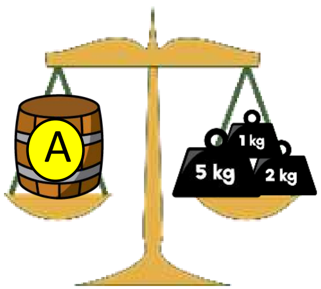
- Sophie's family are going on holiday. Compare the mass of their suitcases.

Sophie's suitcase is _______ than Dad's suitcase
Mum's suitcase weighs ____ kg more than Dad's suitcase.

Measure Mass (kg)

Reasoning and Problem Solving

What is the mass of each barrel?



Double the mass of A

Half the mass of A

What is the difference between the mass of B and C?

Barrel A weighs 8 kg

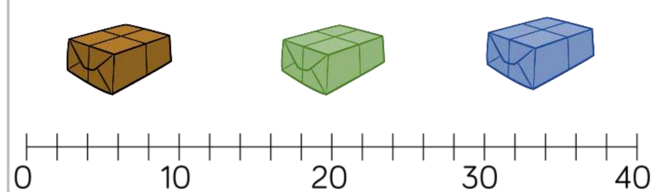
Barrel B weighs 16 kg

Barrel C weighs 4 kg

B is 12 kg heavier than C

The brown parcel weighs twice as much as the blue parcel.
The green parcel weighs 2 kg more than 30 kg
The blue parcel weighs 12 kg less than the green parcel.

Draw an arrow to show where each parcel would be on the scale.



The green parcel weighs 32 kg

The blue parcel weighs 20 kg

The brown parcel weighs 40 kg

Introduce Capacity and Volume

Notes and Guidance

Children are introduced to volume and capacity for the first time.

They explore the concept in a practical way, using a variety of containers.

They compare the volume in a container by describing whether it is full, nearly full, empty or nearly empty.

Mathematical Talk

Look at my bottle, is it full? Is it empty?

Compare my two bottles, which has more liquid in? Which has less?

How can we show the container is nearly full or nearly empty?

How can we measure the capacity of this container?

Varied Fluency

R

- Provide a range of different containers for children to explore practically using water or sand.

  Show me full containers.
  Show me empty containers.
  Show me almost full.
  Show me almost empty.

- Use the words 'more' or 'less' to compare the containers.

A B

A has _______ than B.

A has _______ than B.

A B

- Put these in order from empty to full.

A B C D

empty full

Introduce Capacity and Volume

Reasoning and Problem Solving

R

Always, Sometimes, Never?

The tallest container holds the most liquid.

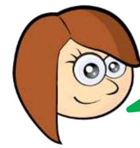
Identical containers can have a different capacity.

Show me.

Sometimes.

Never - If the containers are identical they will have the same capacity but they can have different volumes of liquid in.

Rosie, Teddy and Amir are describing their glasses of water.



Rosie

My glass has more water than Teddy's.

My glass is nearly full.

Teddy

Amir

My glass has less water than Rosie's.

Can you fill in how much water could be in each of the children's glasses?

Rosie Teddy Amir

Various representations for Rosie's and Amir's as long as they show that Amir's is less than Rosie's and Rosie's is more than nearly full.

Measure Capacity

Notes and Guidance

Children measure the capacity of different containers using non-standard units of measure. They understand that the unit of measure must stay the same, for example the same cup, the same spoon etc.

They understand to measure accurately, they must make each container or non-standard measure full.

Mathematical Talk

How can we measure how much liquid will fill my container?

What could I use?

How many bowls of liquid fill the bottle?

How many cups of liquid fill the bottle?

How is this different? How is this the same?

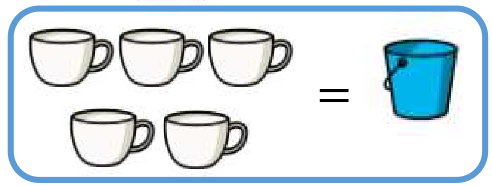
Varied Fluency

R

- Work practically using a variety of containers.
Investigate how many small containers it takes to fill the larger containers.

The capacity of the _______ is _______ pots.

- It takes 5  to fill 1 



How many  will it take to fill 2 buckets?

What about three buckets?

Four buckets?

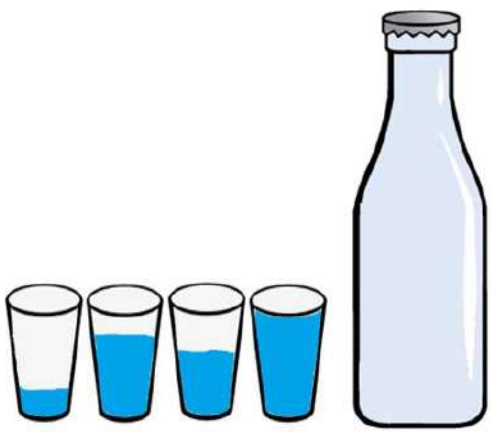
What do you notice?
Can you continue the pattern?

Measure Capacity

Reasoning and Problem Solving

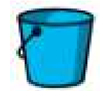
R

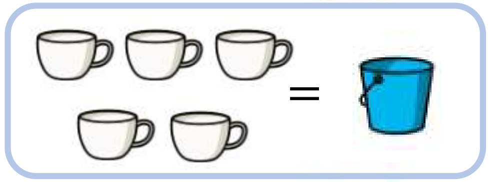
Whitney pours her cups into the bottle and they fill it exactly.



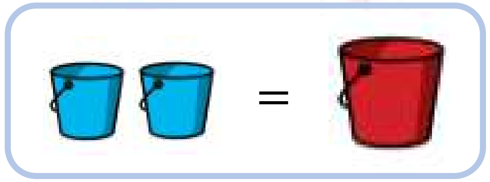
She says the bottle has a capacity of four cups. Do you agree?

Whitney is wrong. She has not filled the cups to the top so her measuring is inaccurate.

It takes 5  to fill 1 



It takes 2  to fill 1 



How many  will fill one  ?

What else can you find out?

10 cups will fill one red bucket.

The children may also find that it will take 20 cups to fill 2 red buckets etc.

Compare Volume

Notes and Guidance

Children compare the volume of containers using < , > and = They build on their understanding of the difference between capacity and volume from Year 1. Capacity is the amount a container can hold. Volume is the amount it is actually holding.

Children use the language 'quarter', 'half' and 'three-quarters full' to describe and compare volume. Make sure children have the opportunity to practically investigate volume and capacity.

Mathematical Talk

Which container has the largest/smallest capacity? How do you know? Can we order them from largest to smallest?

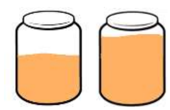
Which container has the most or least liquid in?

How many <u>mugs</u> does it take to fill the <u>bottle?</u>
Is this more or less than the <u>pot</u>? Can we find the difference?
Does the tallest container always hold the most?

Varied Fluency

- Show three different containers. Which container has the largest capacity? Using water or rice, make each container: one quarter full, half full, three-quarters full.

- Complete the sentences using the words 'less', 'more' or equal'.



A B

Container A has ________ than container B.

A B C

Container C has ________ than container B.

Container A has ________ than container C but ______ than container B.

- Complete the sentences:

The bottle can fill _____ mugs.

The pot can fill _____ mugs.

Use other containers to investigate how many mugs of rice they take to fill.

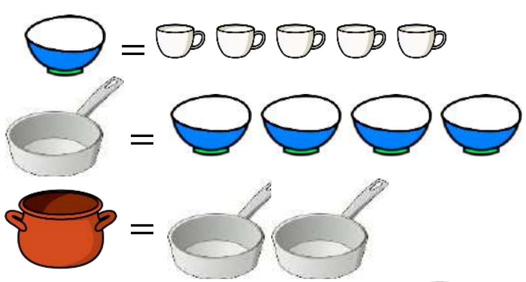
Compare Volume

Reasoning and Problem Solving

Whitney had two full bottles of juice.
She poured some juice into two glasses.

Which glass has the most juice in?
Which has the least juice in?
Explain how you know.

Glass A has the least juice in and Glass B has more juice in. Bottle A has more juice left over which means it has less juice poured out.



How many  does the  hold?

The pot holds 40 cups of water.

Choose a selection of different sized containers.
Decide how you will measure how much liquid each container can hold.
Order your containers from smallest to largest.
Compare the containers using <, > or =

Millilitres

Notes and Guidance

Children are introduced to standard units of millilitres (ml) for the first time.

They should be provided with a selection of different measuring cylinders and jugs in order to practice measuring in millilitres. They should be encouraged to estimate how many ml unlabeled containers will hold and then use measuring cylinders or jugs to check.

Mathematical Talk

Which container has the largest/smallest capacity? Can we order them from largest to smallest?

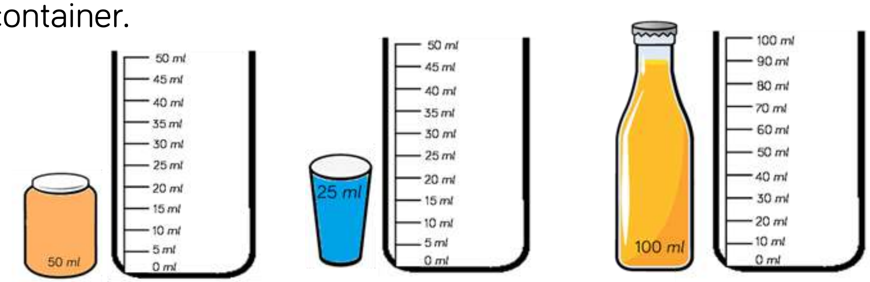
Look at the scale on my cylinder, what do you notice? Is this the same for this cylinder?

If we pour the liquid from this jar/glass into the cylinder, how much does each container hold?

Varied Fluency

- Use a variety of different containers with ml clearly labelled e.g. measuring spoon, water bottle, liquid soap, vinegar etc. Introduce that liquid can be measured in millilitres. Discuss whether 5 ml is a large or small amount. Show 5 ml using a medicine spoon. Look at the containers estimate then identify how many ml each container holds.

- Draw the level on the scale to show the capacity of each container.



The container's capacity is ___ *ml*	The container's capacity is ___ *ml*	The container's capacity is ___ *ml*

- Use different containers e.g. mug, bowl, pan, tea cup. Fill them with water or rice. Pour them into a measuring cylinder and measure the amount of liquid or rice in the measuring cylinder.

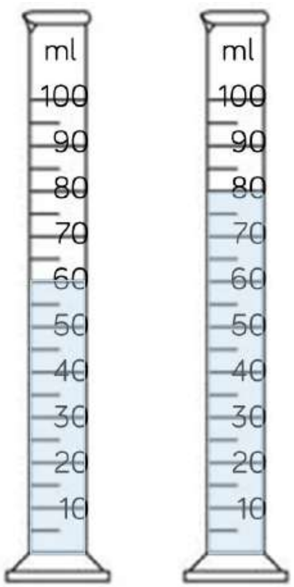
Millilitres

Reasoning and Problem Solving

A  holds 5 ml of liquid.

How many  of liquid are there in each container?

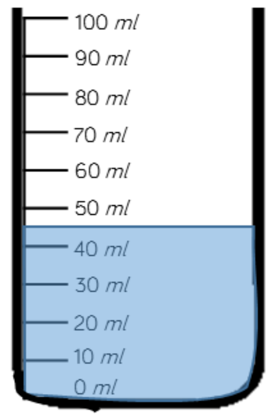
A B



Container A holds 12 teaspoons.

Container B holds 16 teaspoons.

Estimate the amount of water in the container.



Explain why you have given your answer.

The water is between 40 ml and 50 ml

It is approximately 45 ml

Litres

Notes and Guidance

Children are introduced to litres (l) as a standard unit for the first time.

Children recognise the difference between measuring in millilitres and litres and when it is more efficient to use litres to measure liquid rather than millilitres. They should be encouraged to estimate volumes and then check by measuring.

Mathematical Talk

Which is larger, 1 mililitre or 1 litre? How do you know?

Would you measure ________ in litres or millilitres? Why?

How many litres of water do you drink a day?

Show the children a litre container. How many litres of water do you think it would take to fill _________?

Varied Fluency

Provide a variety of different containers with litres clearly labelled e.g. cola bottle, paint bottle, milk etc.

Introduce litres and discuss how these are the same but different to millilitres. Identify how many litres fill each container.

Show how much liquid is in each cylinder after you:

- Pour 3 litres of water into the cylinder.
- Leave 1 litre of cola in the bottle.
- Pour half of the juice into the cylinder.

Use different containers e.g. bucket, large pan etc. Estimate and then measure the capacity of each one.

Litres

Reasoning and Problem Solving

Mo puts 4 litres of water in bucket A. He then pours 3 litres from bucket A into bucket B.

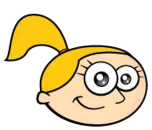
Which sentence is correct? A B

- There is more in bucket A.
- There is less in bucket A.
- There are equal amounts in each bucket.

Explain why.

There is less in bucket A because there will be 1 litre in A and 3 litres in B.

Eva wants to measure 2 litres of water into a tub. She only has a 5 litre and a 3 litre container.



How can she use both containers to measure 2 litres?

Eva could fill her 5 litre container and then empty 3 litres into the 3l container. She will be left with 2 litres.

5l – 3l = 2l

3 bowls each have more than 20 l of water in but less than 50 l

The green bowl has 5 l more than the red bowl.

The blue bowl has 10 l more than the green bowl.

How much could each bowl have in?

The red bowl could have between 20 l and 35 l

The green bowl could have between 25 l and 40 l

The blue bowl could have between 35 l and 50 l

Temperature

Notes and Guidance

Children are introduced to temperature, thermometers and the units 'degrees Centigrade', written °C for the first time. They learn that the temperature is higher when it is warmer.

They apply their counting in 2s, 5s and 10s skills when reading different scales on thermometers.

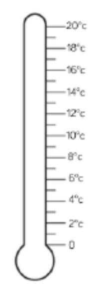
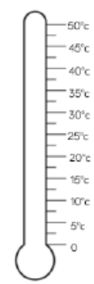
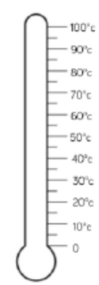
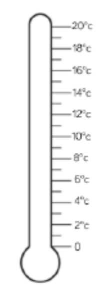
Mathematical Talk

What unit can we use to measure temperature?
What is the scale going up in? How do you know?
If the temperature increases what happens to the number on the scale?
If the temperature decreases what happens to the number on the scale?
Can we compare temperatures using vocabulary such as increased, decreased, warmer, colder and difference?

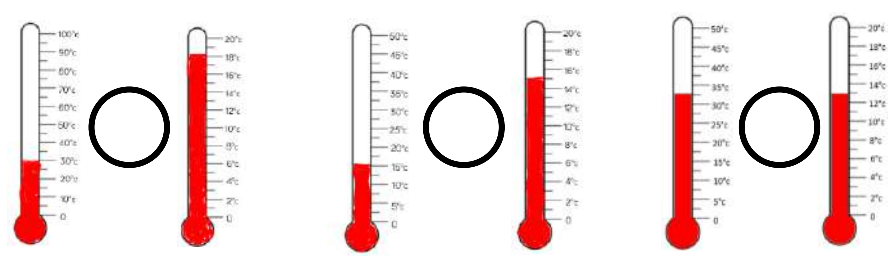
Varied Fluency

- Take temperatures around the school and complete the following stem sentences:
  The temperature in the classroom is ________.
  The classroom is _________ than the playground.
  The difference in temperature between the _________ and the _________ is __ degrees Celsius.

- Complete the thermometers to show the temperatures.


16 °C

35 °C

70 °C

9 °C

- Compare the temperatures using <, > or =



White Rose Maths

Temperature

Reasoning and Problem Solving

Mollie took the temperature at 12 p.m. and again at 5 p.m.

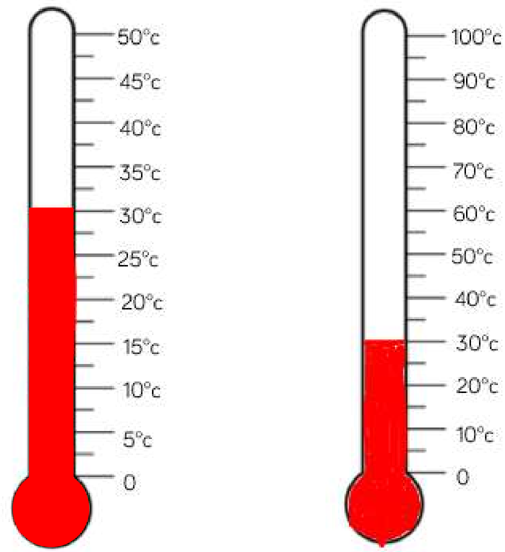
There was a difference of 7°C

What could the temperatures be?

Children may give any temperatures that have a difference of 7

Some children may realise that it is usually cooler in the evening and therefore make sure there 12pm temperature is always warmer than the 5pm temperature.

What is the same and what is different about the thermometers/temperatures?



Both thermometers are showing 30°C

The scale on the first thermometer counts up in 5°c. The scale on the second thermometer counts up in 10°C

The second thermometer will be able to record higher temperatures.