Spring Scheme of Learning

Year 3

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

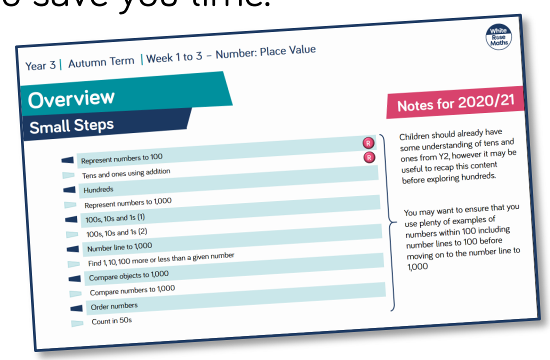
2020 will go down in history. The world has changed for all of us.

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 11.

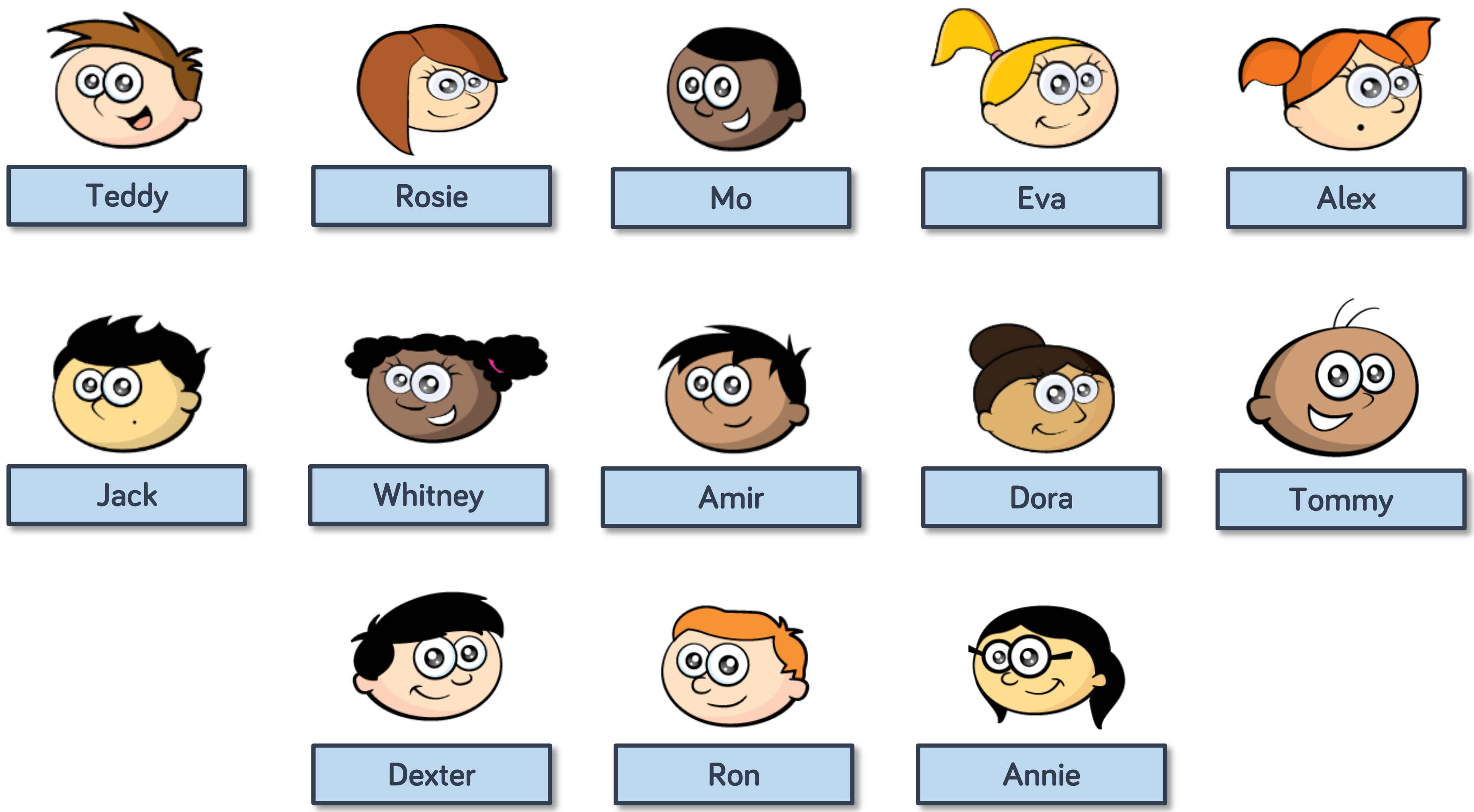
The worksheets are provided in three different formats:

- 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?



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					Number: Multiplication and Division			
Spring	Number: Multiplication and Division			Measurement: Money	Statistics		Measurement: Length and Perimeter			Number: Fractions		Consolidation
Summer	Number: Fractions			Measurement: Time			Geometry: Properties of Shape		Measurement: Mass and Capacity			Consolidation

White Rose Maths

Spring - Block 1

Multiplication & Division

Overview

Small Steps

- Consolidate 2, 4 and 8 times-tables (R)
- Comparing statements
- Related calculations
- Multiply 2-digits by 1-digit (1)
- Multiply 2-digits by 1-digit (2)
- Divide 2-digits by 1-digit (1)
- Divide 2-digits by 1-digit (2)
- Divide 2-digits by 1-digit (3)
- Scaling
- How many ways?

Notes for 2020/21

The 2, 4 and 8 times-tables are revisited here to ensure children are fully equipped for the rest of the learning in this block.

Base 10 equipment and place value counters are useful to explore the topic. Some children may find the jump from Base 10 to counters quite difficult and they should only be moved on when they are ready.

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?

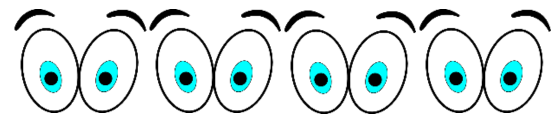
How many 2s go into 16?

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

Varied Fluency

R

- 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	

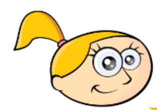
- How many wheels are there on five bicycles?

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

The 2 Times-Table

Reasoning and Problem Solving

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

Eva says,  Every number in the 2 times-table is even. 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 4 Times Table

Notes and Guidance

Children use knowledge of known multiplication tables (2, 3, 5 and 10 times tables) and understanding of key concepts of multiplication to develop knowledge of the 4 times table.

Children who have learnt $3 \times 4 = 12$ can use understanding of commutativity to know that $4 \times 3 = 12$

Mathematical Talk

What do you notice about the pattern?

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

What other times tables will help you with this times table?

Varied Fluency

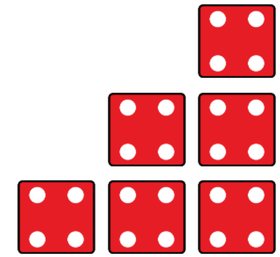
R

- Use the pictorial representations to complete the calculations.

$1 \times 4 =$ ____

$2 \times 4 =$ ____

$3 \times 4 =$ ____



Continue the pattern.

- 2 cars have eight wheels. How many wheels do four cars have?

$2 \times 4 = 8$ $4 \times 4 =$ ____

Three cows have 12 legs. How many legs do six cows have?

$3 \times$ ____ $= 12$ $6 \times$ ____ $=$ ____

- Colour in the multiples of 4
What pattern do you notice?

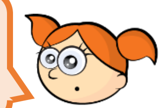
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

The 4 Times Table

Reasoning and Problem Solving

R

I have forgotten what 4×4 is.



Jack says,
"The answer is more than 3×4"

Complete the calculation to prove this.
$4 \times 4 = 3 \times 4 + \_\_$

Mo says,
"The answer is 4 less than 5×4"

Complete the calculation to prove this.
$4 \times 4 = \_\_ \times 4 - \_\_$

Teddy says,
"The answer is double 2×4"

Complete the calculation to prove this.
$4 \times 4 = \_\_ \times 4 \times \_\_$

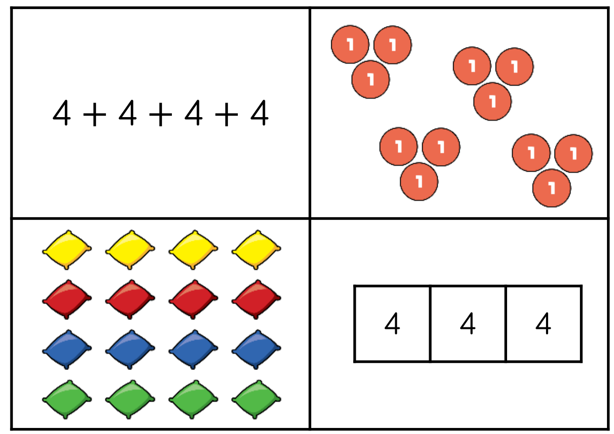
Whose idea do you prefer? Why?

4×4
$= 3 \times 4 + 4$
$= 12 + 4$
$= 16$

4×4
$= 5 \times 4 - 4$
$= 20 - 4$
$= 16$

4×4
$= 2 \times 4 \times 2$
$= 16$

Which part below does not show counting in fours?



Explain why.

The place value counters do not show counting in fours because each part has 3 in so it is counting in threes.

The 8 Times Table

Notes and Guidance

Children use prior knowledge of multiplication facts for 2, 3, 4 and 5 times tables along with the distributive law in order to calculate unknown multiplication facts.

Mathematical Talk

Why is it helpful to partition the number you are multiplying by?

Can you use concrete or pictorial representations to help you?

What other facts can you link to this one?

What other times tables will help you with this times table?

Varied Fluency

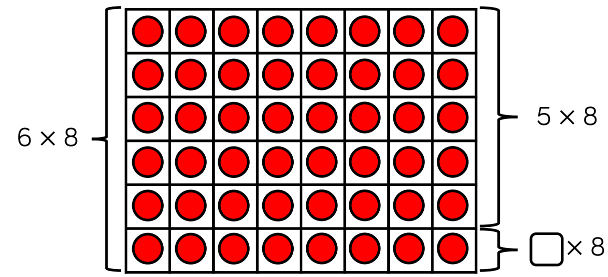
R

Complete the diagram using known facts.

$6 \times 8 <$ $5 \times 8 = \square$

$\square \times 8 = \square$

altogether $\square$



Complete the bar model.

<table>
<tr><td colspan="7">56</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Complete the table.

×	2	4	8
3	6		
	10	20	
			72

Can you spot a pattern in the numbers?

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The 8 Times Table

Reasoning and Problem Solving

R

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All the numbers in the 8 times table are even.

Explain why

When you add an even number to an even number you always make an even number.
The 8 times table is repeated addition so keeps adding an even number each time.

On a blank hundred square, colour multiples of 8 red and multiples of 4 blue.

Always, Sometimes, Never

- Multiples of 4 are also multiples of 8
- Multiples of 8 are also multiples of 4

1) Sometimes, every other multiple of 4 is also a multiple of 8
The ones in between aren't because the jumps are smaller than 8
2) Always – 8 is a multiple of 4 therefore all multiples of 8 will be multiples of 4

Rosie has some packs of cola which are in a box.

Some packs have 4 cans in them, and some packs have 8 cans in them.

Rosie's box contains 64 cans of pop.

How many packs of 4 cans and how many packs of 8 cans could there be?

Find all the possibilities.

Possible answers:
- 2 packs of 4, 7 packs of 8
- 4 packs of 4, 6 packs of 8
- 6 packs of 4, 5 packs of 8
- 8 packs of 4, 4 packs of 8
- 10 packs of 4, 3 packs of 8
- 12 packs of 4, 2 packs of 8
- 14 packs of 4, 1 pack of 8

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Comparing Statements

Notes and Guidance

Children use their knowledge of multiplication and division facts to compare statements using inequality symbols.

It is important that children are exposed to a variety of representations of multiplication and division, including arrays and repeated addition.

Mathematical Talk

What other number sentences does the array show?

If you know your 4 times-table, how can you use this to work out your 8 times-table?

What's the same and what's different about 8×3 and 7×4?

Varied Fluency

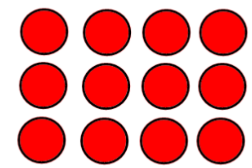
- Use the array to complete the number sentences.

$3 \times 4 = \square$

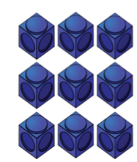
$4 \times 3 = \square$

$\square \div 3 = \square$

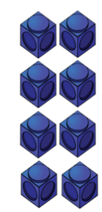
$\square \div 4 = \square$



- Use <, > or = to compare.



$\bigcirc$



$\square \times \square = \square$ $\square \times \square = \square$

$8 \times 3 \bigcirc 7 \times 4$ $36 \div 6 \bigcirc 36 \div 4$

- Complete the number sentences.

$5 \times 1 <$ _____ $\times$ _____ $4 \times 3 =$ _____ $\div 3$

Comparing Statements

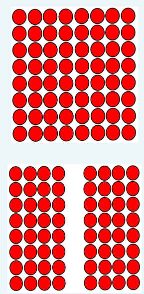
Reasoning and Problem Solving

Whitney says,

8 × 8 is greater than two lots of 4 × 8

Do you agree?
Can you prove your answer?

Possible answer:
She is wrong because they are equal.



True or false?

$6 \times 7 < 6 + 6 + 6 + 6 + 6 + 6 + 6$ False

$7 \times 6 = 7 \times 3 + 7 \times 3$ True

$2 \times 3 + 3 > 5 \times 3$ False

Can you find three different ways to complete each number sentence?

$\_\_\_ \times 3 + \_\_\_ \times 3 < \_\_\_ \div 3$

$\_\_\_ \div 4 < \_\_\_ \times 4 < \_\_\_ \times 4$

$\_\_\_ \times 8 > \_\_\_ \div 8 > \_\_\_ \times 8$

Possible answers include:

$1 \times 3 + 1 \times 3 < 21 \div 3$
$1 \times 3 + 1 \times 3 < 24 \div 3$
$1 \times 3 + 1 \times 3 < 27 \div 3$

$24 \div 4 < 8 \times 4 < 12 \times 4$
$16 \div 4 < 5 \times 4 < 7 \times 4$
$8 \div 4 < 3 \times 4 < 4 \times 4$

$4 \times 8 > 88 \div 8 > 1 \times 8$
$2 \times 8 > 80 \div 8 > 1 \times 8$
$6 \times 8 > 96 \div 8 > 1 \times 8$

Related Calculations

Notes and Guidance

Children use known multiplication facts to solve other multiplication problems.
They understand that because one of the numbers in the calculation is ten times bigger, then the answer will also be ten times bigger.
It is important that children develop their conceptual understanding through the use of concrete manipulatives.

Mathematical Talk

What is the same and what is different about the place value counters?

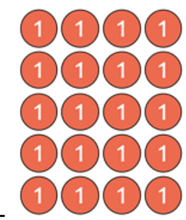
How does this fact help us solve this problem?

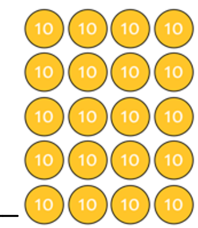
If we know these facts, what other facts do we know?

Can you prove your answer using manipulatives?

Varied Fluency

- Complete the multiplication facts.

____ × ____ = ____ 

____ × ____ = ____ 

- The number pieces represent 5 × ____ = ____

If each hole is worth ten, what do the pieces represent?

- If we know 2 × 6 = 12, we also know 2 × 60 = 120
Use this to complete the fact family.

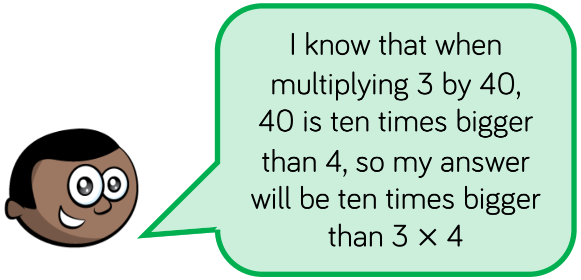
2 × 60 = 120	$\square$ × $\square$ = $\square$
$\square$ ÷ $\square$ = $\square$	$\square$ ÷ $\square$ = $\square$

Complete the fact families for the calculations.

3 × 30 = $\square$
$\square$ = 4 × 80
160 ÷ 2 = $\square$

Related Calculations

Reasoning and Problem Solving



Is Mo correct?
Explain your answer.

Mo is correct. I know $3 \times 4 = 12$, so if he has 3×40 then his answer will be ten times bigger because 4 has become ten times bigger.

Rosie has 240 cakes to sell.
She puts the same number of cakes in each box and has no cakes left over.
Which of these boxes could she use?

She could use 10, 20, 30, 40, 60, 80 because 240 is a multiple of all of these numbers.
$10 \times 24 = 240$
$20 \times 12 = 240$
$30 \times 8 = 240$
$40 \times 6 = 240$
$60 \times 4 = 240$
$80 \times 3 = 240$

True or false?

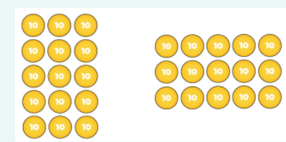
$$5 \times 30 = 3 \times 50$$

Prove it.

Possible response:

Children may represent it with place value counters.

True because they are equal.



Children may explore the problem in a context.

e.g. 5 lots of 30 apples compared to 3 lots of 50 apples.

Multiply 2-digits by 1-digit (1)

Notes and Guidance

Children use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives. They use the formal method of column multiplication alongside the concrete representation. They also apply their understanding of partitioning to represent and solve calculations.
In this step, children explore multiplication with no exchange.

Mathematical Talk

How does multiplication link to addition?

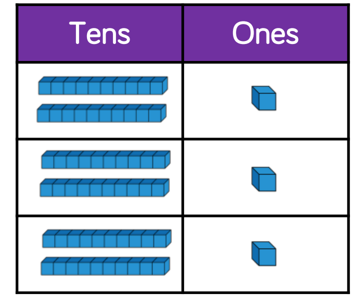
How does partitioning help you to multiply 2-digits by a 1-digit number?

How does the written method match the concrete representation?

Varied Fluency

- There are 21 coloured balls on a snooker table.
How many coloured balls are there on 3 snooker tables?

Use Base 10 to calculate:
21 × 4 and 33 × 3



- Complete the calculations to match the place value counters.

Tens	Ones
10 10	1 1
10 10	1 1
10 10	1 1
10 10	1 1

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

$\square \times \square = \square$

- Annie uses place value counters to work out 34 × 2

Tens	Ones
10 10 10	1 1 1 1
10 10 10	1 1 1 1

	T	O
	3	4
×		2
	6	8

Use Annie's method to solve:
23 × 3
32 × 3
42 × 2

Multiply 2-digits by 1-digit (1)

Reasoning and Problem Solving

Alex completes the calculation:

$$43 \times 2$$

Can you spot her mistake?

	T	O
	4	3
×		2
		6
+		8
	1	4

Alex has multiplied 4 by 2 rather than 40 by 2

Teddy completes the same calculation as Alex.
Can you spot and explain his mistake?

	T	O
	4	3
×		2
8	0	6

Teddy has written 80 where he should have just put an 8 because he is multiplying 4 tens by 2 which is 8 tens. The answer should be 86

Dexter says,

$4 \times 21 = 2 \times 42$

Is Dexter correct?

True. Both multiplications are equal to 84

Children may explore that one number has halved and the other has doubled.

Multiply 2-digits by 1-digit (2)

Notes and Guidance

Children continue to use their understanding of repeated addition to represent a two-digit number multiplied by a one-digit number with concrete manipulatives.
They move on to explore multiplication with exchange. Each question in this step builds in difficulty.

Mathematical Talk

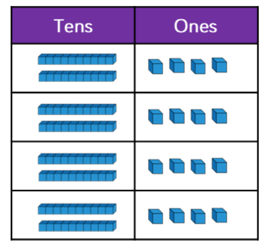
What happens when we have ten or more ones in a column?
What happens when we have twenty or more ones in a column?

How do we record our exchange?

Do you prefer Jack's method or Amir's method?
Can you use either method for all the calculations?

Varied Fluency

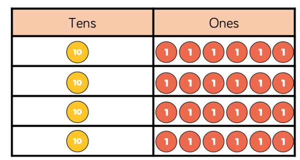
Jack uses Base 10 to calculate 24 × 4



	T	O
	2	4
×		4
	9	6
	1	

Use Jack's method to solve:
13 × 4
23 × 4
26 × 3

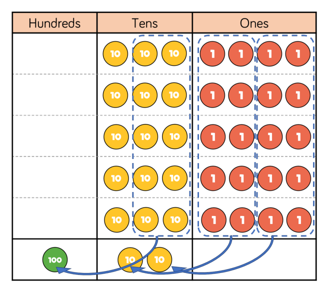
Amir uses place value counters to calculate 16 × 4



	T	O
	1	6
×		4
	6	4
	2	

Use Amir's method to solve:
16 × 6
17 × 5
28 × 3

Amir then calculates 5 × 34



	T	O
	3	4
×		5
1	7	0
1	2	

Use Amir's method to solve:
36 × 6
48 × 4

Multiply 2-digits by 1-digit (2)

Reasoning and Problem Solving

Always, Sometimes, Never?

A two-digit number multiplied by a one-digit number has a two-digit product.

Sometimes.

e.g.

$13 \times 5 = 65$

$31 \times 5 = 155$

Explain the mistake.

H	T	O
	2	7
×		3
6	2	1

They have not performed the exchange correctly.
6 tens and 2 tens should be added together to make 8 tens so the correct answer is 81

How close can you get to 100?

Use each digit card once in the multiplication.

2 3 4

☐☐ × ☐ =

You can get within 8 of 100

$23 \times 4 = 92$ this is the closest answer.

$24 \times 3 = 72$

$32 \times 4 = 128$

$34 \times 2 = 68$

Divide 2-digits by 1-digit (1)

Notes and Guidance

Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.

They divide numbers that do not involve exchange or remainders.

It is important that children divide the tens first and then the ones.

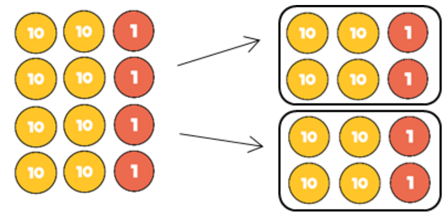
Mathematical Talk

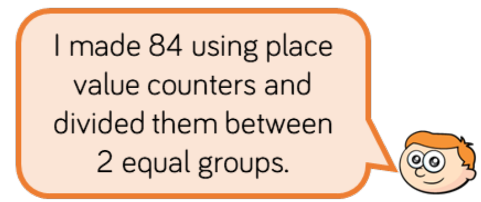
How can we partition the number?
How many tens are there?
How many ones are there?
What could we use to represent this number?
How many equal groups do I need?

How many rows will my place value chart have?
How does this link to the number I am dividing by?

Varied Fluency

Ron uses place value counters to solve 84 ÷ 2



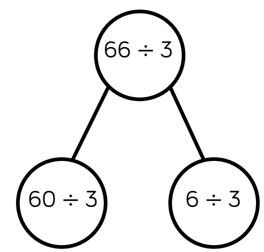


Use Ron's method to calculate:

84 ÷ 4 66 ÷ 2 66 ÷ 3

Eva uses a place value grid and part-whole model to solve 66÷ 3

Tens	Ones
10 10	1 1
10 10	1 1
10 10	1 1



Use Eva's method to calculate:

69 ÷ 3 96 ÷ 3 86 ÷ 2

Divide 2-digits by 1-digit (1)

Reasoning and Problem Solving

Teddy answers the question 44 ÷ 4 using place value counters.

Tens		Ones	
10	10	1	1
10	10	1	1

Is he correct?
Explain your reasoning.

Teddy is incorrect. He has divided 44 by 2 instead of by 4

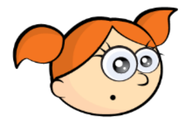
Dora thinks that 88 sweets can be shared equally between eight people.

Is she correct?

Dora is correct because 88 divided by 8 is equal to 11

T	O
10	1
10	1
10	1
10	1
10	1
10	1
10	1
10	1

Alex uses place value counters to help her calculate 63 ÷ 3



10	10	1
10	10	1
10	10	1

Tens	Ones	
10	10	1
10	10	1
10	10	1

She gets an answer of 12
Is she correct?

Alex is incorrect because she has not placed counters in the correct columns.

It should look like this:

Tens		Ones
10	10	1
10	10	1
10	10	1

The correct answer is 21

Divide 2-digits by 1-digit (2)

Notes and Guidance

Children divide 2-digit numbers by a 1-digit number by partitioning into tens and ones and sharing into equal groups.

They divide numbers that involve exchanging between the tens and ones. The answers do not have remainders.

Children use their times-tables to partition the number into multiples of the divisor.

Mathematical Talk

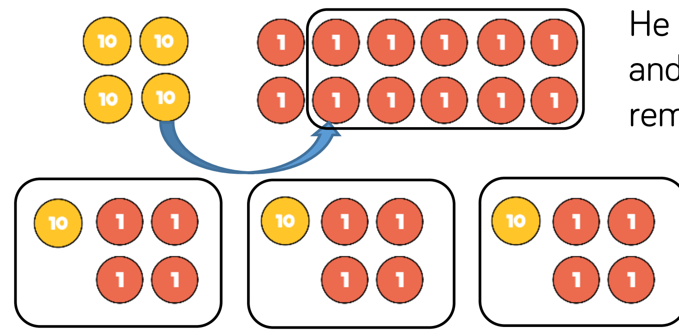
Why have we partitioned 42 into 30 and 12 instead of 40 and 2?

What do you notice about the partitioned numbers and the divisor?

Why do we partition 96 in different ways depending on the divisor?

Varied Fluency

Ron uses place value counters to divide 42 into three equal groups.

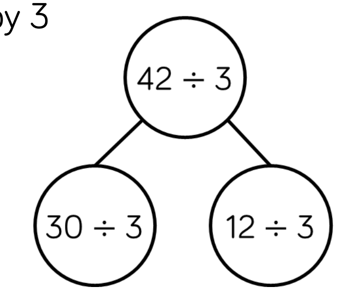


He shares the tens first and exchanges the remaining ten for ones.

Then he shares the ones.
$42 \div 3 = 14$

Use Ron's method to calculate $48 \div 3$, $52 \div 4$ and $92 \div 8$

Annie uses a similar method to divide 42 by 3



Use Annie's method to calculate:

$96 \div 8$ $96 \div 4$ $96 \div 3$ $96 \div 6$

Divide 2-digits by 1-digit (2)

Reasoning and Problem Solving

Compare the statements using <, > or =

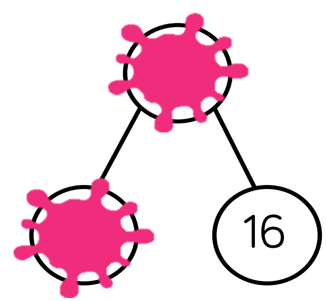
Statement	Answer
$48 \div 4$ ◯ $36 \div 3$	=
$52 \div 4$ ◯ $42 \div 3$	<
$60 \div 3$ ◯ $60 \div 4$	>

Amir partitioned a number to help him divide by 8

Some of his working out has been covered with paint.

What number could Amir have started with?

 ÷ 8



The answer could be 56 or 96

Divide 2-digits by 1-digit (3)

Notes and Guidance

Children move onto solving division problems with a remainder.
Links are made between division and repeated subtraction, which builds on learning in Year 2
Children record the remainders as shown in Tommy's method.
This notation is new to Year 3 so will need a clear explanation.

Mathematical Talk

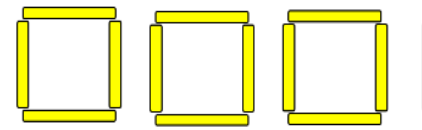
How do we know 13 divided by 4 will have a remainder?

Can a remainder ever be more than the divisor?

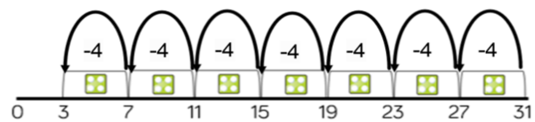
Which is your favourite method?
Which methods are most efficient with larger two digit numbers?

Varied Fluency

- How many squares can you make with 13 lollipop sticks?
  There are ___ lollipop sticks.
  There are ___ groups of 4
  There is ___ lollipop stick remaining.
  $13 \div 4 =$ ___ remainder ___
  Use this method to see how many triangles you can make with 38 lollipop sticks.



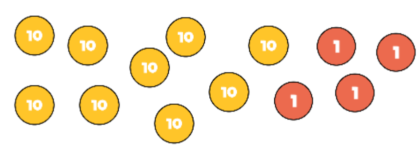
- Tommy uses repeated subtraction to solve $31 \div 4$



$31 \div 4 = 7 \text{ r } 3$

  Use Tommy's method to solve 38 divided by 3

- Use place value counters to work out $94 \div 4$
  Did you need to exchange any tens for ones?
  Is there a remainder?



Tens	Ones

Divide 2-digits by 1-digit (3)

Reasoning and Problem Solving

Which calculation is the odd one out? Explain your thinking. $64 \div 8$ $77 \div 4$ $49 \div 6$ $65 \div 3$	$64 \div 8$ could be the odd one out as it is the only calculation without a remainder. Make sure other answers are considered such as $65 \div 3$ because it is the only one being divided by an odd number.

Jack has 15 stickers.  He sorts his stickers into equal groups but has some stickers remaining. How many stickers could be in each group and how many stickers would be remaining?	There are many solutions, encourage a systematic approach. e.g. 2 groups of 7, remainder 1 3 groups of 4, remainder 3 2 groups of 6, remainder 3
Dora and Eva are planting bulbs. They have 76 bulbs altogether. Dora plants her bulbs in rows of 8 and has 4 left over. Eva plants her bulbs in rows of 10 and has 2 left over. How many bulbs do they each have?	Dora has 44 bulbs. Eva has 32 bulbs.

Scaling

Notes and Guidance

It is important that children are exposed to problems involving scaling from an early age.
Children should be able to answer questions that use the vocabulary "times as many".
Bar models are particularly useful here to help children visualise the concept. Examples and non-examples should be used to ensure depth of understanding.

Mathematical Talk

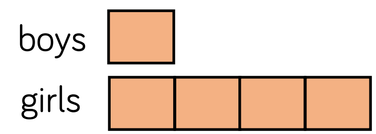
Why might someone draw the first bar model? What have they misunderstood?

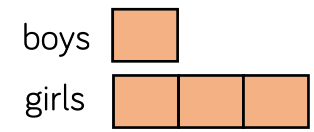
What is the value of Amir's counters? How do you know?

How many adults are at the concert? How will you work out the total?

Varied Fluency

- In a playground there are 3 times as many girls as boys.





Which bar model represents the number of boys and girls? Explain your choice.

- Draw a bar model to represent this situation.

In a car park there are 5 times as many blue cars as red cars.

- Eva has these counters 

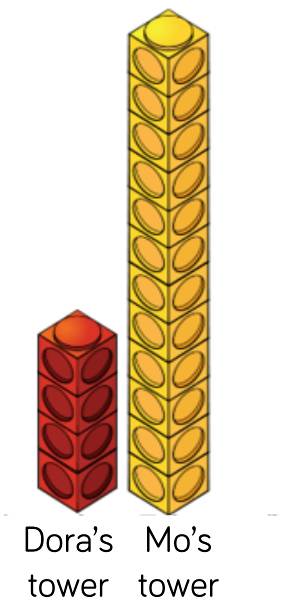
Amir has 4 times as many counters.
How many counters does Amir have?

- There are 35 children at a concert.
3 times as many adults are at the concert.
How many people are at the concert in total?

Scaling

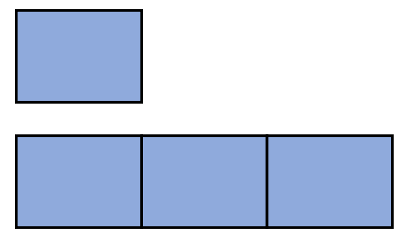
Reasoning and Problem Solving

Dora says Mo's tower is 3 times taller than her tower.
Mo says his tower is 12 times taller than Dora's tower.
Who do you agree with?
Explain why?

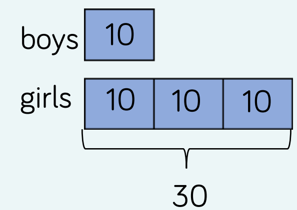


I agree with Dora. Her tower is 4 cubes tall. Mo's tower is 12 cubes tall. 12 is 3 times as big as 4. Mo has just counted his cubes and not compared them to Dora's tower.

In a playground there are 3 times as many girls as boys.
There are 30 girls.
Label and complete the bar model to help you work out how many boys there are in the playground.



There are 10 boys in the playground.



A box contains some counters.
There are twice as many green counters as pink counters.
There are 18 counters in total.
How many pink counters are there?

There are 6 pink counters.

How Many Ways?

Notes and Guidance

Children list systematically the possible combinations resulting from two groups of objects. Encourage the use of practical equipment and ensure that children take a systematic approach to each problem.
Children should be encouraged to calculate the total number of ways without listing all the possibilities. e.g. Each T-shirt can be matched with 4 pairs of trousers so altogether $3 \times 4 = 12$ outfits.

Mathematical Talk

What are the names of the shapes on the shape cards?
How do you know you have found all of the ways?
Would making a table help?

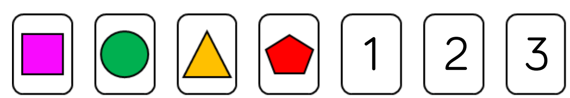
Without listing, can you tell me how many possibilities there would be if there are 5 different shape cards and 4 different number cards?

Varied Fluency

- Jack has 3 T-shirts and 4 pairs of trousers. Complete the table to show how many different outfits he can make.

T-shirt	Trousers
Blue	Blue
Blue	Dark blue
Blue	Orange
Blue	Green

- Alex has 4 shape cards and 3 number cards.

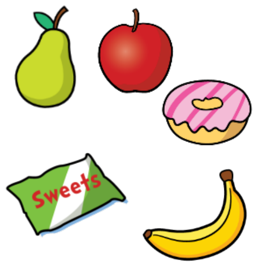


She chooses a shape card and a number card.
List all the possible ways she could do this.

How Many Ways?

Reasoning and Problem Solving

Eva chooses a snack and a drink.



What could she have chosen?
How many different possibilities are there?

_____ × _____ = _____

There are _____ possibilities.

How many of the ways contain an apple?

There are 15 possibilities.
AW
AC
AO
PW
PC
PO
SW
SC
SO
DW
DC
DO
BW
BC
BO

3 ways contain an apple.

Jack has some jumpers and pairs of trousers.
He can make 15 different outfits.
How many jumpers could he have and how many pairs of trousers could he have?

He could have:
1 jumper and 15 pairs of trousers.
3 jumpers and 5 pairs of trousers.
15 jumpers and 1 pair of trousers.
5 jumpers and 3 pairs of trousers.

White Rose Maths

Spring - Block 2

Money

Overview

Small Steps

- Count money (pence) R
- Count money (pounds) R
- Pounds and pence
- Convert pounds and pence
- Add money
- Subtract money
- Give change

Notes for 2020/21

Counting money in pounds and pence is revisited here before children start looking at them side by side.

At this stage children should not learn about money using decimals, although they may have come across this in real life. Instead they learn about money in terms of a number of pounds and a number of pence.

White Rose Maths

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

R

- Count the money.

 = ___ p

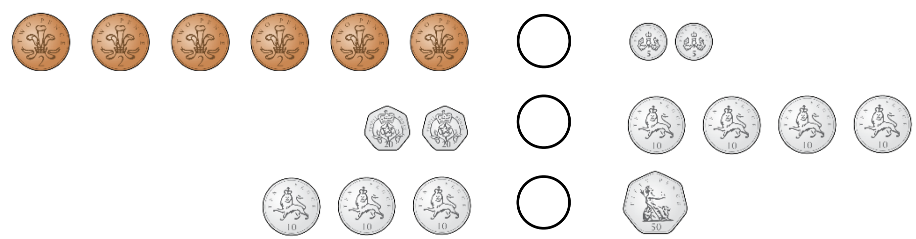
 = ___ p

 = ___ p

___ p = 

___ p = 

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



- Count the money.

 = ___ p

 = ___ p

Count Money - Pence

Reasoning and Problem Solving

R

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

R

- Count the money.


= £___

£___ =



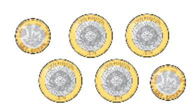
= £___

£___ =


- Complete the bar models.

£30		

- Match the money to the correct total.

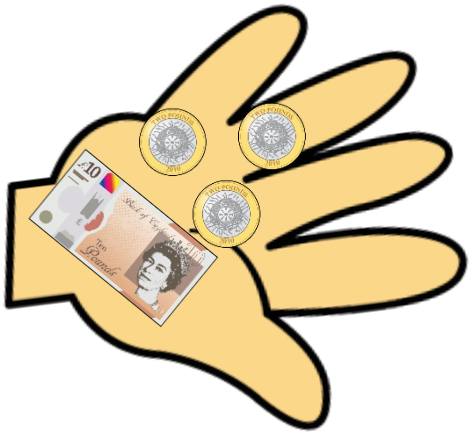




£25 £60 £10

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

Pounds and Pence

Notes and Guidance

Children need to know the value of each coin and note and understand what these values represent.
They should understand that money can be represented in different ways but still have the same value.
Children will need to be able to add coin values together to find the total amount.

Mathematical Talk

What is the value of the coin/note?

What does p mean?

Why do we have different values of coins and notes?

What's the difference between £5 and 5p?

Varied Fluency

Match the amounts that are equal.

Fifteen pounds | Fifteen pence | Fifty pounds | Fifty pence




How much money does the jar contain?

The jar contains £____ and ____ p.

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



Pounds and Pence

Reasoning and Problem Solving

Rosie has 5 silver coins in her purse. She can make 40p with three coins. She can also make 75p with three coins. How much money does Rosie have in her purse?	Rosie has 95 pence in her purse. She has one 20p coin, one 50p coin, two 10p coins and one 5p coin.	Amir has 5 different coins in his wallet.  What is the greatest amount of money he could have in his wallet? What is the least amount of money?	Greatest: £3 and 80p Least: 38p

Convert Pounds and Pence

Notes and Guidance

Children convert between pounds and pence using the knowledge that £1 is 100 pence.
They group 100 pennies into pounds when counting money.
They apply their place value knowledge and use their number bonds to 100

Mathematical Talk

How many pennies are there in £1?

How can this fact help us to convert between pounds and pence?

How could you convert 600p into pounds?
How could you convert 620p into pounds?

Varied Fluency

- What is the total of the coins shown?

Can you group any of the coins to make 100 pence?
How many whole pounds do you have?
How many pence are left over?
So there is £____ and ____ p.

- Write the amounts in pounds and pence.

- Write each amount in pounds and pence.

165p 234p 199p 112p 516p

Convert Pounds and Pence

Reasoning and Problem Solving

Dexter has 202 pence. He has **one** pound coin. Show five possible combinations of other coins he may have.	Children may work systematically and look at combinations of coins that make £1 to help them.
Whitney thinks that she has £10 and 3p. Is she correct?  Explain your answer.	Whitney is wrong, she has £12 and 1p. Whitney has not considered the value of the coins she has.

Dora thinks there is more than £5 but less than £6 Is Dora correct?  Convince me.	Dora is incorrect. There is £6 and 30p. This is greater than £6

Add Money

Notes and Guidance

Children add two amounts of money using pictorial representations to support them.

They are encouraged to add the pounds first and then add the pence. Children then exchange the pence for pounds to complete their calculations.

Mathematical Talk

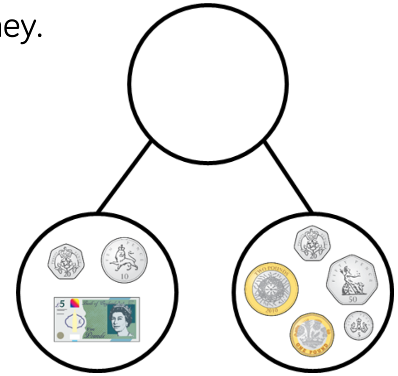
Can you group any of the coins to make a pound?

Can you use estimation to support your calculation?

Why is adding 99p the same as adding £1 and taking away 1p?

Varied Fluency

- Mo uses a part-whole model to add money.

  £____ and ____ p + £____ and ____ p
  There is £____ and 105p.
  105p= £_____ and _____p
  Altogether there is £_____ and ____p.

  Use Mo's method to find the total of:

  £10 and 35p and £4 and 25p   £10 and 65p and £9 and 45p

- What calculation does the bar model show?
  Find the total amount of money.

- A book costs £5 and 99p.
  A magazine costs £1 and 75p.
  How much do the book and magazine cost altogether?

Add Money

Reasoning and Problem Solving

Dora bought these muffins.

Muffins cost 35p each.
How much did Dora spend?

Tommy bought three times as many muffins as Dora.
How many muffins did Tommy buy?
How much money did Tommy spend on muffins?

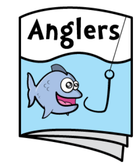
How much more money did Tommy spend than Dora?

Dora spent 105p or £1 and 5p.

Tommy bought 9 muffins.
He spent 315p or £3 and 15p.

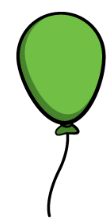
Tommy spent 210p or £2 and 10p more than Dora.

Rosie has £5
Has she got enough money to buy a car and two apples?



£3 and 35p

£2 and 55p



85p

75p

What combinations of items could Rosie buy with £5?

£3 and 35p + 85p + 85p = £5 and 5p

She does not have enough money.

Rosie could buy

1 car and 2 balloons
1 car, 1 apple and 1 balloon
1 magazine and 2 apples

Subtract Money

Notes and Guidance

Children use different methods to subtract money.
They will see examples where they can physically remove the coins, and examples where they will need to use their knowledge of converting money to exchange £1 for 100 pence.
Children also use number lines to count on or back to calculate the difference between two amounts.

Mathematical Talk

Can we make 50p in a different way to make it easier to subtract 10p physically?
Which number should I place on the number line first?
Could I count backwards on the number line?
Does this change the difference?
Do we need to exchange any pounds for pence?

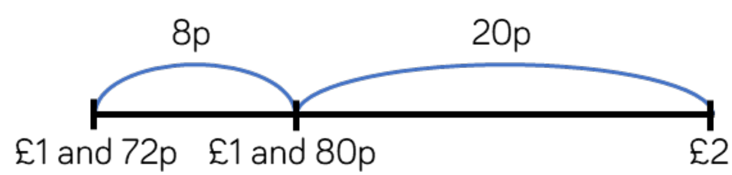
Varied Fluency

- Alex has £3 and 50p.
  She gives £2 and 10p to her sister.
  How much money does she have left?

$£3 - £2 = £$____ 50p − 10p = ____ p

Alex has £____ and ____ p remaining.

- Tommy has £1 and 72p. Rosie has £2
  How much more money does Rosie have than Tommy?



Rosie has ____ p more than Tommy.

- A T-shirt costs £7 and 20p.
  In a sale, the T-shirt costs £5 and 40p.

  How much has the cost of the T-shirt been reduced by?

Subtract Money

Reasoning and Problem Solving

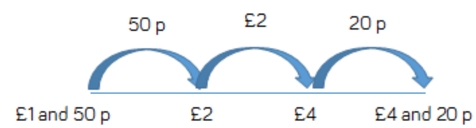
Jack has £2 and 90p. Teddy has three times as much money as Jack. How much more money does Teddy have than Jack? Rosie has twice as much money as Teddy. How much more money does Rosie have than Jack?	Jack: £2 & 90p Teddy: £8 & 70p Rosie: £17 & 40p Teddy has £5 and 80p more than Jack. Rosie has £14 and 50p more than Jack. Use coins to support children in calculating.

Three children are calculating £4 and 20p subtract £1 and 50p.

£4 – £1 = £2
20p – 50p = 30p
£1 + 30p = £1 and 30p

Annie

Teddy



The difference is £2 and 70p.

£4 and 20p – £2 = £2 and 20p
£2 and 20p + 50p = £2 and 70p

Eva

Who is correct? Who is incorrect?
Which method do you prefer?

Annie's second step of calculation is incorrect.
Teddy and Eva both got the correct answer using different methods. Children may choose which method they prefer or discuss pros and cons of each.

Give Change

Notes and Guidance

Children use a number line and a part-whole model to subtract to find change.
Teachers use coins to practically model giving change.
Encourage role-play to give children a context of giving and receiving change.

Mathematical Talk

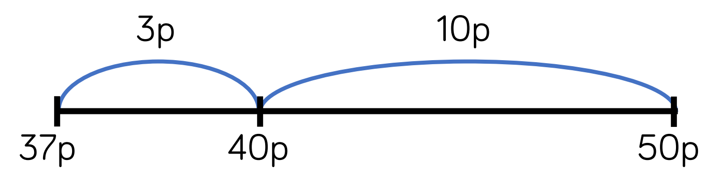
What do we mean by 'change' in the context of money?

Which method do you find most effective?

How does the part-whole model help to solve the problem?

Varied Fluency

Mo buys a chocolate bar for 37p. He pays with a 50p coin. How much change will he receive?

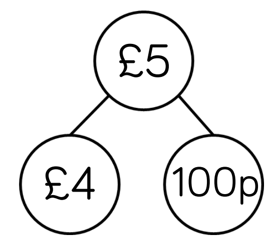


Mo will receive ____ p change.

Use a number line to solve the problems.

- Ron has £1. He buys a lollipop for 55p. How much change will he receive?
- Whitney has £5. She spends £3 and 60p. How much change will she receive?

Tommy buys a comic for £3 and 25p.
He pays with a £5 note.
How much change will he receive?
Use the part-whole model to help you.



Use a part-whole model to solve the problem.

- Eva buys a train for £6 and 55p. She pays with a £10 note. How much change will she receive?

Give Change

Reasoning and Problem Solving

Dora spends £7 and 76p on a birthday cake.

She pays with a £10 note.
How much change does she get?

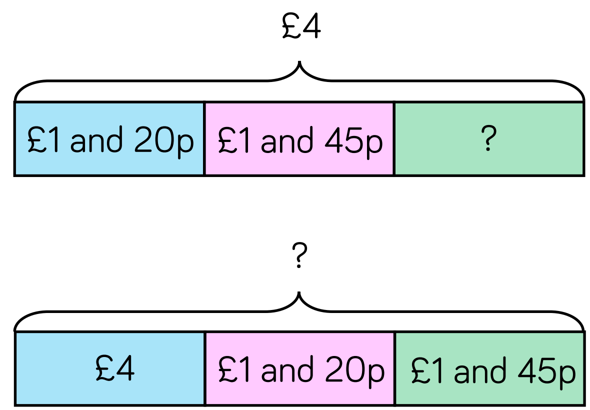
The shopkeeper gives her six coins for her change.
What coins could they be?

She receives £2 and 24p change.

There are various answers for which coins it could be, e.g. £1, £1, 10p, 10p, 2p, 2p.

Amir has £4
He buys a pencil for £1 and 20p and a book for £1 and 45p.

Which bar model represents the question?
Explain how you know.



Use the correct bar model to help you calculate how much change Amir receives.

The first bar model is correct as the whole is £4 and we are calculating a part as Amir has spent money.
Amir receives £1 and 35p change.

Spring - Block 3

Statistics

Overview

Small Steps

- Make tally charts R
- Draw pictograms (2, 5 and 10) R
- Interpret pictograms (2, 5 and 10) R
- Pictograms
- Bar Charts
- Tables

Notes for 2020/21

Tally charts and pictograms are revisited as this content may have been missed in 2020.

This will help children access the rest of the content on bar charts and table. Use this block to consolidate previous number work.

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

R

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

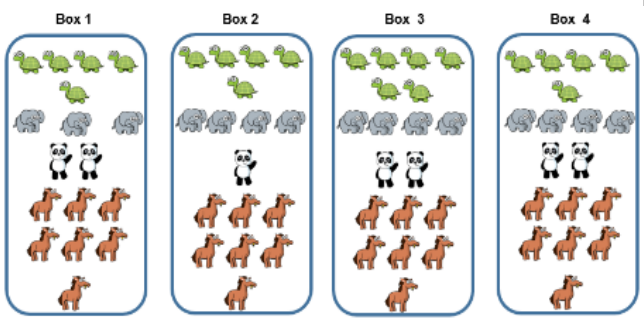
Make Tally Charts

Reasoning and Problem Solving

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

Animal	Tally
	卌
	||||
	||
	卌 ||

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	卌 卌 卌
Chocolate	卌 卌 卌 卌
Strawberry	卌 ||
Mint	|

Class 2	
Flavour	Total
Vanilla	卌 卌 ||
Chocolate	卌 卌 卌 卌
Strawberry	卌
Mint	|||

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 (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?

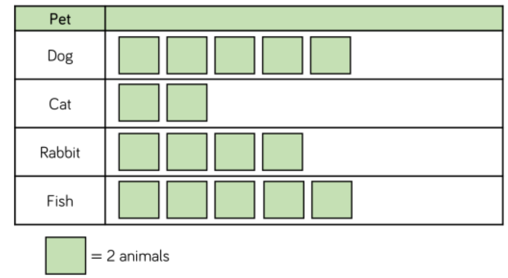
When would you use a picture to represent 10 objects?

Discuss with children that when using larger numbers, 1-1 correspondence becomes inefficient.

Varied Fluency

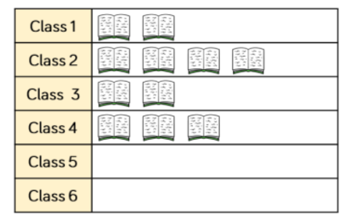
Use the tally chart to complete the pictogram.

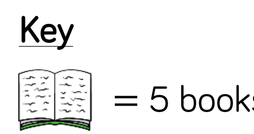
Pet	Tally
Dog	𝍸 𝍸
Cat	𝍸 𝍸 IIII
Rabbit	𝍸 𝍸 II
Fish	𝍸 𝍸 𝍸 I



Use the information to complete the pictogram about the number of books read in each class.

Class 1	𝍸 𝍸 𝍸 𝍸 𝍸
Class 2	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸
Class 3	𝍸 𝍸 𝍸
Class 4	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸
Class 5	𝍸 𝍸 𝍸 𝍸
Class 6	𝍸 𝍸 𝍸





Year 2 sell cakes at a bake sale. The tally chart shows the data.
Draw a pictogram to represent the data.

Chocolate	𝍸 𝍸 𝍸 𝍸
Lemon	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸
Red Velvet	𝍸 𝍸 𝍸 𝍸 𝍸
Mint	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸
Carrot	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸

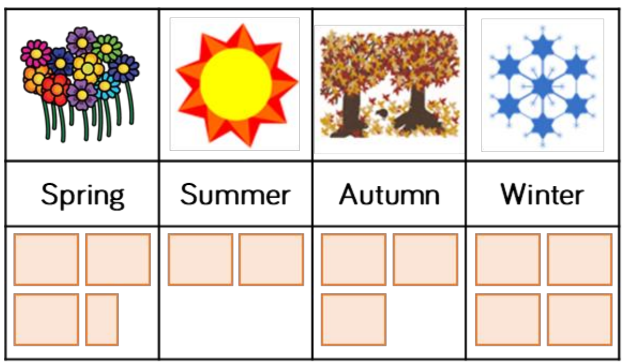
Draw Pictograms (2, 5 & 10)

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.

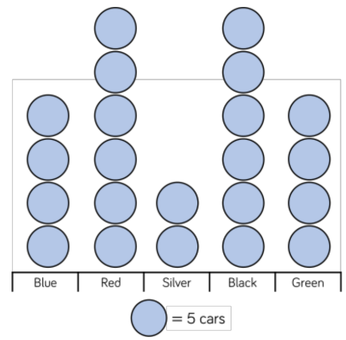
Here is an example.

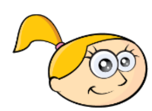


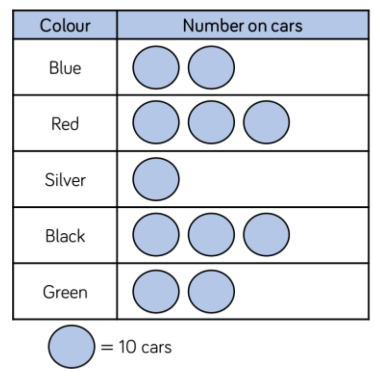
Key

= 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

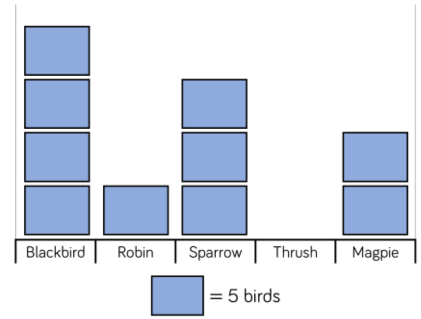
How can we represent 0 on a pictogram?

What does the pictogram show? What doesn't it show?

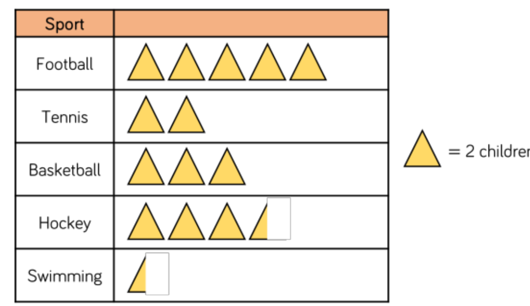
What is each symbol worth?

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.

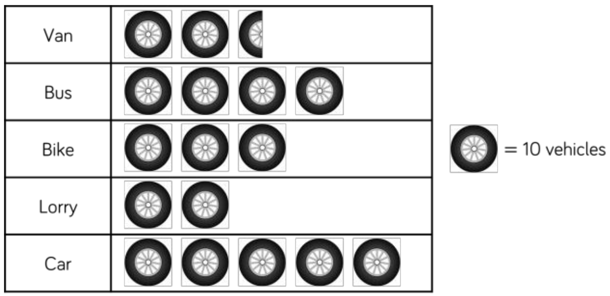
Statement	True or False?
Horses were the least popular animal.	
The number of chickens seen was half the number of cows seen.	
The total amount of pigs and sheep is 70	
There were 8 cows on the farm.	
There were 10 fewer chickens than sheep.	

Interpret Pictograms (2, 5 & 10)

Reasoning and Problem Solving

R

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;

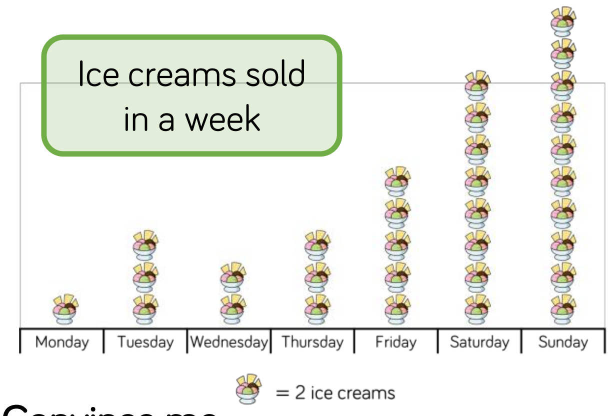
To find the total number of vehicles I need to count the symbols. There are 16 and a half vehicles.

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.

Pictograms

Notes and Guidance

Children build on their understanding of pictograms from Year 2. They continue to read and interpret information in order to answer questions about the data. It is important that children understand the value of each symbol used and what it means when half a symbol is used.

Children construct pictograms and choose an appropriate key. Encourage children to carry out their own data collection.

Mathematical Talk

What is each symbol worth?

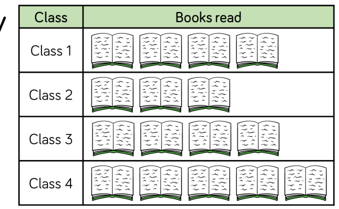
What does half of the symbol represent? Is it always possible to use half of a symbol? Why?

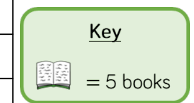
What other questions could you ask about the pictogram?

What would each symbol represent in your pictogram? Have you used the same key as a friend? Could it be represented in different ways?

Varied Fluency

4 classes are recording how many books they read in a week.
Here are the results of how many books they read last week.



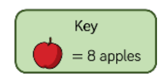


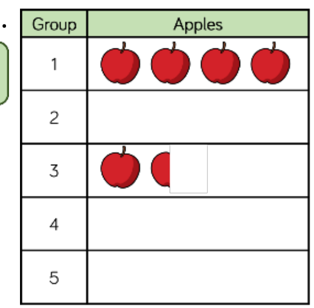
- Which class read the most books?
- Which class read the least books?
- How many more books did Class 4 read than Class 2?

Complete the pictogram using the information.

- Group 2 collected 40 apples.
- Group 4 collected half as many apples as Group 1
- Group 5 collected 20 more apples than Group 3

How many apples did each group collect?





Class 3 are counting the colour of cars that pass the school.

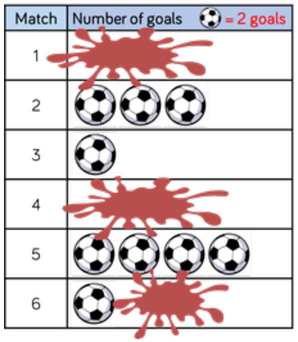
Red	Blue	Black	Silver	White	Other
12	6	14	10	14	2

Draw a pictogram to represent their findings.

Pictograms

Reasoning and Problem Solving

Ron, Amir and Alex record the scores of six football matches. Unfortunately, Ron spilt paint on them.



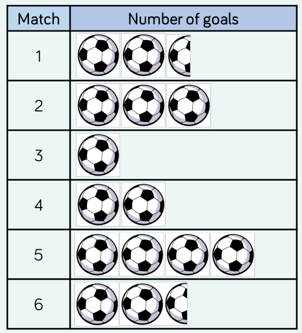
Record the results based on what the children remember.

Match 1 had 3 more goals than match 3

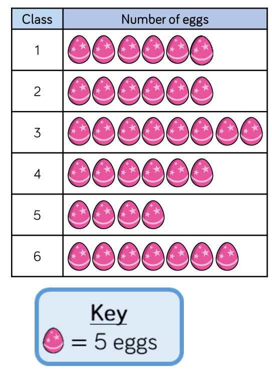
Match 6 had 1 less goal than match 2

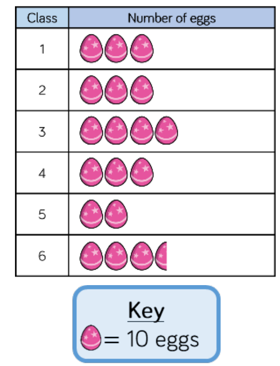
Match 4 had twice as many goals as match 3

Possible answer:



Whitney and Teddy are making pictograms to show how many chocolate eggs each class won at the school fair.





What's the same and what's different about their pictograms?
Whose pictogram do you prefer and why?

Possible answer:

Same image/symbol for key, same total of eggs, different values for the key…

Bar Charts

Notes and Guidance

Children interpret information in pictograms and tally charts in order to construct bar charts. They interpret information from bar charts and answer questions relating to the data.

Children read and interpret bar charts with scales of 1, 2, 5 and 10. They decide which scale will be the most appropriate when drawing their own bar charts.

Mathematical Talk

What's the same and what's different about the pictogram and the bar chart?

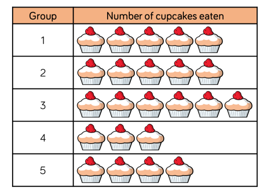
How does the bar chart help you understand the information?

Which scale should we use? How can we decide whether to have a scale going up in intervals of 1, 2, 5 or 10?

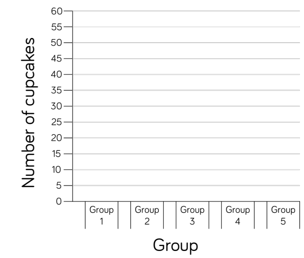
What other questions could you ask about the bar chart?

Varied Fluency

- Use the information from the pictogram to complete the bar chart.

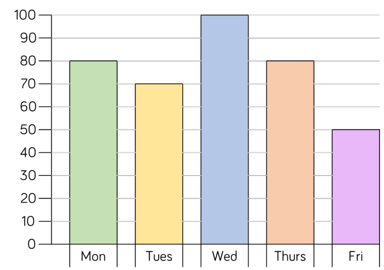


Key
 = 5 cupcakes



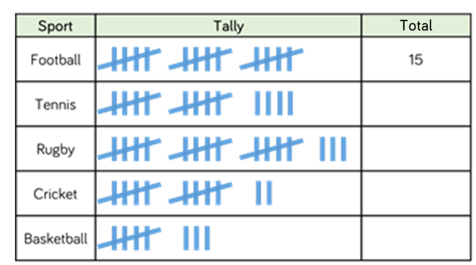
A bar chart to show the number of cupcakes eaten

- The bar chart shows how many children attend after school clubs.



Which day is the most popular?
Which day is the least popular?
What is the difference between the number of children attending on Tuesday and on Thursday?
What information is missing from the bar chart?

- Here is a tally chart showing the number of children in each sports club.
Draw a bar chart to represent the data.



Bar Charts

Reasoning and Problem Solving

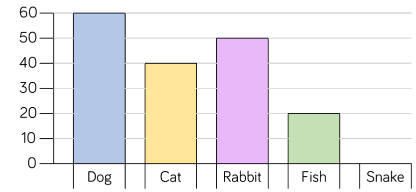
Which would be more suitable to represent this information, a bar chart or a pictogram?
Explain why.

Child	Number of Skips in 30 Seconds
Teddy	12
Annie	15
Whitney	17
Ron	8

Possible answer:

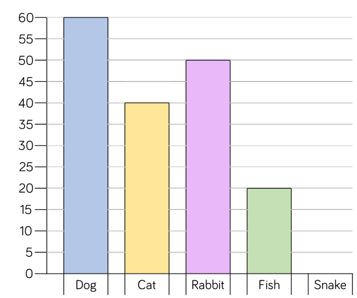
I think a bar chart would be more suitable because in a pictogram you would need to draw symbols representing 1 or 2 which would make it less efficient.
Children may draw both to experiment which representation is clearer.

Rosie and Jack have drawn bar charts to show how many people have pets



Rosie says,

I asked more people because my scale goes up in larger jumps.



Jack says,

I asked more people because my bars are taller.

Who is correct? Explain why.

Possible answer:

They are both incorrect as they asked the same amount of people but they have just used different scales on their bar charts.
Children could discuss which scale is more efficient.

Tables

Notes and Guidance

Children interpret information from tables to answer one and two-step problems.

They use their addition and subtraction skills to answer questions accurately and ask their own questions about the data in tables.

Mathematical Talk

What information can we gather from the table?

Can you explain to a friend how to read the table?

Where do we need to use tables in real life?

What other questions could I ask and answer using the information in the table?

Varied Fluency

The table shows which sports children play.

	Whitney	Jack	Eva	Mo	Teddy	Annie
Football	✓		✓	✓		✓
Rugby			✓		✓	
Tennis	✓	✓		✓		✓
Cricket			✓		✓	
Basketball		✓	✓	✓		✓

How many children play tennis?
Which sports does Mo play?
Which children play football and tennis?
Which child plays the most sport?

The table shows the increase in bus ticket prices.

- The cost of Ron's new ticket is 60p. How much was his ticket last year? How much has the price increased by?
- Which ticket price has increased the most from 2016 to 2017? Which ticket price has increased the least?

1st January	
2016	2017
44p	49p
56p	60p
64p	69p
76p	85p
85p	93p
98p	£1.03
£1.05	£1.11

Tables

Reasoning and Problem Solving

How many questions can you create for your partner about this table?

Day	Number of hours shop is open
Monday	8
Tuesday	8
Wednesday	4
Thursday	10
Friday	7
Saturday	12

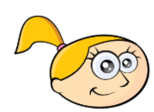
Possible answers:

How many hours does the shop open for in total?
Which day does it open the longest?
How many more hours does the shop open for on Saturday than Thursday?
Which day was the shop open the shortest amount of time?

Eva has created a table to show how many boys and girls took part in after school clubs last week.

Day	Boys	Girls
Monday	11	9
Tuesday	18	12
Wednesday	13	11
Thursday	8	8
Friday	9	7

Eva says,



106 boys took part in after school clubs last week.

Is Eva correct?

Explain why.

Possible answer:

Eva is incorrect. She has counted all the children rather than just the boys. 59 boys took part in after school clubs last week.

Spring - Block 4

Length & Perimeter

Overview

Small Steps

- Measure length
- Measure length (m) R
- Equivalent lengths – m & cm
- Equivalent lengths – mm & cm
- Compare lengths R
- Compare lengths
- Add lengths
- Subtract lengths
- Measure perimeter
- Calculate perimeter

Notes for 2020/21

In this block, additional time has been given to measuring lengths, comparing lengths and calculating perimeter.

A secure understanding of place value and addition and subtraction will be needed to access the new learning.

Measure Length

Notes and Guidance

Children are introduced to millimetres for the first time and build on their understanding of centimetres and metres.

Children use different measuring equipment including rulers, tape measures, metre sticks and trundle wheels. They discuss which equipment is the most appropriate depending on the object they are measuring.

Mathematical Talk

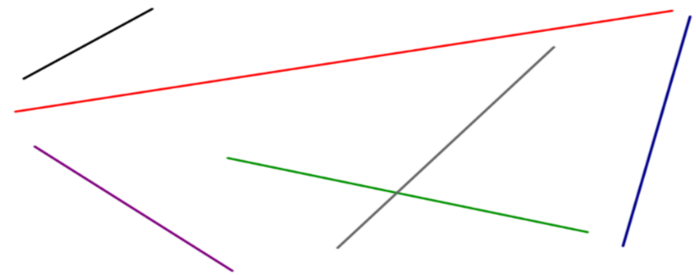
What would be the best equipment to measure _____ with? (e.g. tape measure, ruler, metre stick)

What do we have to remember when using a ruler to measure? Which unit of measurement are we going to use to measure? Centimetres or millimetres?

What unit of measure would be best to measure____ ?

Varied Fluency

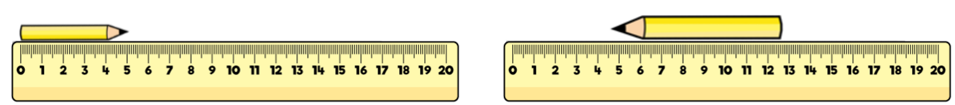
Measure the lines to the nearest centimetre.
Can you measure the lines in millimetres?



What unit of measurement would you use to measure these real life objects? Millimetres, centimetres or metres?

Fingernail	Eraser	Pencil
Height of a house	Length of a playground	Length of a table

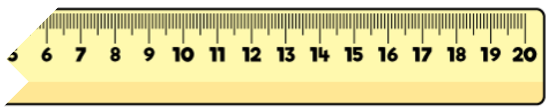
What is the length of each pencil?



Measure Length

Reasoning and Problem Solving

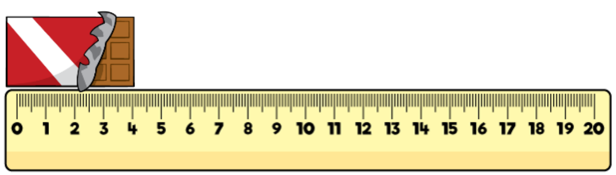
Whitney's ruler is broken.
How could she use it to still measure items?



Possible answer:

She could start from a different number and count on.

Tommy thinks that this chocolate bar is 4 cm long.
Is he correct?

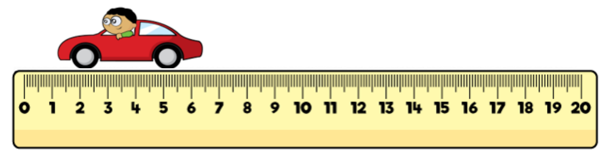


Convince me.

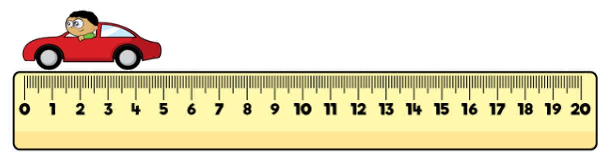
He is incorrect because he has not placed the chocolate bar at 0, he has put it at the end of the ruler.

Three children measured the same toy car.

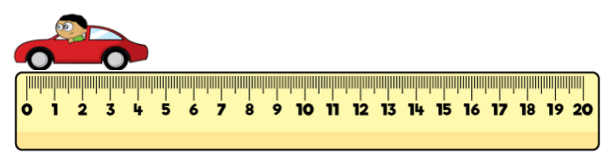
Eva says that the car is 6 cm and 5 mm



Dexter says the car is 5 cm



Annie says the car is 4 cm 5 mm



Who is correct?
Who is incorrect?
Explain why.

Dexter is correct. The other two children have not lined up the ruler correctly: Eva has started at 1 cm and 5 mm instead of 0 and Annie has started at the end of the ruler.

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?

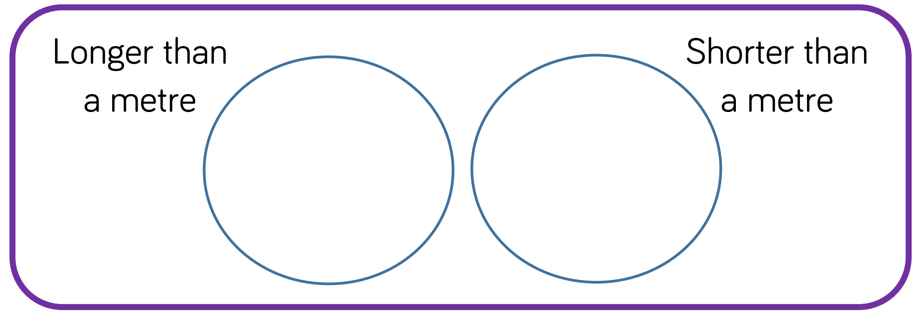
Why is more efficient to use metres instead of centimetres for longer objects/distances?

What equipment would you use to measure longer objects/distances?

Varied Fluency

R

- 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

R

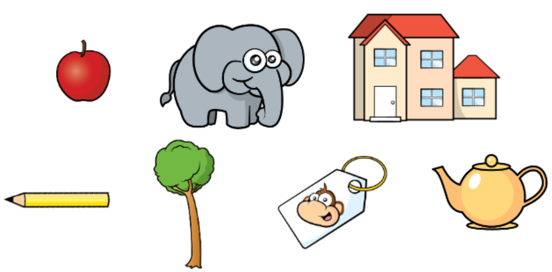
Usain Bolt can run 100 m in 9.58 seconds (just under 10 seconds).

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.

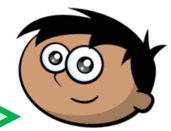


Circle elephant, school and tree

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.

Equivalent Lengths – m & cm

Notes and Guidance

Children recognise that 100 cm is equivalent to 1 metre. They use this knowledge to convert other multiples of 100 cm into metres and vice versa.

When looking at lengths that are not multiples of 100, they partition the measurement and convert into metres and centimetres. At this stage, children do not use decimals. This is introduced in Year 4.

Mathematical Talk

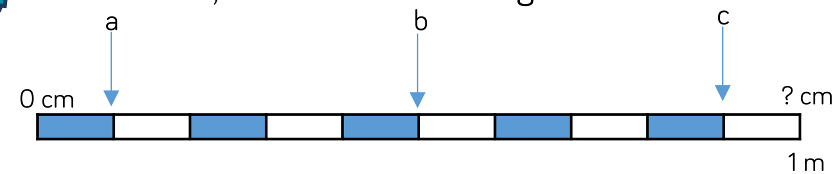
If there are 100 cm in 1 metre, how many centimetres are in 2 metres? How many centimetres are in 3 metres?

Do we need to partition 235 cm into hundreds, tens and ones to convert it to metres? Is it more efficient to partition it into two parts? What would the two parts be?

If 100 cm is equal to one whole metre, what fraction of a metre would 50 cm be equivalent to? Can you show me this in a bar model?

Varied Fluency

If a = 10 cm, calculate the missing measurements.



b = ____ cm   c = ____ cm   1 metre = ____ cm

Can you match the equivalent measurements?

100 cm	9 m
5 m	200 cm
300 cm	500 cm
2 m	1 metre
900 centimetres	3 m

Eva uses this diagram to convert between centimetres and metres.
Use Eva's method to convert:

- 130 cm
- 230 cm
- 235 cm
- 535 cm
- 547 cm

120 cm	
100 cm	20 cm
1 m	20 cm
1m 20 cm	

Equivalent Lengths – m & cm

Reasoning and Problem Solving

Mo and Alex each have a skipping rope.

Alex says,

I have the longest skipping rope. My skipping rope is $2\frac{1}{2}$ metres long.

Mo says,

My skipping rope is the longest because it is 220 cm and 220 is greater than $2\frac{1}{2}$

Who is correct?
Explain your answer.

Alex is correct because her skipping rope is 250 cm long which is 30 cm more than 220 cm.

Three children are partitioning 754 cm

Teddy says,

75 m and 4 cm

Whitney says,

7 m and 54 cm

Jack says,

54 cm and 7 m

Who is correct?
Explain why.

Whitney and Jack are both correct. Teddy has incorrectly converted from cm to m when partitioning.

Equivalent Lengths – mm & cm

Notes and Guidance

Children recognise that 10 mm is equivalent to 1 cm. They use this knowledge to convert other multiples of 10 mm into centimetres and vice versa.

When looking at lengths that are not multiples of 10, they partition the measurement and convert into centimetres and millimetres. At this stage, children do not use decimals. This is introduced in Year 4.

Mathematical Talk

What items might we measure using millimetres rather than centimetres?

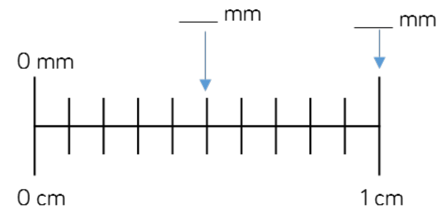
If there are 10 mm in 1 cm, how many mm would there be in 2 cm?

How many millimetres are in $\frac{1}{2}$ cm?

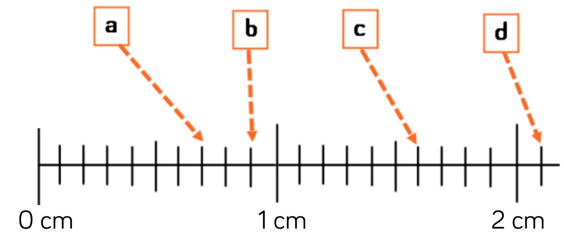
How many different ways can you partition 54 cm?

Varied Fluency

- Fill in the blanks.



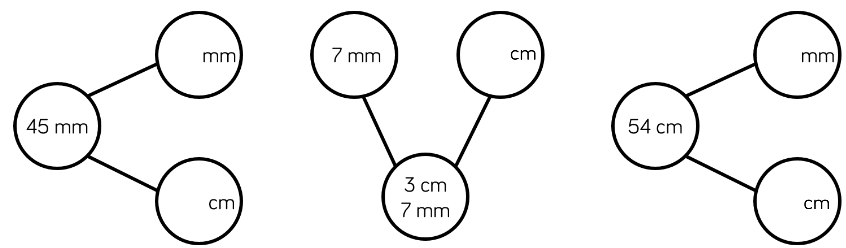
There are ___ mm in 1 cm.



a = ___ cm ___ mm
b = ___ cm ___ mm
c = ___ cm ___ mm
d = ___ cm ___ mm

- Measure different items around your classroom.
Record your measurements in a table in cm and mm, and just mm.

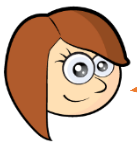
- Complete the part whole models.



Equivalent Lengths – mm & cm

Reasoning and Problem Solving

Rosie is measuring a sunflower using a 30 cm ruler.
Rosie says,



The sunflower is 150 cm tall.

Rosie is incorrect.
Explain what mistake she might have made.
How tall is the sunflower?

Rosie is incorrect. She has used the wrong unit on the ruler.
The sunflower is 15 cm tall or 150 mm tall.

Ron is thinking of a measurement.
Use his clues to work out which measurement he is thinking of.

- In mm, my measurement is a multiple of 2
- It has 8 cm and some mm
- It's less than 85 mm
- In mm, the digit sum is 12

Ron is thinking of 84 mm (8 cm and 4 mm)

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

R

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

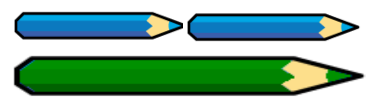
Reasoning and Problem Solving

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.

Compare Lengths

Notes and Guidance

Children compare and order lengths based on measurements in mm, cm and m.

They use their knowledge of converting between units of measurement to help them compare and order. Encourage children to convert all the measurements to the same unit of length before comparing.

Mathematical Talk

Is descending order, shortest to tallest or tallest to shortest?

Can you order the children's heights in ascending order?

Why does converting to the same unit of length, make it easier to compare lengths?

Estimate which child's tower you think will be the tallest. Explain why.

Varied Fluency

- Complete the sentences.

Child	Height
Rosie	109 cm
Amir	1 m 5 cm
Jack	135 cm
Dora	1 m 45 mm

Rosie is ________ than Jack.

Jack is ________ than Dora.

Amir is _______ than Rosie.

Dora is ______ than Amir.

- Four friends are building towers.
  Eva's tower is 22 cm and 7 mm tall.
  Teddy's tower is 22 cm tall.
  Annie's tower is 215 mm tall.
  Dexter's tower is 260 mm tall.
  Order the children's towers in descending order.

  ☐ < ☐ < ☐ < ☐

- Using a ruler, measure the width of 5 different books to the nearest mm. Record your results in a table, then compare and order them.

Compare Lengths

Reasoning and Problem Solving

Always, Sometimes, Never?

mm lengths are smaller than cm lengths.

Possible answer:

Sometimes.
E.g. 1 mm is smaller than 1 cm but 70 mm is larger than 3 cm.

Sort the lengths into the table.

Longer than a metre	Shorter than a metre

1 m 65 cm | 165 mm | 165 m

165 cm | 16 cm 5 mm | 1 cm 65 mm

Are any of the lengths equivalent?

1 m 65 cm, 165 cm and 165 m are longer than a metre.
165 mm, 16cm 5 mm and 1 cm 65 mm are shorter than a metre.

1 m 65 cm is equivalent to 165 cm.
165 mm is equivalent to 16 cm 5 mm.

Add Lengths

Notes and Guidance

Children add lengths given in different units of measurement. They convert measurements to the same unit of length to add more efficiently. Children should be encouraged to look for the most efficient way to calculate and develop their mental addition strategies.

This step helps prepare children for adding lengths when they calculate the perimeter.

Mathematical Talk

How did you calculate the height of the tower?

Estimate which route is the shortest from Tommy's house to his friend's house.

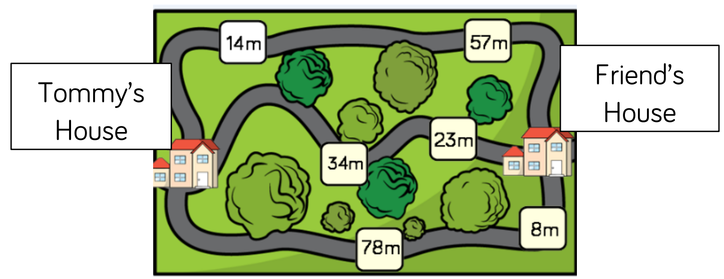
Which route is the longest?

Why does converting the measurements to the same unit of length make it easier to add them?

Varied Fluency

- Ron builds a tower that is 14 cm tall.
  Jack builds a tower than is 27 cm tall.
  Ron puts his tower on top of Jack's tower.
  How tall is the tower altogether?

- Tommy needs to travel to his friend's house.
  He wants to take the shortest possible route.
  Which way should Tommy go?



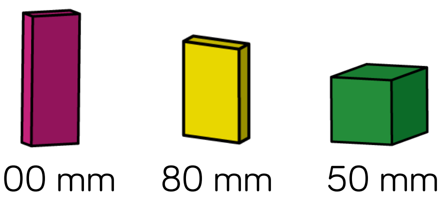
- Miss Nicholson measured the height of four children in her class.
  What is their total height?

95 cm	1 m and 11 cm	1 m and 50 mm	89 cm

Add Lengths

Reasoning and Problem Solving

Eva is building a tower using these blocks.



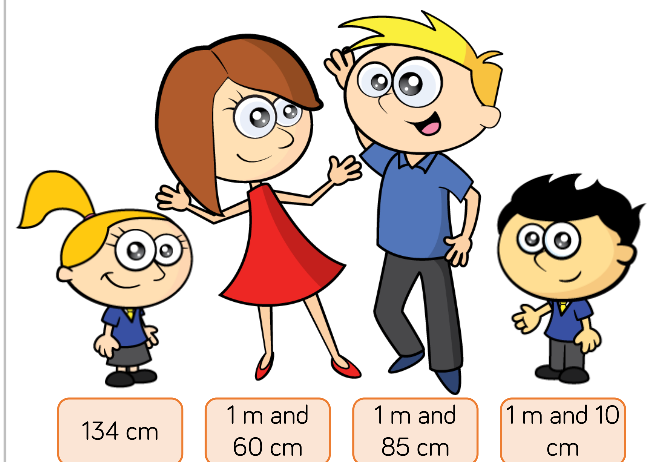
How many different ways can she build a tower measuring 56 cm?
Can you write your calculations in mm and cm?

Possible answer:

Four 100 mm blocks and two 80 mm blocks.

There are many other solutions.

Eva and her brother Jack measured the height of their family.



Eva thinks their total height is 4 m and 55 cm

Jack thinks their total height is 5 m and 89 cm

Who is correct? Prove it.

Jack is correct. Eva has not included her own height.

White Rose Maths

Subtract Lengths

Notes and Guidance

Children use take-away and finding the difference to subtract lengths. Children should be encouraged to look for the most efficient way to calculate and develop their mental subtraction strategies.

This step will prepare children for finding missing lengths within perimeter.

Mathematical Talk

What is the difference between the length of the two objects? How would you work it out?

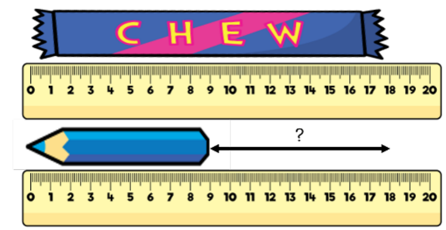
How are Alex's models different? How are they the same?

Which model do you prefer? Why?

What is the most efficient way to subtract mixed units?

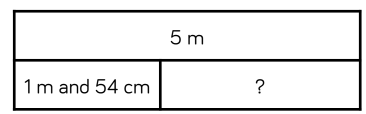
Varied Fluency

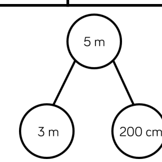
Find the difference in length between the chew bar and the pencil.



The chew bar is ___ cm long.
The pencil is ___ cm long.
The chew bar is ___ cm longer than the pencil.

Alex has 5 m of rope. She uses 1 m and 54 cm to make a skipping rope. She works out how much rope she has left using two different models.





5 m – 1 m = 4 m
4 m – 54 cm = 3 m 46 cm

200 cm – 154 cm = 46 cm
3 m + 46 cm = 3 m 46 cm

Use the models to solve:

- Mrs Brook's ball of wool is 10 m long. She uses 4 m and 28 cm to knit a scarf. How much does she have left?
- A roll of tape is 3 m long. If I use 68 cm of it wrapping presents, how much will I have left?

Subtract Lengths

Reasoning and Problem Solving

 A bike race is 950 m long. Teddy cycles 243 m and stops for a break. He cycles another 459 m and stops for another break. How much further does he need to cycle to complete the race?	Teddy needs to cycle 248 metres further.
A train is 20 metres long. A car is 15 metres shorter than the train. A bike is 350 cm shorter than the car. Calculate the length of the car. Calculate the length of the bike. How much longer is the train than the bike?   	The car is 5 m and the bike is 150 cm or 1 m 50 cm. The train is 18 metres and 50 cm longer than the bike.

Annie has a 3 m roll of ribbon.  She is cutting it up into 10 cm lengths. How many lengths can she cut? Annie gives 240 cm of ribbon to Rosie. How much ribbon does she have left? How many 10 cm lengths does she have left?	Annie can cut it in to 30 lengths. Annie has 60 cm left. She has 6 lengths left.

Measure Perimeter

Notes and Guidance

Children are introduced to perimeter for the first time. They explore what perimeter is and what it isn't.

Children measure the perimeter of simple 2-D shapes. They may compare different 2-D shapes which have the same perimeter.

Children make connections between the properties of 2-D shapes and measuring the perimeter.

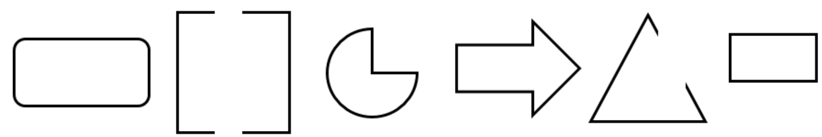
Mathematical Talk

What is perimeter?
Which shape do you predict will have the longest perimeter?
Does it matter where you start when you measure the length of the perimeter? Can you mark the place where you start and finish measuring?
Do you need to measure all the sides of a rectangle to find the perimeter? Explain why.

Varied Fluency

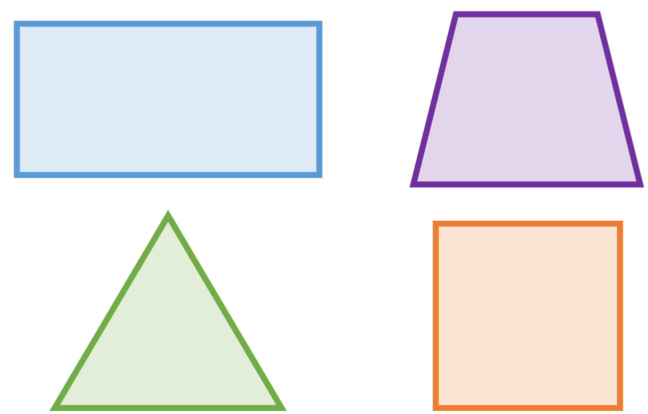
- Using your finger, show me the perimeter of your table, your book, your whiteboard etc.

- Tick the images where you can find the perimeter.



Explain why you can't find the perimeter of some of the images.

- Use a ruler to measure the perimeter of the shapes.

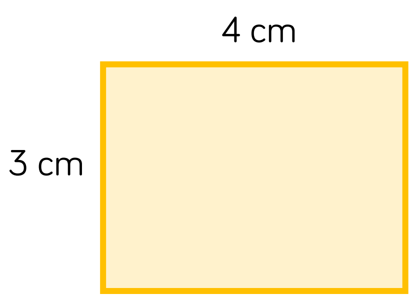


Measure Perimeter

Reasoning and Problem Solving

Amir is measuring the shape below.
He thinks the perimeter is 7 cm.

Can you spot his mistake?



Amir has only included two of the sides. To find the perimeter he needs all 4 sides. It should be 14 cm.

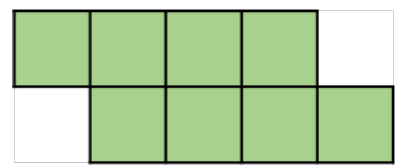
Whitney is measuring the perimeter of a square.
She says she only needs to measure one side of the square.

Do you agree?
Explain your answer.

Whitney is correct because all four sides of a square are equal in length so if she measures one side she can multiply it by 4

Here is a shape made from centimetre squares.

Find the perimeter of the shape.



The perimeter is 14 cm.

Can you use 8 centimetre squares to make different shapes?

Find the perimeter of each one.

There are various different answers depending on the shape made.

White Rose Maths

Calculate Perimeter

Notes and Guidance

Children use their understanding of the properties of shape to calculate the perimeter of simple 2-D shapes.

It is important to note they will not explore the formula to find the perimeter of a rectangle at this point.

They explore different methods for calculating the perimeter of a shape. For example, they may use repeated addition or they may make connections to multiplication.

Mathematical Talk

How can we calculate the perimeter of each shape?

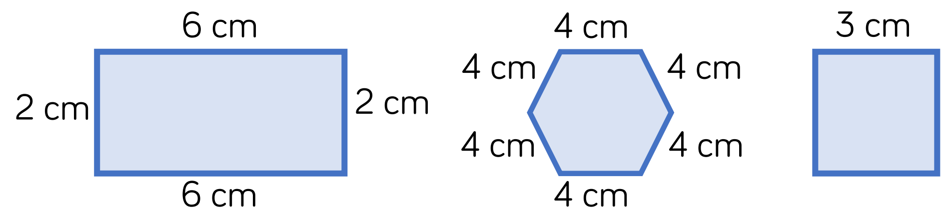
Can we calculate the perimeter using a different method?

What is the same about the two methods? What is different?

How can we work out the length of the missing side? What other information do we know about the rectangle? Can we write on the lengths of all the sides?

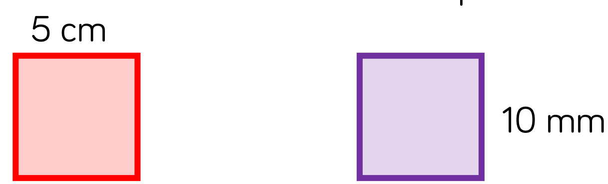
Varied Fluency

- Calculate the perimeter of the shapes.



Can you find more than one way to calculate the perimeter?

- Use two different methods to calculate the perimeter of the squares.

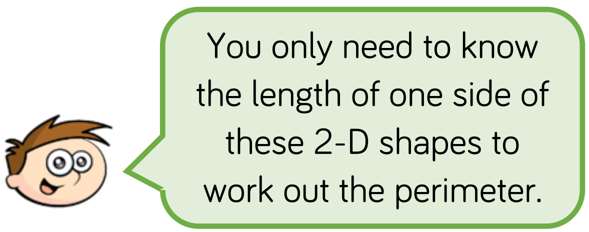


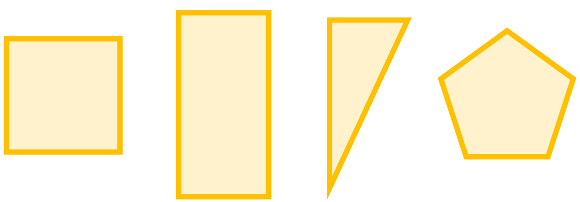
- What is the length of the missing side?

Calculate Perimeter

Reasoning and Problem Solving

Teddy says,





Do you agree with Teddy?
Explain your answer.

You only need to know the length of one side for the square and the pentagon as all the sides are the same.
However, Teddy is wrong because for the rectangle you need to know two lengths and for the triangle you need to know all of them.

Each side of this shape is of equal length.
The perimeter is 60 cm.
How long is each side?

The shape has 10 sides so the length of each side is 6 cm

How many different rectangles can you draw with a perimeter of 20 cm?

There are 5 different rectangles.

1 cm by 9 cm
2 cm by 8 cm
3 cm by 7 cm
4 cm by 6 cm
5 cm by 5 cm

Spring - Block 5

Fractions

Overview

Small Steps

- Make equal parts R
- Recognise a half R
- Find a half R
- Recognise a quarter R
- Find a quarter R
- Recognise a third R
- Find a third R
- Unit fractions R
- Non-unit fractions R
- Equivalence of $\frac{1}{2}$ and $\frac{2}{4}$ R
- Count in fractions R

Notes for 2020/21

The year 3 fractions content has been moved to the summer term so that more time can be spent revisiting the fractions content from Year 2.

Some children may have missed this content or not fully grasped it in 2020. Having a firm foundation with fractions is important for confidence and future success in mathematics, hence the reason for extra time dedicated to the topic.

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?

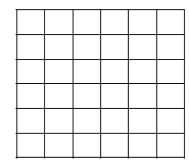
Is there more than one way to split the object/quantity into equal parts?

Varied Fluency

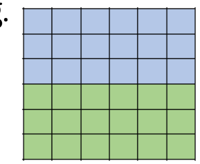
R

- Use different colours to show how this shape can be split into equal parts.

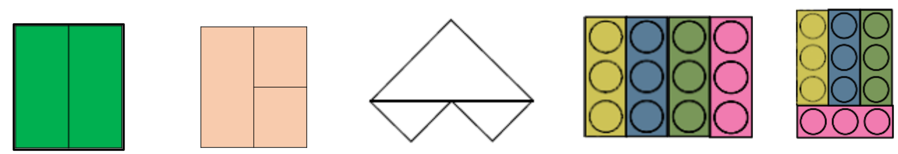
  How many ways can you find?



e.g.

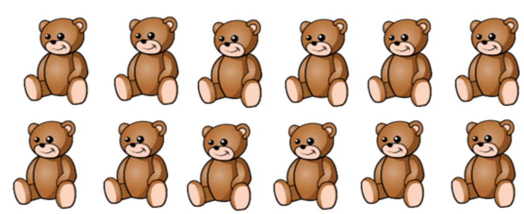


- Look at the representations. Decide which show equal parts and which show unequal parts.



  Can you make some of your own representations of equal and unequal parts?

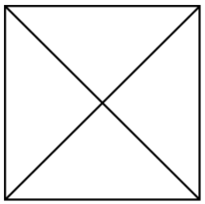
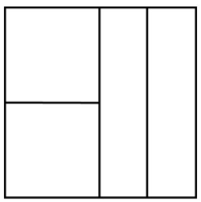
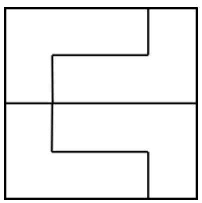
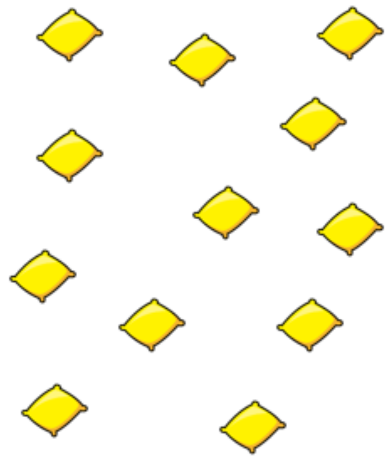
- Can you split the teddies into three equal groups?
  Can you split the teddies into three unequal groups?



  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

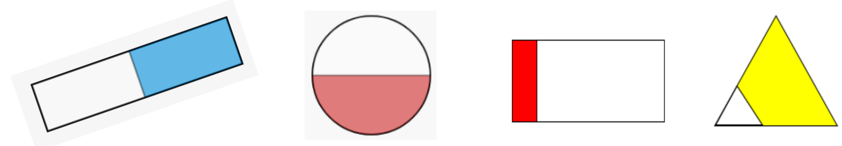
R

- The whole gummy bear is split into _____ equal parts.

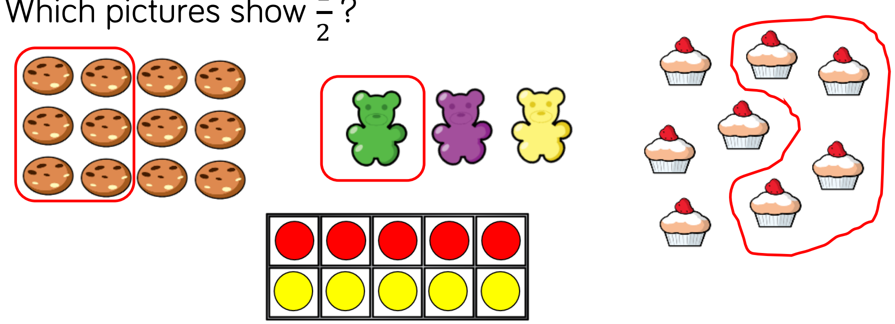
  Each part is worth a _________ .

  This can be written as $\frac{\square}{\square}$

- Which pictures show $\frac{1}{2}$?



- Which pictures show $\frac{1}{2}$?

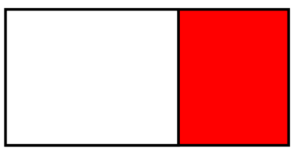


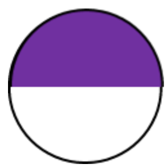
Recognise a Half

Reasoning and Problem Solving

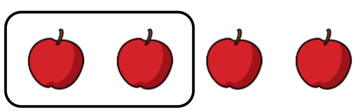
R

Odd One Out





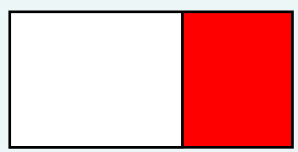
$\frac{1}{2}$



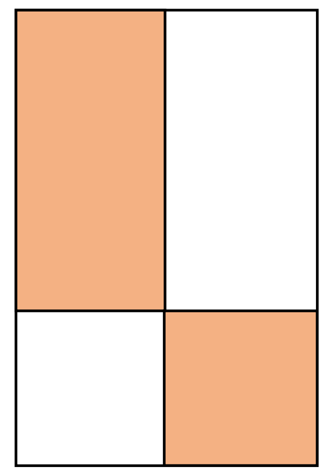
One half

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

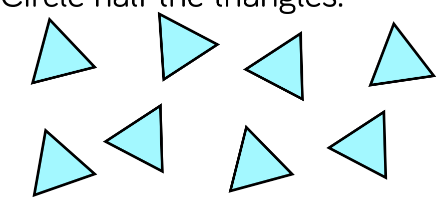
R

- 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.

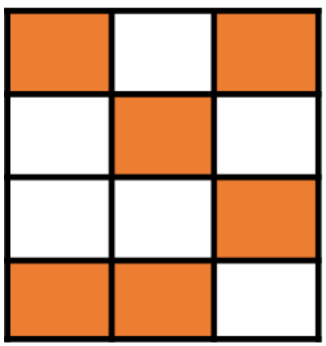
$\frac{1}{2}$ of 4 = $\square$ $\frac{1}{2}$ of 40 = $\square$

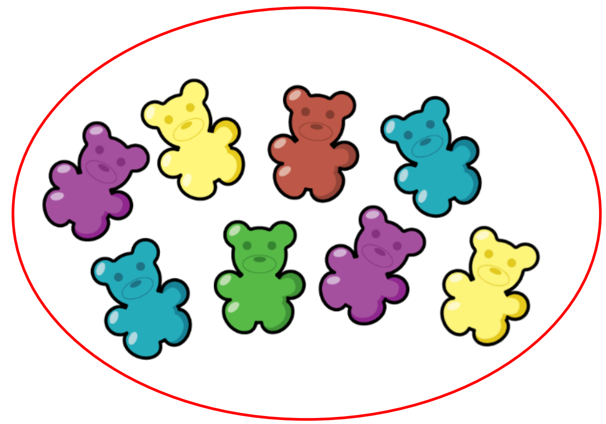
$\frac{1}{2}$ of 6 = $\square$ $\frac{1}{2}$ of 60 = $\square$

$\frac{1}{2}$ 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?

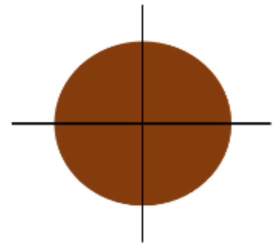
Can you shade one quarter in different ways? How do you know that you have shaded one quarter?

How many quarters make a whole?

Varied Fluency

R

- Four friends are sharing a cake.

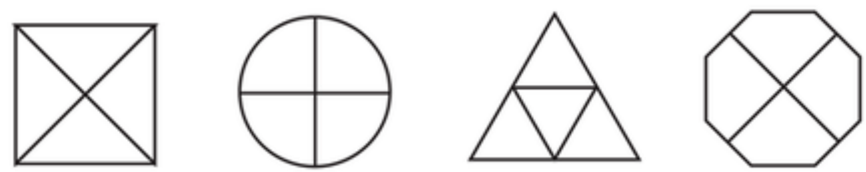


The cake is split into _____ equal parts.

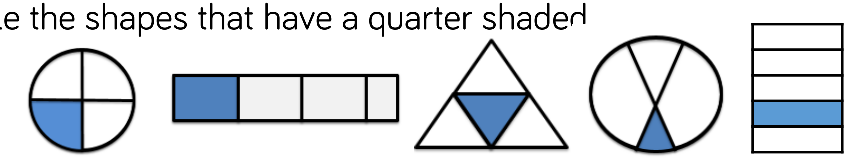
Each part is worth a ________ .

This can be written as $\frac{\square}{\square}$

- Shade $\frac{1}{4}$ of each shape.



- Circle the shapes that have a quarter shaded.

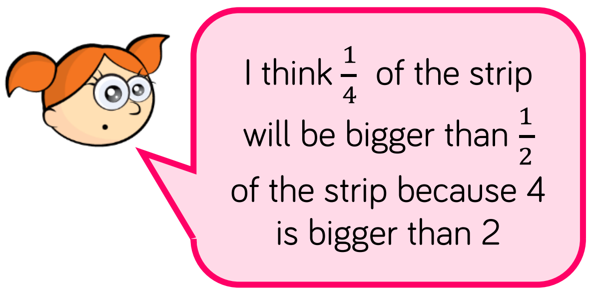


Which shapes do not have a quarter shaded? How do you know?
Draw the shapes again and split them into quarters correctly?

Recognise a Quarter

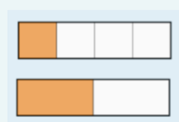
Reasoning and Problem Solving

Alex is folding two identical paper strips.



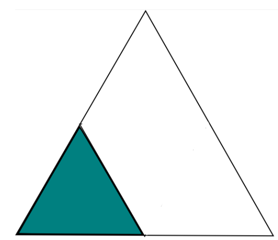
Use paper strips to prove Alex is incorrect.

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.



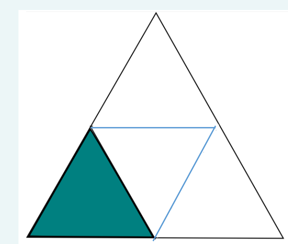
True or False?

$\frac{1}{4}$ 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?

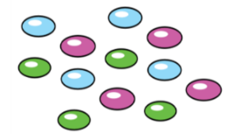
How do you know you have found $\frac{1}{4}$?

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 _____

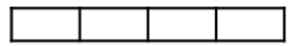
Varied Fluency

Share the smarties equally between 4 people.



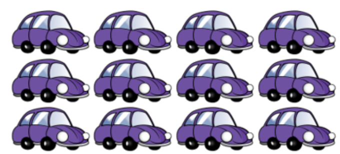
The smarties are split into ____ equal parts.

Each part is worth a _________ .



This can be written as $\frac{\boxed{}}{\boxed{}}$

Circle one quarter of the cars.



One quarter of ____ is ____

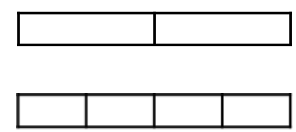
____ is $\frac{1}{4}$ of ____

Complete:

$\frac{1}{2}$ of 12 = $\boxed{}$ $\frac{1}{4}$ of 12 = $\boxed{}$

$\frac{1}{2}$ of 20 = $\boxed{}$ $\frac{1}{4}$ of 20 = $\boxed{}$

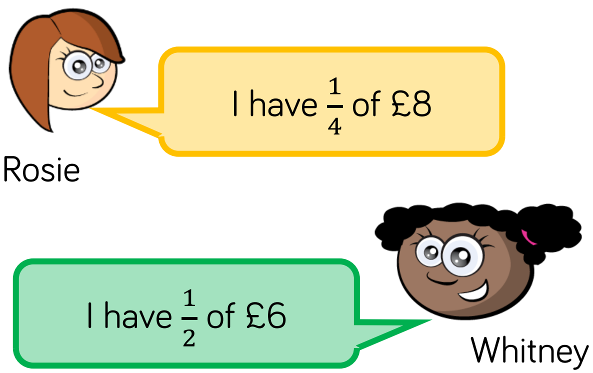
$\frac{1}{2}$ of 8 = $\boxed{}$ $\frac{1}{4}$ of 8 = $\boxed{}$



Find a Quarter

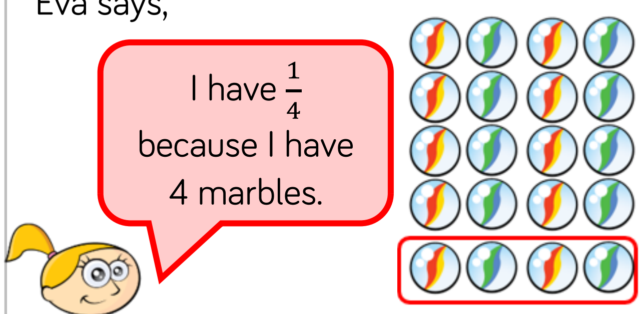
Reasoning and Problem Solving

Who has more? Explain why.



Whitney has more because half of £6 is £3, whereas a quarter of £8 is only £2

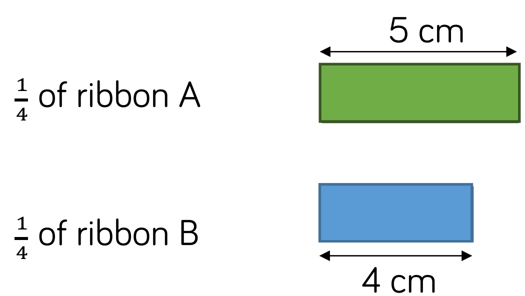
Eva says,



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.



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?

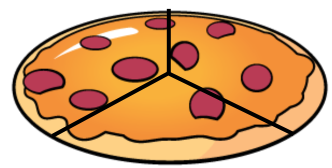
Can you shade $\frac{1}{3}$ in a different way? How do you know that you have shaded $\frac{1}{3}$?

How many thirds make a whole?

Varied Fluency

R

- Three friends are sharing a pizza.

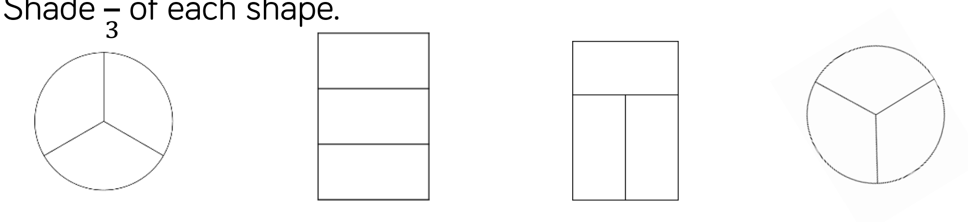


The pizza is split into _____ equal parts.

Each part is worth a ________ .

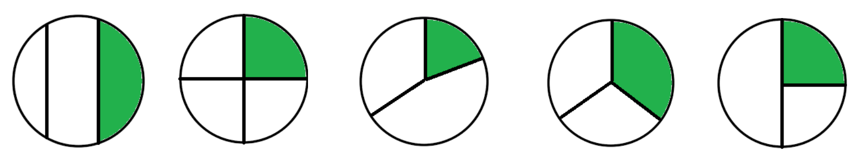
This is the same as $\frac{\square}{\square}$

- 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

R

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?

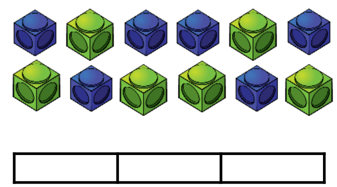
How does changing the whole amount change the answer?

Is the answer still worth a third? Explain why?

Varied Fluency

R

- Use the cubes to make three equal groups.



There are ___ cubes altogether.

One third of ____ is ____

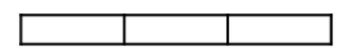
$\frac{\square}{\square}$ of ___ is ___

- 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 = $\square$

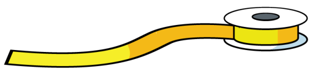


Find a third

Reasoning and Problem Solving

R

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.
($6 \times 3 = 18$cm
Half of $18 = 9$cm)

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?

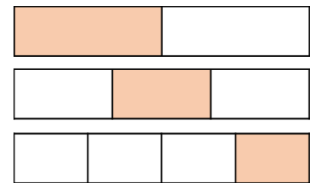
Show me $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ of the model/counters etc. What is the same? What is different?

Which unit fraction is bigger/smaller if the whole is the same?

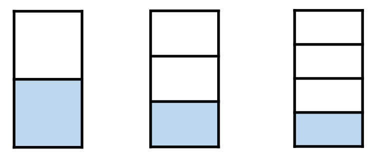
Varied Fluency

R

- What is the same and what is different about each bar model?



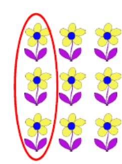
- What fraction is shaded in each diagram?

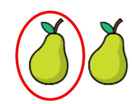


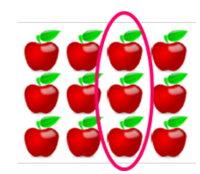
What do you notice? Complete the sentence.

The __________ the denominator the ___________ the fraction.

- Match the unit fraction to the correct picture.







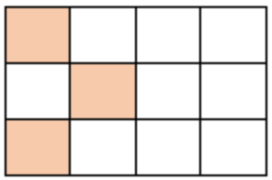
$\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$

Unit Fractions

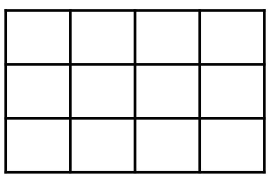
Reasoning and Problem Solving

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 $\frac{3}{4}$?

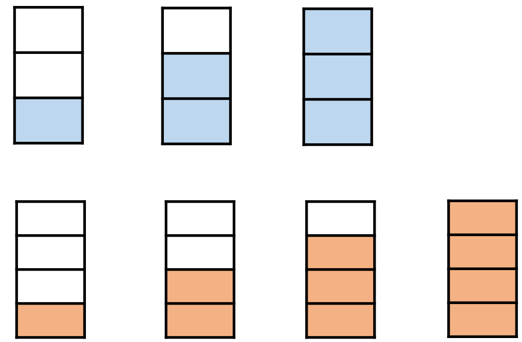
In $\frac{3}{4}$ what does the digit 3 represent? What does the digit 4 represent?

Give me an example of a unit fraction and a non-unit fraction.

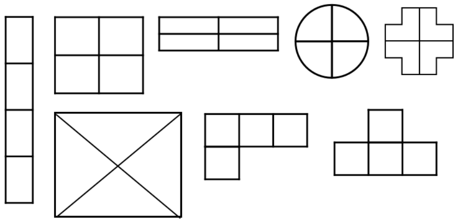
Varied Fluency

R

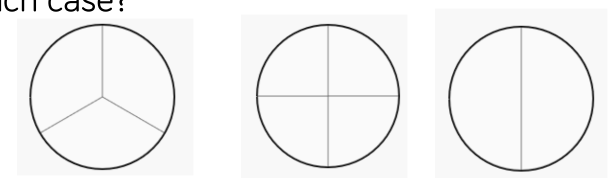
- What fraction is shaded in each diagram?



- Shade $\frac{3}{4}$ of each shape.



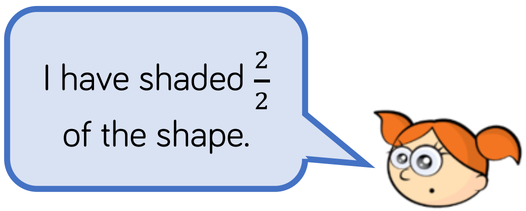
- Shade in the whole of each circle. What fraction is represented in each case?



Non-Unit Fractions

Reasoning and Problem Solving

Alex says,



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)

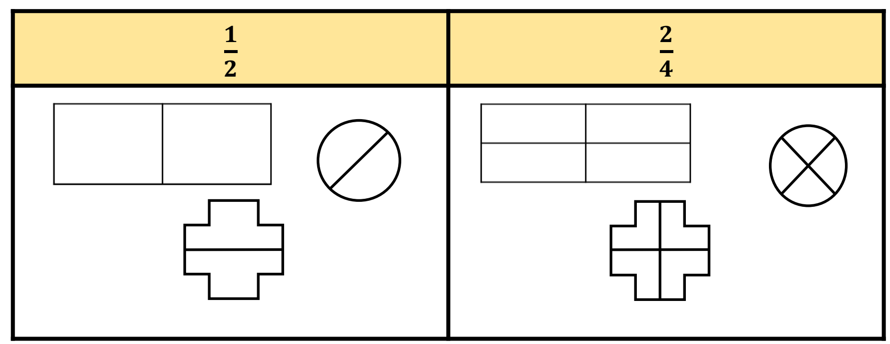
Are the numerators the same? Are the denominators the same?

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

R

Tommy has a jar of 12 cookies. He gives half of them to Alex, and $\frac{2}{4}$ of them to Mo.

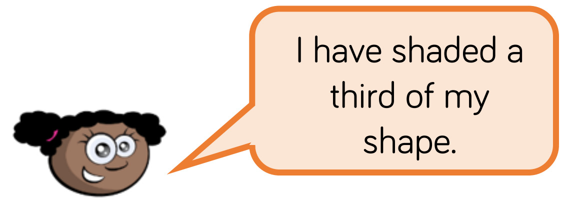
Who gets the most cookies?

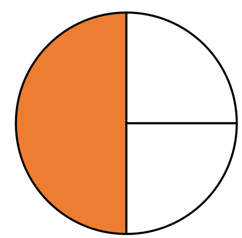
They both get the same amount.
They will each get 6 cookies.

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.

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?

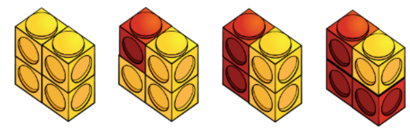
Which fraction will come next?

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

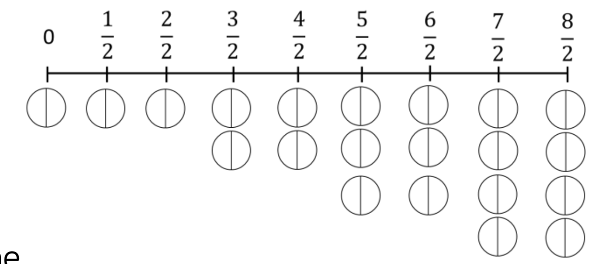
- What would the next image in the sequence look like?



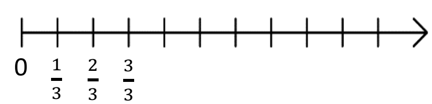
What do you notice about the fraction of yellow cubes? Can you count the fractions represented?

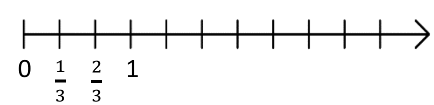
- In groups of 4, give each child an identical strip of paper. Fold each of them into 2 equal parts. Count how many halves there are on two strips of paper, on three strips, on 4 strips. Predict: how many halves will there be on six, seven, eight strips?

- Shade the correct number of parts for each fraction.



- Complete each number line. What's the same, what's different?

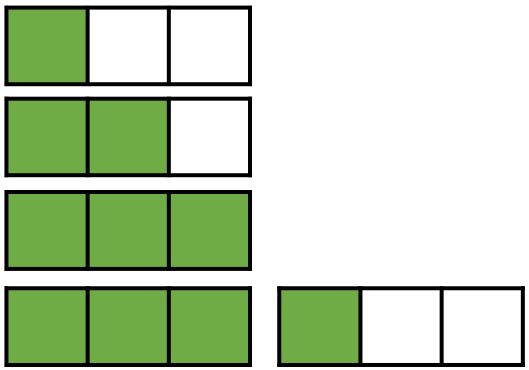




Count in Fractions

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.