Spring Scheme of Learning

Year 2

#MathsEveryoneCan

2020-21

White Rose Maths

New for 2020/21

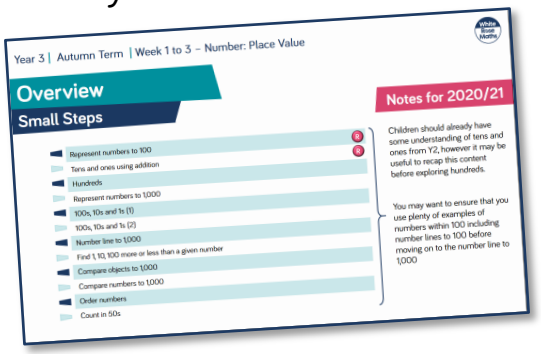
2020 will go down in history. The world has changed for all of us.

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

We have amended our schemes for 2020/21 to:

- ★ highlight key teaching points
- ★ recap essential content that children may have forgotten
- ★ flag any content that you might not have covered during the school closures period.

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



Lesson-by-lesson overviews

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

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

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

Teaching for Mastery

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

The overviews:

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

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

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

Concrete - Pictorial - Abstract

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

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

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

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

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

Supporting resources

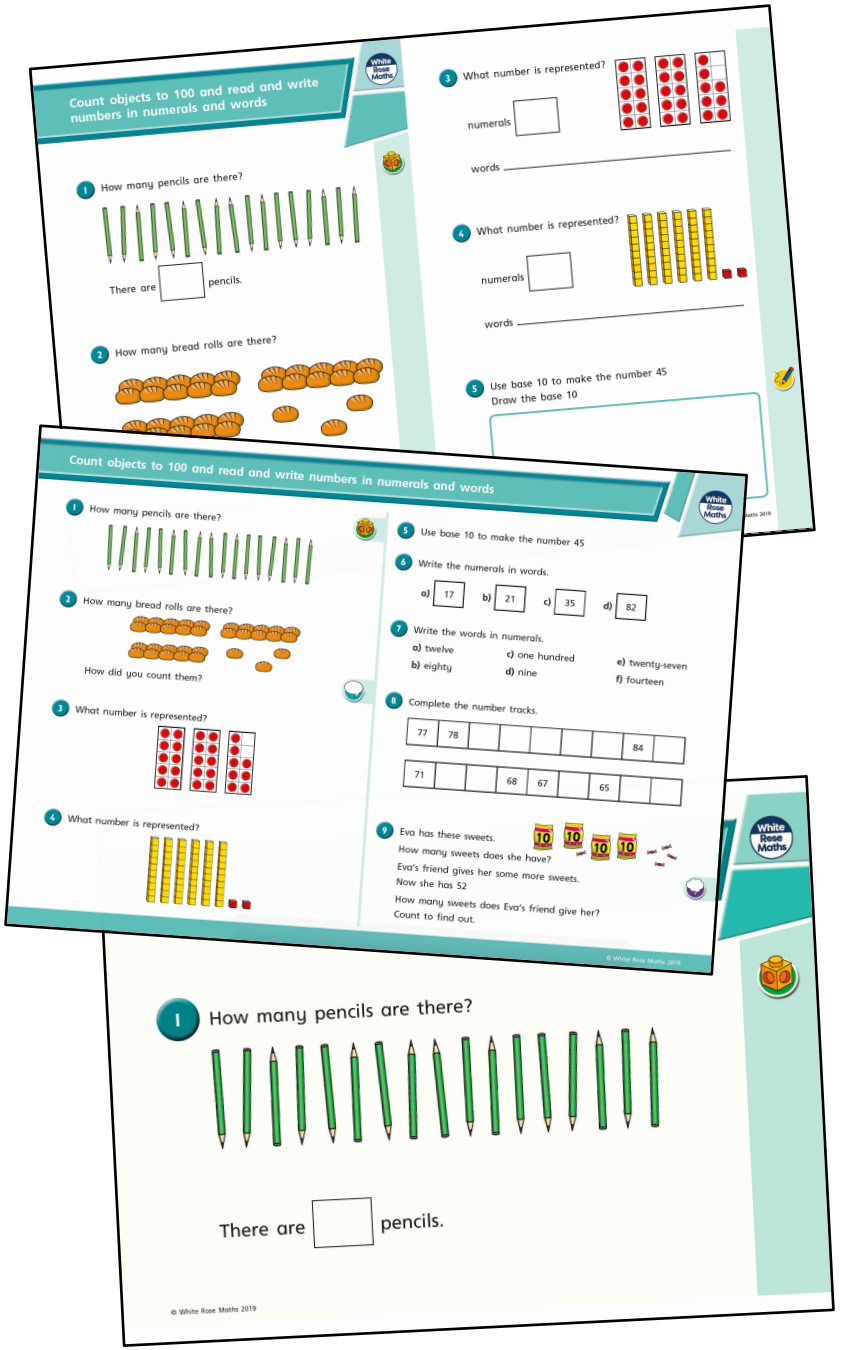
NEW for 2019-20!

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

The worksheets are provided in three different formats:

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

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



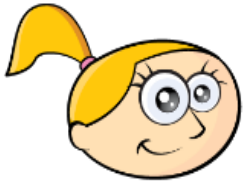
Meet the Characters

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


Teddy


Rosie


Mo


Eva


Alex


Jack


Whitney


Amir


Dora


Tommy


Dexter


Ron


Annie

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

White Rose Maths

Spring - Block 1

Multiplication & Division

Overview

Small Steps

1	Recognise equal groups
2	Make equal groups
3	Add equal groups
4	Multiplication sentences using the × symbol
5	Multiplication sentences from pictures
6	Use arrays
7	Make doubles R
8	2 times-table
9	5 times-table
10	10 times-table
11	Make equal groups – sharing R
12	Make equal groups – sharing
13	Make equal groups – grouping R
14	Make equal groups – grouping
15	Divide by 2
16	Odd & even numbers
17	Divide by 5
18	Divide by 10

Notes for 2020/21

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

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

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

Recognise Equal Groups

Notes and Guidance

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

Mathematical Talk

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

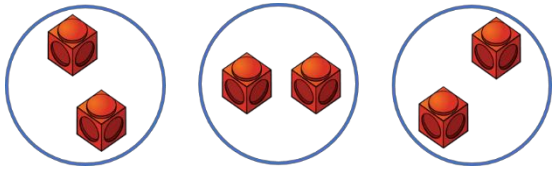
What does the 5 represent? What does the 2 represent?

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

Why are these groups equal/unequal?

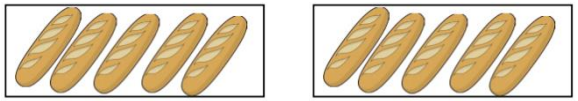
Varied Fluency

- Complete the stem sentences.



There are ____ equal groups with ____ in each group.

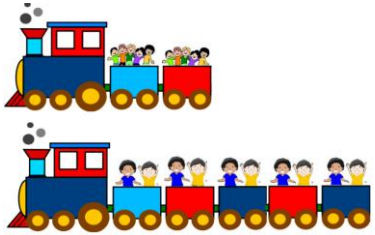
- Complete the sentences.



There are ____ equal groups with ____ in each group.

There are _____ baguettes altogether.

- Describe the equal groups.

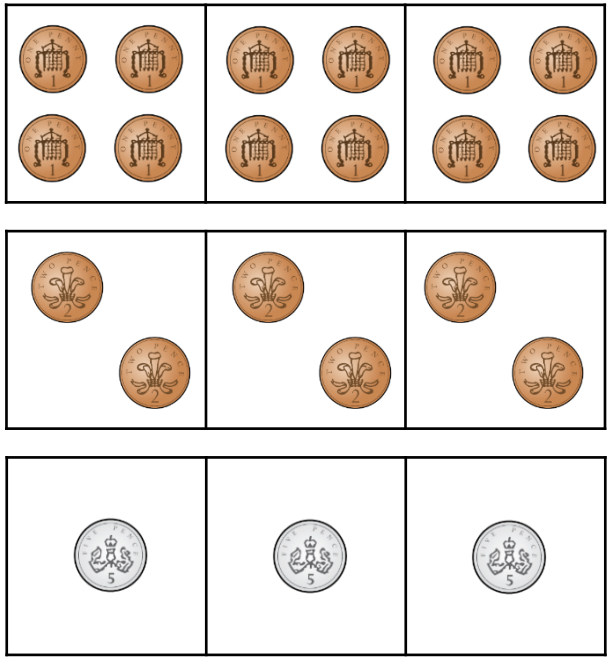


What is the same and what is different in each group?

Recognise Equal Groups

Reasoning and Problem Solving

Which group of money is the odd one out?

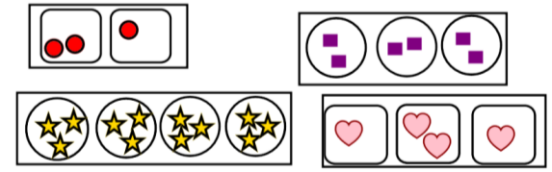


Explain why.

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

Sort into equal and unequal groups.

Equal Groups	Unequal Groups

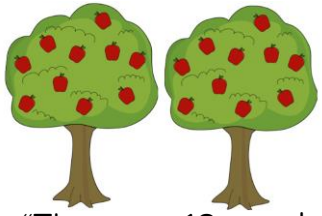


Create your own picture to go in each column.

Hearts and dots in unequal groups.

Stars and squares in equal groups.

Spot the mistake.



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

There are 2 equal groups with 10 in each group

There are two 10s.

Make Equal Groups

Notes and Guidance

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

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

Mathematical Talk

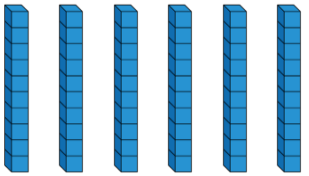
How else could you represent these in equal groups?

How many ways can you represent this?

How have you grouped your items?

Varied Fluency

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



How else can you represent these as equal groups?

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

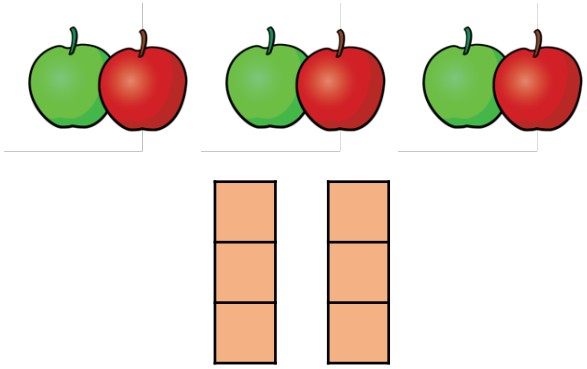
- What else do we need to show 'five 3s'?

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

Make Equal Groups

Reasoning and Problem Solving

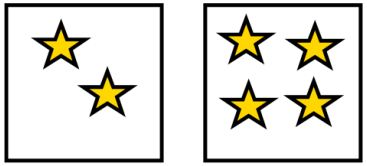
Has Eva shown the equal groups correctly?



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

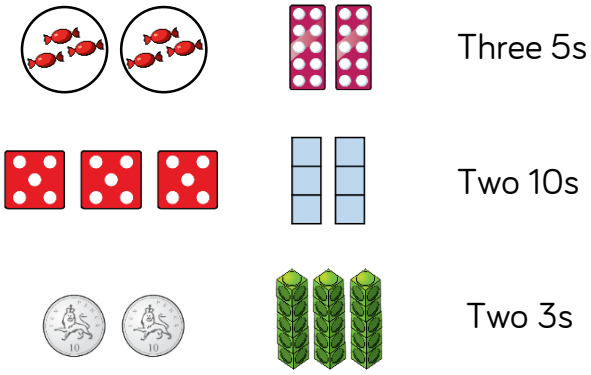
Children to draw or make 3 towers with 2 in each tower.

How can you make the groups equal?



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

Match the equal groups.



Sweets, squares, two 3s.

Dice, cubes, three 5s.

Coins, number pieces, two 10s.

Add Equal Groups

Notes and Guidance

Children begin to connect equal groups to repeated addition.

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

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

Mathematical Talk

What do the two 3s represent?

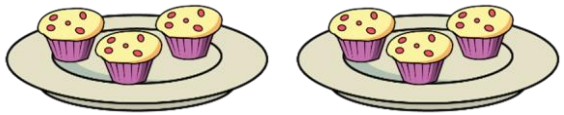
Why are we using the addition symbol?

How else can we show the equal groups?

What is the total?

Varied Fluency

Complete:



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

Complete:

There are ___ equal groups with ___ in each group.
There are three ___s.
___ + ___ + ___ = 12

Complete the table.

	Draw It	Say It	Add It
			

Add Equal Groups

Reasoning and Problem Solving

True or False?

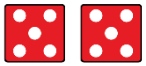
$5 + 5 = 2 + 2 + 2 + 2 + 2$

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

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

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

Which one does not belong?



Two 5s

Ten

$5 + 5$

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

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

The Multiplication Symbol

Notes and Guidance

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

Mathematical Talk

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

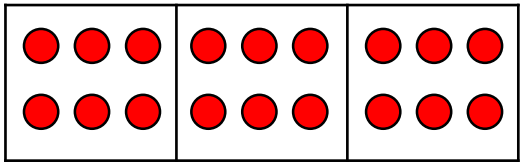
What does 'lots of' mean?

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

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

Varied Fluency

Complete the sentences to describe the equal groups.



___ + ___ + ___ = 18

___ × ___ = 18

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

Complete:

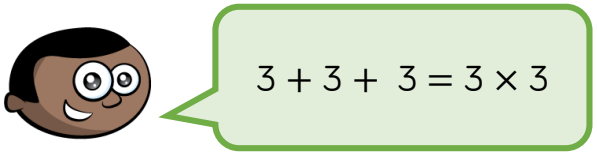
Three 2s	Draw It	Addition	Multiplication
There are 3 equal groups with 2 in each group.			

Complete:

Addition	Multiplication	Story
10 + 10 + 10		
	6 × 5	

The Multiplication Symbol

Reasoning and Problem Solving



Is Mo correct? Explain why.

Draw an image to help you.

He is correct because
3 + 3 + 3 = 9
and 3 × 3 = 9

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

3 × 5	◯	5 + 5 + 5 + 5
2 × 2	◯	2 + 2
10 × 2	◯	5 + 5 + 5

3 × 5 < 5 + 5 + 5 + 5

2 × 2 = 2 + 2

10 × 2 > 5 + 5 + 5

Think of a multiplication to complete:

6 + 6 + 6 > ___ × ___

Any two numbers which multiply together to give an answer of less than 18

The total is 12, what could the addition and multiplication be?

6 + 6 = 2 × 6

2 + 2 + 2 + 2 + 2 + 2 = 6 × 2

3 + 3 + 3 + 3 = 4 × 3

4 + 4 + 4 = 3 × 4

12 = 1 × 12

1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = 12 × 1

Multiplication from Pictures

Notes and Guidance

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

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

Coins could be used within this small step too.

Mathematical Talk

What does the 4 represent?

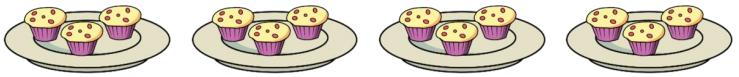
What does the 3 represent?

What does the 12 represent?

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

Varied Fluency

Complete:



___ × ___ = ___

___ lots of 3 = ___

___ multiplied by ___ = 12

Complete:

4 lots of 3 ○  

 = 1 × ___

Complete the table.

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

Multiplication from Pictures

Reasoning and Problem Solving

There are four baskets.

There are three dolls in each basket.

How many dolls are there altogether?

Draw an image and write a calculation to represent the problem.

The image could be 4 circles with 3 dots in each.

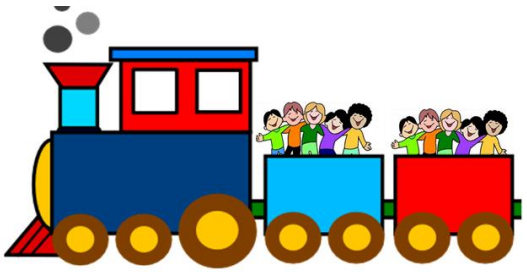
The calculation:

$4 \times 3 = 12$

Write a story for the calculation 4×10

Draw an image to illustrate your story.

Stories with 4 groups and 10 in each group, for example:
Four tables with ten children on each table.
Four purses with 10p in each purse.



2×5
$5 + 5$
5×2

Each calculation could explain the image.

Explain why.

There are 2 groups with 5 people in each group.

There are 5 people in one group and 5 in the other.

There are 5 lots of 2 people.

Use Arrays

Notes and Guidance

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

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

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

Mathematical Talk

Where are the 2 lots of 3?

Where are the 3 lots of 2?

What do you notice?

What can we use to represent the eggs?

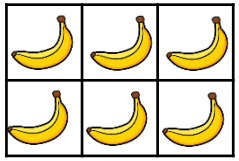
Can you draw an image?

Varied Fluency

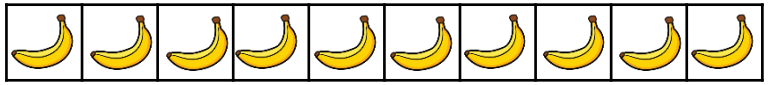
- On the image, find 2×5 and 5×2

Can you represent this array using another object?

- Complete the number sentences to describe the arrays.



2×3 and ___ × ___



___ × ___ and ___ × ___

- Draw an array to show:

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

Use Arrays

Reasoning and Problem Solving

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

Once you have created your array complete:

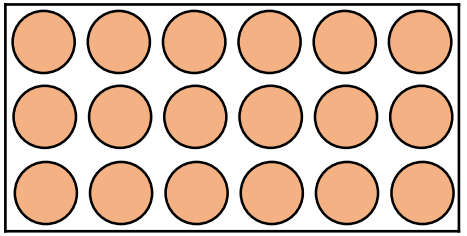
___ × ___ = ___ × ___

$1 \times 12 = 12 \times 1$

$2 \times 6 = 6 \times 2$

$3 \times 4 = 4 \times 3$

Find different ways to solve six lots of three.



Count in 3s

3 lots of 3 add 3 lots of 3

5 × 3 add 1 × 3

etc.

Part of this array is hidden.

The total is less than 16

What could the array be?

4 × 2

5 × 2

6 × 2

7 × 2

Making Doubles

Notes and Guidance

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

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

Mathematical Talk

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

What comes next in my table, why?

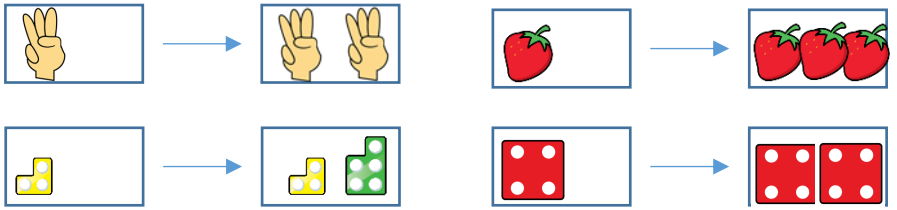
How can we show the double differently?

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

Varied Fluency

R

Circle the representations which have been doubled:

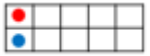
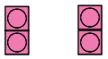


Take a number piece and double it. Complete the sentence.

Double ____ is ____

Double ____ is ____

Complete and continue the table.

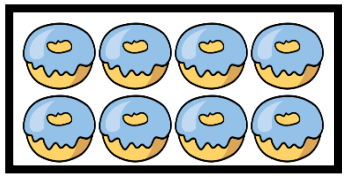
Build	Represent	Add	Double
		1 + 1 = 2	Double 1 is 2
		2 + 2 = __	Double 2 is __
		3 + 3 = __	Double 3 is __
		__ + __ = __	Double 4 is __

Making Doubles

Reasoning and Problem Solving

R

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

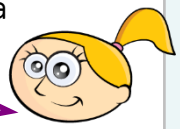


Whitney

Louise started with 4 and ended with 8 donuts.

Eva

Louise started with 8 and ended with 16 donuts.



Mo

Louise started with 2 and ended with 4 donuts.

Who do you agree with? Explain why.

Possible answer:

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

Complete the table by doubling each number.

1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

What patterns do you notice?

Possible answer:

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

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

The 2 Times-Table

Notes and Guidance

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

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

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

Mathematical Talk

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

How many 2s go into 16?

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

Varied Fluency

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

There are ____ eyes in total.

____ × ____ = ____

- Complete the number track.

2	4		8		12
14	16	18			24
	2	4	6	8	

- How many wheels are there on five bicycles?

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

The 2 Times-Table

Reasoning and Problem Solving

Fill in the blanks.

$3 \times \_\_\_ = 6$

$\_\_\_ \times 2 = 20$

$\_\_\_ = 8 \times 2$

2

10

16

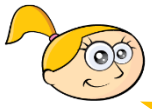
Tommy says that $10 \times 2 = 22$

Is he correct?

Explain how you know.

No Tommy is wrong because $10 \times 2 = 20$
Children could draw an array or a picture to explain their answer.

Eva says,



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 5 Times-Table

Notes and Guidance

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

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

Mathematical Talk

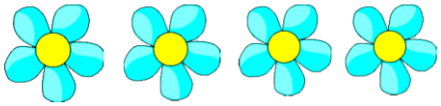
If there are 30 petals, how many flowers? Can you count in 5s to 30? How many 5s go into 30?

How many 5s go into 35?

What does each symbol mean?

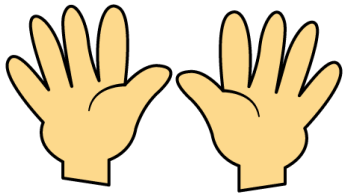
Varied Fluency

- How many petals altogether?



Write the calculation.

- There are 35 fingers.
How many hands?



___ × 5 = 35

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

2 × 5 ◯ 5 × 2

3 × 2 ◯ 4 × 5

10 × 5 ◯ 5 × 5

The 5 Times-Table

Reasoning and Problem Solving

Is Mo correct?

Explain your answer.

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

Tubes of tennis balls come in packs of 2 and 5

Whitney has 22 tubes of balls.

How many of each pack could she have?

How many ways can you do it?

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

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

35						
5	5	5	5	5	5	5

35				
7	7	7	7	7

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

Draw your own bar model to represent 4 × 5

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

Children can choose either way to represent 4 × 5

The 10 Times-Table

Notes and Guidance

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

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

Mathematical Talk

What if there were 10 packs of crayons?

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

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

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

Varied Fluency

- How many crayons are there altogether?

There are ___ crayons altogether.

___ × 10 = ___

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

__ × 10 = 30

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

2 × 10		9 × 10	0 × 10		2 × 10
smallest		greatest	smallest		greatest
	1 × 10	6 × 10		5 × 10	
smallest		greatest	smallest		greatest

The 10 Times-Table

Reasoning and Problem Solving

On sports day, Jack runs 10 metres, 7 times.

Which of these calculations do **not** describe this word problem?

$10 + 7$

7×10

$7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7$

$10 + 10 + 10 + 10 + 10 + 10 + 10$

Explain why.

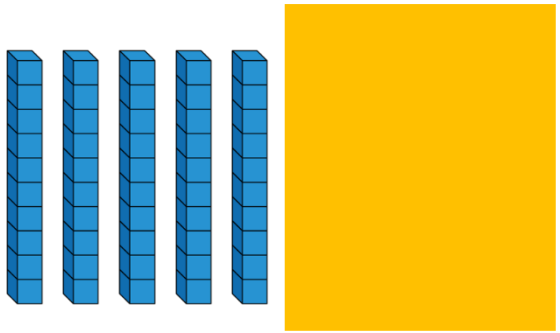
$10 + 7$ is incorrect because he has run 10 metres, 7 times, not 10 metres then 7 metres.

$7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7 + 7$ is incorrect because he does not run 7 metres each time but 10 metres.

Some Base 10 is hidden.

The total is less than 100

What could the calculation be?



___ × 10 = ___

Tim says it could be 10 × 10
Is he correct? Explain your answer.

It could be
$6 \times 10 = 60$
$7 \times 10 = 70$
$8 \times 10 = 80$
$9 \times 10 = 90$

It can't be 10 × 10 because 100 is not less than 100, it is equal to 100.

Sharing Equally

Notes and Guidance

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

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

Mathematical Talk

How can I share the muffins equally?

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

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

Varied Fluency

R

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

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

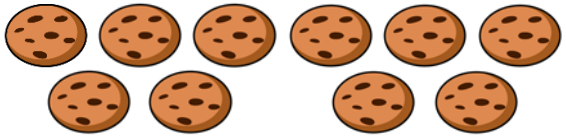
- Tim has 16 bananas.
  He shares them equally between two boxes.
  How many bananas are in each box?
  Represent and solve the problem.

Sharing Equally

Reasoning and Problem Solving

R

Dora has 10 biscuits.



She wants to share them equally at her party.

How many people could be at the party?

Possible answers:

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

There are 10 cakes and 2 boxes.

An equal amount needs to be put into each box.

Jack

Put them into groups of 2

Eva

Share them into 2 groups.

Who is correct?
Explain your answer.

Possible answer:

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

Make Equal Groups - Sharing

Notes and Guidance

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

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

Mathematical Talk

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

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

Varied Fluency

- Share the 12 cubes equally into the two boxes.

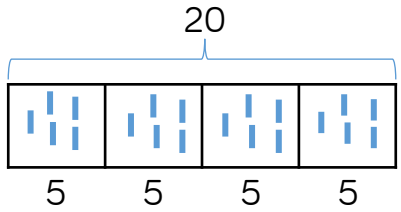
There are ___ cubes altogether.
There are ___ boxes.
There are ___ cubes in each box.

Can you share the 12 cubes equally into 3 boxes?

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

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

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



What other number sentences could Ron create using his model?

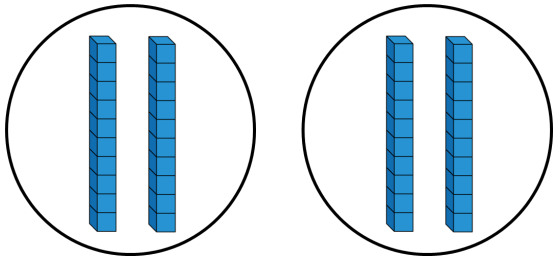
Make Equal Groups - Sharing

Reasoning and Problem Solving

Jack says,

I can work out 40 ÷ 2 easily because I know that 40 is the same as 4 tens.

This is what he does:

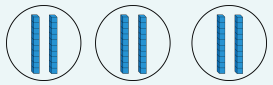


$40 \div 2 = 20$

Is it possible to work out 60 ÷ 3 in the same way?
Prove it.

Is it possible to work out 60 ÷ 4?
What is different about this calculation?

Possible answer :



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

Alex has 20 sweets and shares them between 5 friends.

Tommy has 20 sweets and shares them between 10 friends.

Whose friends will receive the most sweets?

How do you know?

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

Make Equal Groups - Grouping

Notes and Guidance

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

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

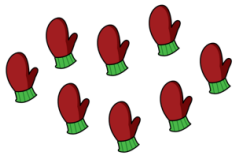
Mathematical Talk

How can you tell if the groups are equal? How can you represent the equal groups? Do all numbers divide into equal groups of 2?
How do you sort the cubes into equal groups?
What would happen if there were 21 cubes?
Have I got equal groups?
How do you know?
Does each group need to be arranged in the same way for it to be equal?

Varied Fluency

R

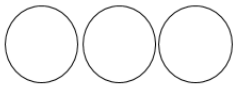
- How many equal groups of 2 can you make with the mittens?



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

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

- Complete the table. Use equipment to help you.

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

Make Equal Groups - Grouping

Reasoning and Problem Solving

R

Tommy and Jack each have the same number of sweets.

Tommy has 5 equal groups of 2
Jack has 1 equal group.
How many sweets are in Jack's group?

Jack has 10 sweets in his group.

I am thinking of a number between 20 and 30

I can only make equal groups of 5

What must my number be?

What happens when I try to make groups of 2 with it?

What happens when I try to make groups of 10 with it?

Answer: 25
Children can use practical equipment to solve this and discover what happens.
If you make equal groups of 2 with it there will be 1 left over.
If you make equal groups of 10 with it there will be 5 left over.

Make Equal Groups - Grouping

Notes and Guidance

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

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

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

Mathematical Talk

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

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

_____ groups of _____ make _____

Varied Fluency

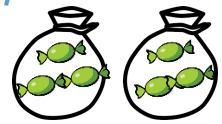
- Pencils come in packs of 20
  We need to put 5 in each pot.
  How many pots will we need?

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

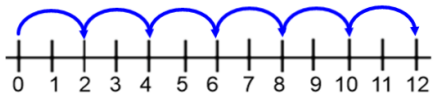
- Mrs Green has 18 sweets.
  She puts 3 sweets in each bag.
  How many bags can she fill?

18 ÷ 3 = ☐

18



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

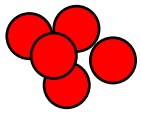


Use a number line to work out how many equal groups of 5 you can make from 30

Make Equal Groups - Grouping

Reasoning and Problem Solving

You have 30 counters.



How many different ways can you put them into equal groups?

Write down all the possible ways.

10 groups of 3
3 groups of 10
6 groups of 5
5 groups of 6
2 groups of 15
15 groups of 2
1 group of 30
30 groups of 1

Amir has some counters.
He makes 5 equal groups.

The amount he started with is greater than 10 but less than 35

How many counters could he have started with?

How many will be in each group?

He could have 30 counters in 5 groups of 6

25 counters in 5 groups of 5

20 counters in 5 groups of 4

15 counters in 5 groups of 3

Divide by 2

Notes and Guidance

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

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

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

Mathematical Talk

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

Is there a link between dividing by 2 and halving?

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

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

Varied Fluency

Complete the stem sentences.

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

□ ÷ □ = □

□ × □ = □

Group the socks into pairs.

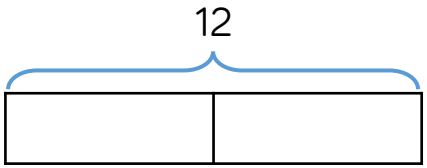
Complete the number sentences.

□ ÷ □ = □

□ × □ = □

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

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



Complete the bar model and write a calculation to match.

Divide by 2

Reasoning and Problem Solving

I have 24p.
I divide it equally between 2 friends.
How much will they get each?

I have 24p in 2p coins.
How many 2p coins do I have?

Consider the two questions above.
What is the same and what is different?

The calculation is the same in both. In the first question we are sharing, whereas in the second question we are grouping.

Tommy and Annie have some counters.

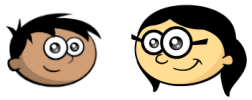
Tommy shares his counters into 2 equal groups.
He has 15 in each group.

Annie groups her counters in twos.
She has 19 groups.

Who has more counters and by how many?
How did you work it out?

Tommy has 30 counters.
Annie has 38 counters.
Annie has 8 more.
Children could have compared 15 and 19 and realised they could have done 2 × 4

Ron has shared some grapes equally between two friends.



Ron's friends

Each friend receives fewer than 50 grapes.

Complete the sentences to describe the number of grapes Ron started with.

He must have started with...

He could have started with...

He can't have started with...

Possible answer:

He must have started with an even number of grapes.

He could have started with 40 grapes.

He can't have started with 100 grapes.

Odd & Even Numbers

Notes and Guidance

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

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

Mathematical Talk

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

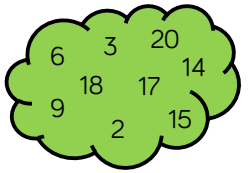
What makes these odd/even?

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

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

Varied Fluency

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



odd	even

Can you see any patterns?

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

- Spot the mistakes:

odd	even
nine  1	 10 
6  3 	eight  25

Can you make your own odd and even sets?

Odd & Even Numbers

Reasoning and Problem Solving

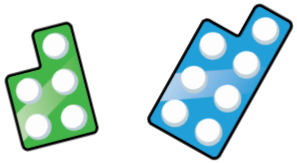
True or false?

12 is an odd number.

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

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

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

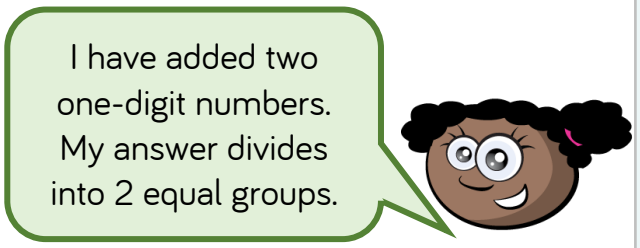


Is he correct? Convince me.

What else can you find out?

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

Whitney says,



What could Whitney's numbers be?

Is this the only possible answer?

Which numbers would not be possible?

Explain your answers.

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

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

Divide by 5

Notes and Guidance

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

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

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

Mathematical Talk

How can we represent the problem using objects/images?

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

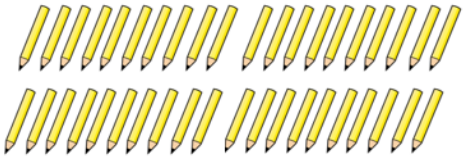
Circle all the multiples of 5 on a 100 square. What do you notice about the numbers? Can you explain the pattern? How does this help you to divide these numbers?

When would we count in 5s?

Varied Fluency

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

- 40 pencils are shared between 5 children.



□ ÷ □ = □

How many pencils does each child get?

- Group the 1p coins into 5s.
  How many 5p coins do we need to make the same amount of money?
  Draw coins and complete the missing information.
  - ___ lots of 5p = 20 one pence coins
  - ___ lots of 5p = 20p
  - 20p = ___ × 5p
  - 20p ÷ 5 = ___

Divide by 5

Reasoning and Problem Solving

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

Ron has 75 sweets.

How many party bags will he need?

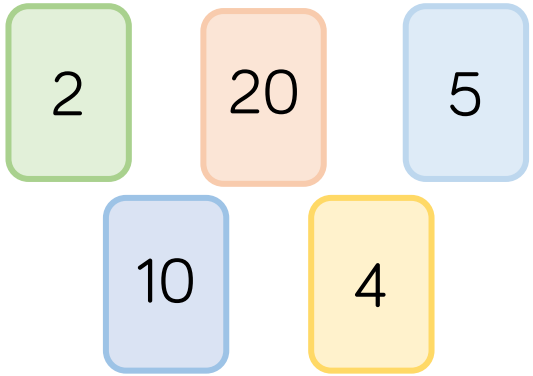
How many jars will he need?

15 party bags.

3 jars.

Use the number cards to make multiplication and division sentences.

How many can you make?



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

Divide by 10

Notes and Guidance

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

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

Mathematical Talk

What can we use to represent the problem?

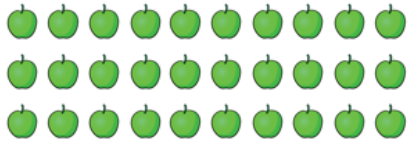
How does knowing your 10 times table help you to divide by 10?

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

How many groups of 10 are there in ___ ?

Varied Fluency

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



□ ÷ □ = □

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

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

Fill in the missing numbers.

- 70 ÷ 10 = ___
- 6 tens ÷ 1 ten = ___
- 5 = ___ ÷ 10
- There are ___ tens in 40

Divide by 10

Reasoning and Problem Solving

Mrs Owen has some sweets.

She shares them equally between 10 tables.

How many sweets could each table have?

Find as many ways as you can.

What do you notice about your answers?

They could have:

$10 \div 10 = 1$

$20 \div 10 = 2$

$30 \div 10 = 3$

$40 \div 10 = 4$

$50 \div 10 = 5$

etc

The tens digit is the same as the answer.

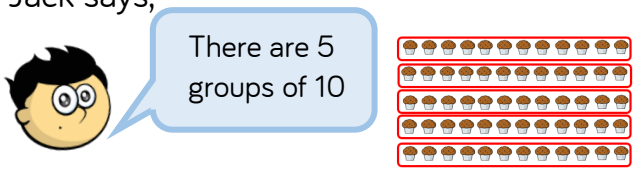
True or false?

Dividing by 10 is the same as dividing by 5 then dividing by 2

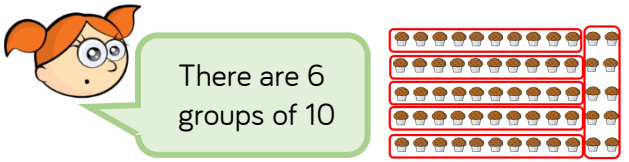
True

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

Jack says,



Alex says,



Who is correct? Explain how you know.

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

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

White Rose Maths

Spring - Block 2

Statistics

Overview

Small Steps

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

Notes for 2020/21

This block leads on really nicely from multiplication and division.

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

Make Tally Charts

Notes and Guidance

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

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

Mathematical Talk

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

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

Why do we draw tallys like this?

When do we use tallys?

Varied Fluency

Complete the tally chart.

Favourite Colour	Tally	Total
Blue	𝍸 | | |	
Red	𝍸 𝍸 | |	
Yellow	| |	
Green	| | |	

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 | |	
Year 4	𝍸 𝍸 𝍸 | |	17

Make a tally chart about one of the following topics:

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

Make Tally Charts

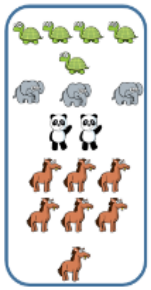
Reasoning and Problem Solving

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

Animal	Tally
	𝍸
	𝍸 | | | |
	| |
	𝍸 | |

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

Box 1



Box 2

Box 3

Box 4

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.

Box 4

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

Class 1	
Flavour	Total
Vanilla	𝍸 𝍸 𝍸
Chocolate	𝍸 𝍸 𝍸 𝍸
Strawberry	𝍸 | |
Mint	|

Class 2	
Flavour	Total
Vanilla	𝍸 𝍸 | |
Chocolate	𝍸 𝍸 𝍸 𝍸
Strawberry	𝍸
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 (1-1)

Notes and Guidance

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

Mathematical Talk

How do you know how many images to draw?

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

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

Varied Fluency

Complete the pictogram.

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

Key: ○ = 1 person

Use the tally chart to help you complete the pictogram.

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

Fruit	
Banana	
Grape	
Pear	
Apple	○○○

Key: ○ = ___

Complete the pictogram using the data given.

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

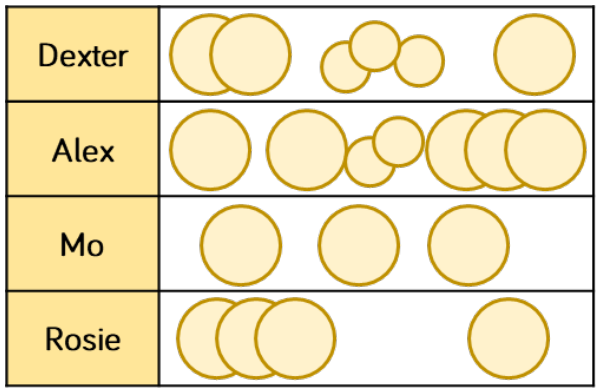
⚽ ⚽			
Teddy	Annie	Amir	Whitney

Key: ⚽ = 1 goal

Draw Pictograms (1-1)

Reasoning and Problem Solving

Here is a pictogram showing the number of counters each child has.



How could you improve the pictogram?

Possible answer
Children show understanding that the pictogram is hard to read as the symbols are overlapping each other. The pictures must be lined up and evenly spaced. There are also different sized circles representing the data. The pictures need to be the same size. There isn't a key.

Use the clues below to help you complete the pictogram.

- More Caramel was sold than Bubblegum flavour, but less than Strawberry flavour.
- Mint was the most popular flavour.
- Vanilla was the least popular.

Flavour	= 1 ice cream	Total
Strawberry		
Vanilla		
Chocolate		
Mint		
Caramel		
Bubblegum		4

Can you find more than one way to complete the pictogram?

Various answers, e.g.
Strawberry – 8
Vanilla – 1
Chocolate – 4
Mint – 9
Caramel – 6
Bubblegum – 4

Interpret Pictograms (1-1)

Notes and Guidance

Children use their knowledge of one-to-one correspondence to help them interpret and answer questions about the data presented in pictograms.

It is important that children are able to compare data within the pictograms.

Mathematical Talk

What is the pictogram showing us?

What can you find out from this pictogram?

Can you think of your own questions to ask a partner?

Varied Fluency

Here is a pictogram to show Class 5s favourite t-shirts.

Colour	
Blue	
Green	
Red	
Purple	

Key

 = 1 T-shirt

What is the most popular colour t-shirt?
What colour is the least popular t-shirt?
How many more children chose blue t-shirts than red?
How many children are in Class 5?

Here is a pictogram to show minibeasts collected by Class 5.

Minibeast	
Woodhouse	
Ladybird	
Centipede	
Worm	
Spider	

Key

 = 1 minibeast

There are ____ ladybirds.
There are ____ centipedes and worms altogether.
There are ____ more worms than centipedes.
What else does the pictogram tell us?

Interpret Pictograms (1-1)

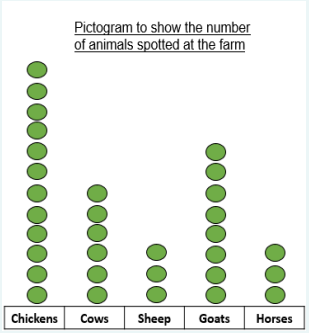
Reasoning and Problem Solving

Teddy writes these statements about his pictogram:

- There were more cows than sheep.
- There were the same number of sheep and horses.
- There were more chickens than any other animal.
- There were less cows than goats.
- There were 8 goats.

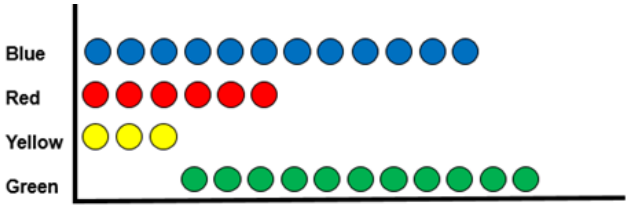
Can you draw a pictogram so that Teddy's statements are correct?
What title would you give it?

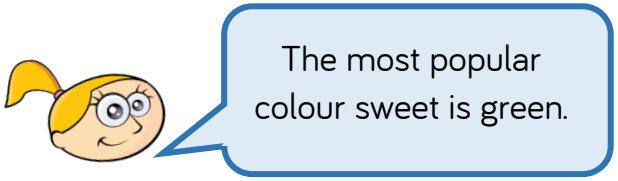
Possible answer



Children may have different numbers from this and still be correct.

Here is a pictogram.



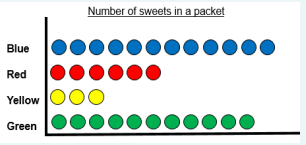


Do you agree with Eva?

Explain why and correct any mistakes.

Eva is wrong because the green sweets are not lined up correctly. There are 11 green and 12 blue.

It should look like this:



Draw Pictograms (2, 5 & 10)

Notes and Guidance

Children draw pictograms where the symbols represent 2, 5 or 10 items.

The children will need to interpret part of a symbol, for example, half of a symbol representing 10 will represent 5

Children count in twos, fives, and tens to complete and draw their own pictograms.

Mathematical Talk

If a symbol represents 2, how can you show 1 on a pictogram? How can you show 5? How can you show any odd number?

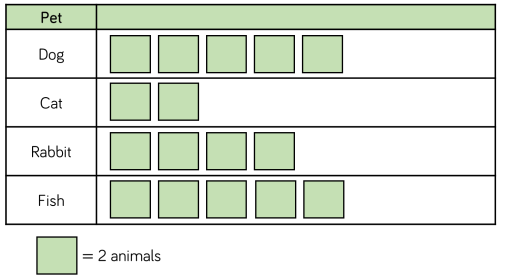
When would you use a picture to represent 10 objects?

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

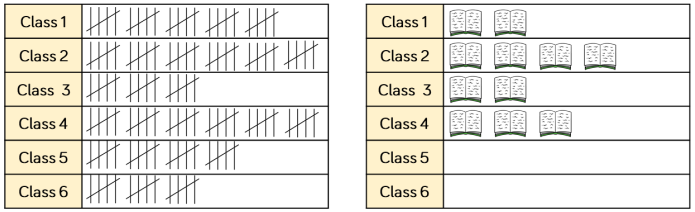
Varied Fluency

Use the tally chart to complete the pictogram.

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.



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

Chocolate	
Lemon	
Red Velvet	
Mint	
Carrot	

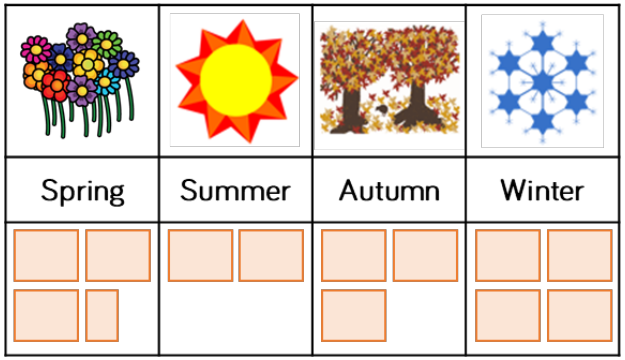
Draw Pictograms (2, 5 & 10)

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.

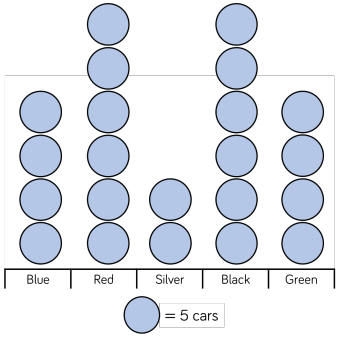
Here is an example.

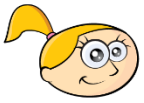


Key

= 2 children

Teddy and Eva both draw a pictogram to show how many cars they counted driving past their school.





Colour	Number on cars
Blue	● ●
Red	● ● ●
Silver	●
Black	● ● ●
Green	● ●

● = 10 cars

What is the same? What is different?
Whose pictogram do you prefer? Why?

Possible answer.
Same – both pictograms show the same information. Both easy to read.
Both used circle.
Both are in the same order.

Different – Eva counts in 10s, Teddy counts in 5s
Teddy's is vertical and Eva's is horizontal.

Interpret Pictograms (2, 5 & 10)

Notes and Guidance

To help children to fully understand pictograms, it is important they have collected their own data previously in tally charts and constructed larger scale pictograms practically.
Children also need to be able to halve 2 and 10

It is important the children are exposed to both horizontal and vertical pictograms.

Mathematical Talk

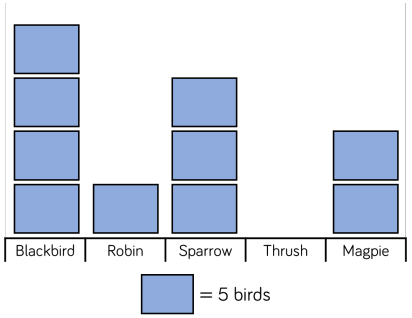
How can we represent 0 on a pictogram?

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

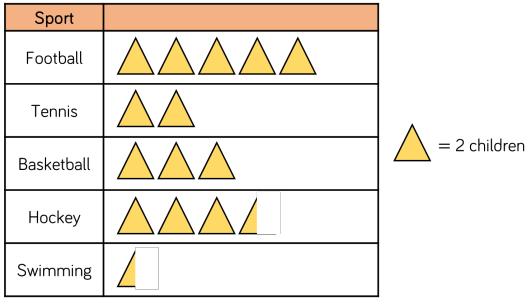
What is each symbol worth?

Varied Fluency

- How many more sparrows are there than robins?
  What is the total number of birds?
  How did you calculate this?
  Can you think of your own questions to ask a friend?



- Which is the most popular sport?
  How many children voted for football and swimming altogether?
  What could the title of this pictogram be?



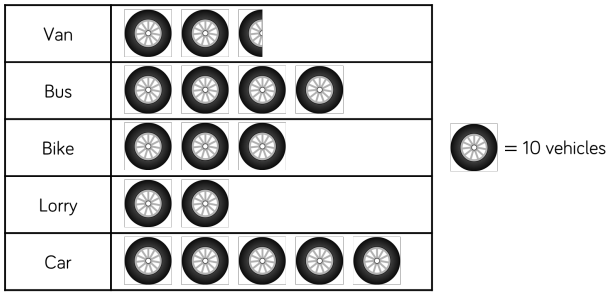
- Use the pictogram to decide if the statements are true or false.

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

Interpret Pictograms (2, 5 & 10)

Reasoning and Problem Solving

Jack and Whitney have carried out a traffic survey.



Jack says;

If I add the number of lorries and bikes together then it will be equal to the number of cars

Is he right? Convince me.

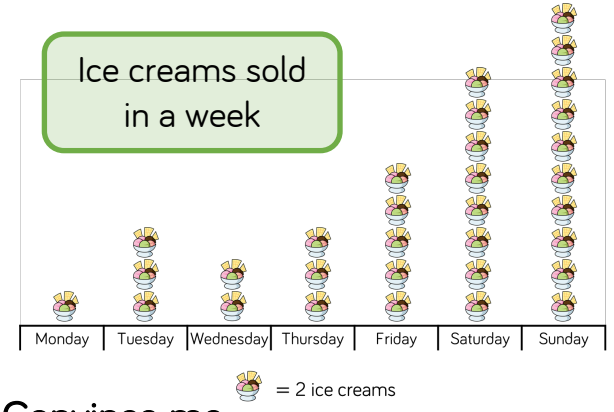
Whitney says;

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

Is she correct? Explain your answer.

Jack is correct because there are 20 lorries and 30 bikes. That means there are 50 lorries and bikes altogether. This is the same as the number of cars.

Whitney is incorrect because she has ignored the key.
That means there will be 165 cars, not 16 and a half.



Convince me

There are more ice-creams sold at the weekend than during the rest of the week.

True or False (Why?)

Three ice creams were sold on Tuesday.

Justify

If the staff needed to pick one day to have off during the week, which would be the best day and why?

There were 36 ice creams sold at the weekend and only 28 sold during the rest of the week.
There were not 3 ice creams sold on Tuesday, there were 6 sold. One symbol represents 2 ice creams.
The best day off would be Monday because that is the day they sold the least amount.

Block Diagrams

Notes and Guidance

Moving from concrete to pictorial, children build block diagrams using cubes and then move to drawing and interpreting block diagrams.

Children use their knowledge of number lines to read the scale on the chart and work out what each block represents.

Children ask and answer questions using their addition, subtraction, multiplication and division skills.

Mathematical Talk

Can you draw a block diagram to represent the data? What will each block be worth?

Can you make a block diagram to show favourite colours in your class?

Can you create your own questions to ask about the block diagram?

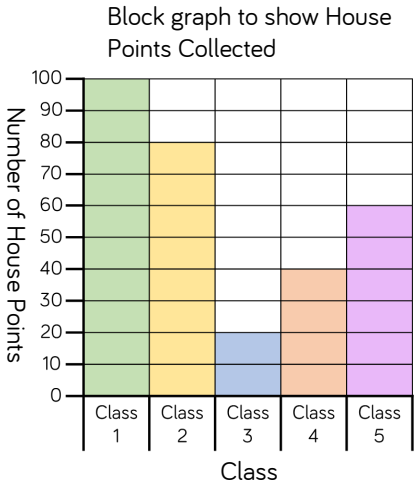
Varied Fluency

Class 4 are collecting data about favourite colours.

Colour	Number of children
Red	5
Green	8
Blue	7
Yellow	2

Make a block diagram using cubes to represent the data.
Now draw the block diagram.
What will the title be?
Remember to label the blocks and draw a clear scale.

5 classes collected their house points.
Here are their results.
Which class collected the most house points?
Which class collected the fewest house points?
How many more points did Class 2 get than Class 4?
How many fewer points did Class 3 get than Class 5?
How many points did Class 2 and Class 3 get altogether?



Block Diagrams

Reasoning and Problem Solving

Here are three tables of data.
Which set of data could you display using the block graph?
Which could use the pictogram?
Which could use the tally chart?
Explain your reasoning.

Data Set 1

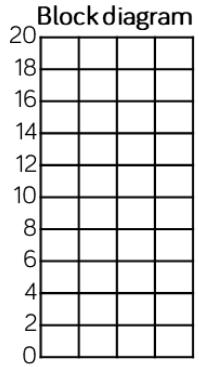
Team	Goals scored
A	20
B	32
C	27
D	16

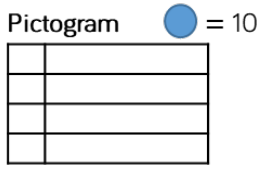
Data Set 2

Player	Points
1	20
2	65
3	80
4	45

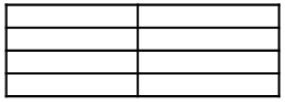
Data Set 3

Name	Score
Ron	20
Eva	12
Amir	6
Mo	16





Tally Chart



Data Set 3 would best suit the block diagram because the numbers are all under 20

Data Set 2 would best suit the pictogram because the numbers are larger but all multiples of 5 or 10

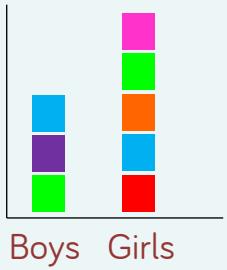
Data Set 3 would best suit the tally chart because some numbers are larger than 20 but not all multiples of 5 or 10

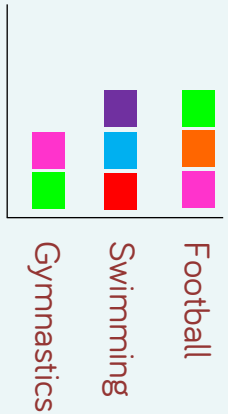
Split into groups.
Everyone needs to write their name on a sticky note.
Use your sticky notes to create a block diagram to answer each question.

- How many boys and how many girls are there in your group?
- Which month has the most birthdays for your group?
- What is your favourite sport?

What other information about your group could you show?

Possible examples:





White Rose Maths

Spring - Block 3

Shape

Overview

Small Steps

- Recognise 2-D and 3-D shapes
- Count sides on 2-D shapes
- Count vertices on 2-D shapes
- Draw 2-D shapes
- Lines of symmetry
- Sort 2-D shapes
- Make patterns with 2-D shapes
- Count faces on 3-D shapes
- Count edges on 3-D shapes
- Count vertices on 3-D shapes
- Sort 3-D shapes
- Make patterns with 3-D shapes

Notes for 2020/21

Children have briefly covered 2-D and 3-D shapes in Year 1. Now there is an opportunity to delve deeper into this concept.

Ensure correct mathematical language is used throughout to help equip children for the future. From this point on 'vertices' should used to describe corners of shapes.

Try to make this block as practical as possible and use outdoor space to explore shapes in nature.

Recognise 2-D and 3-D Shapes

Notes and Guidance

Before learning about their properties, children need to recognise and name both 2-D and 3-D shapes and to be able to differentiate between them. They begin to understand that 2-D shapes are actually flat and the manipulatives they handle in class are representations of the shapes. Children also need to be able to recognise 2-D shapes in different orientations and proportions.

Mathematical Talk

What is the difference between a 2-D and 3-D shapes?

What shape is this? If I turn it around, what shape is it now?

Can you draw around any of the faces on your 3-D shapes? Which 2-D shapes can you make?

Varied Fluency

- Match the names of the shapes to the pictures.

Square Triangle Rectangle Circle

- Put a combination of 3-D shapes in a feely bag. Can you find the cube, the cone, the cylinder? What do you notice about each shape?

  How did you know that was the right shape?

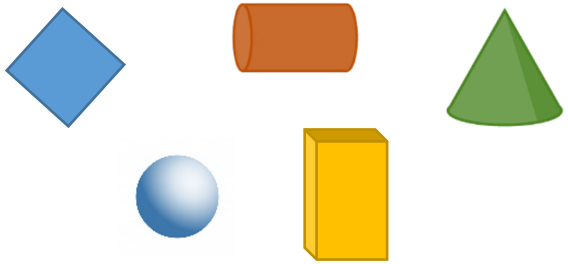
  What were you feeling for?

- Go on a shape hunt around school.
  Create a tally of the shapes you see.
  Can you see any pentagons?
  Can you see any octagons?
  Can you see any hexagons?
  What was the most common shape?

Recognise 2-D and 3-D Shapes

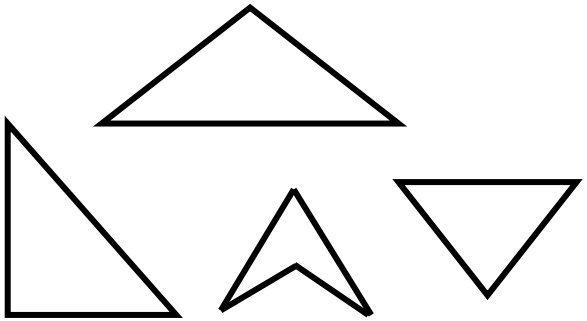
Reasoning and Problem Solving

Which shape is the odd one out?
Explain why.



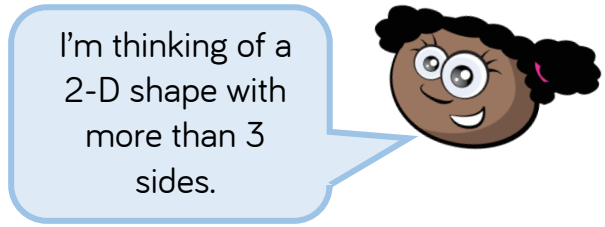
The square is the odd one because it is the only 2-D shape or flat shape.

Which shape is the odd one out?
Explain your reasoning.



Three of the shapes are triangles, one is not. Three of them have three sides, one has four.

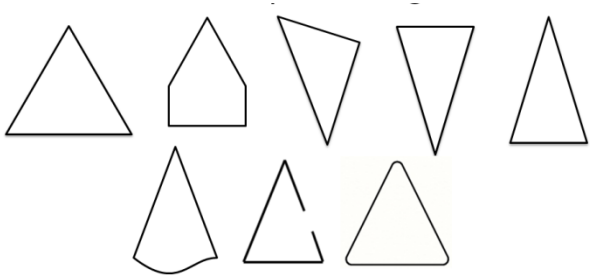
Other answers can be accepted with a clear explanation.



What shape could Whitney be thinking of?
Are there any other shapes it could be?
What shape is Whitney definitely not thinking about? How do you know?

Possible examples:
square
rectangle
pentagon
hexagon
octagon
Whitney is not thinking of a triangle because it only has 3 sides.

Use true or false to say which shapes are triangles.



True, false, true, true, true, false, false, false

Count Sides on 2-D Shapes

Notes and Guidance

Children should be encouraged to develop strategies for accurate counting of sides, such as marking each side as it has been counted.

Children also need to understand that not all same-sided shapes look the same, such as irregular 2-D shapes.

Mathematical Talk

What is a side?

How can you check that you have counted all the sides?

Do all four-sided shapes look the same?

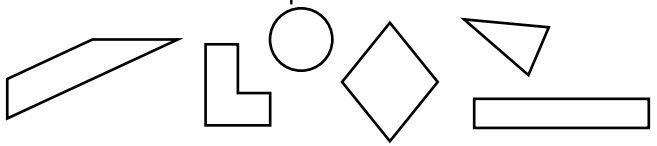
Why do you think the shapes have the names that they do?

Varied Fluency

- Match the shapes to the number of sides.

Six Four Three

- Colour the four-sided shapes.



- Complete the table.

Name	Shape	Number of sides
Pentagon		
Rectangle		
Square		
Triangle		
Hexagon		

Count Sides on 2-D Shapes

Reasoning and Problem Solving

Here are 18 lollipop sticks.
How many hexagons can you make?

How many octagons can you make?

What other shapes can you make with 18 lollipop sticks?

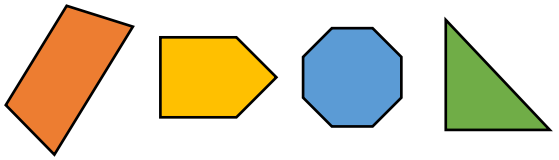
Using one stick per side:
3 hexagons, 2 octagons with 2 lollipop sticks spare, 6 triangles, 4 squares or 3 pentagons.
May also create shapes with more than one stick on each side.

Mo makes a rectangle using the sticks.

How many identical rectangles could he make with 18 sticks?
Make your own rectangle. How many sticks did you use? Is your rectangle the same as your friend's?

Mo could make 3 rectangles using 6 sticks.
Talk about how rectangles can look differently.

If I put these shapes into order from the smallest number of sides to the largest, which shape would come third?



Where would a hexagon come in the list? Why?

triangle, quadrilateral, pentagon, octagon

The pentagon would be third.

A hexagon would come after the pentagon and before the octagon because it has 6 sides which is more than 5 and less than 8.

Count Vertices on 2-D Shapes

Notes and Guidance

Children are introduced to the terms vertex and vertices. They understand that a vertex is where two lines meet at a point. They recognise that corners are vertices and will be able to identify and count them on shapes.

Ensure from this point forwards the word vertex is used in place of corner throughout all content.

Mathematical Talk

Show me a vertex.

Can you identify the vertices in this shape?

Would this be a vertex? Explain why.

If my shape has ____ vertices, what could my shape be?

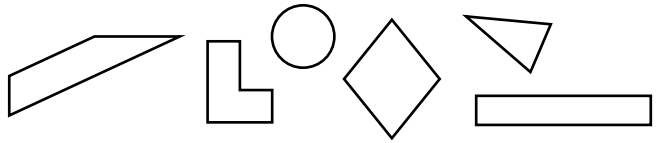
What couldn't it be?

Varied Fluency

- Match the shapes to the number of vertices.

Six Four Three

- Colour the shapes with 4 vertices.



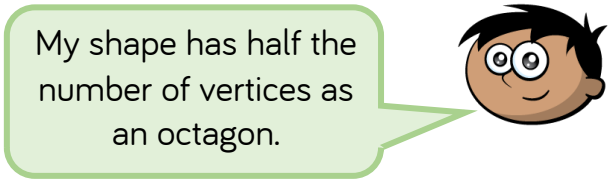
- Complete the table.

Name	Shape	Number of vertices
Pentagon		
Rectangle		
Square		
Triangle		
Hexagon		

Count Vertices on 2-D Shapes

Reasoning and Problem Solving

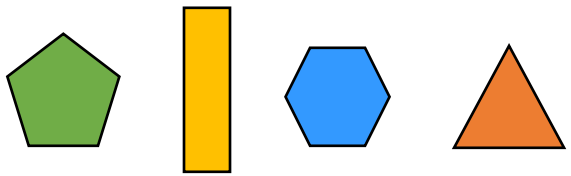
Amir says:



What shape could he have?

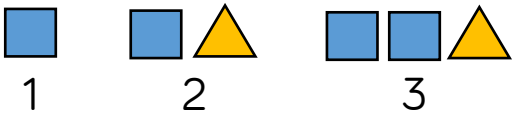
Square
Rectangle

Put these shapes in order based upon the number of vertices they have.



Triangle, rectangle, pentagon, hexagon

Jack has created a pattern using shapes.



How many vertices does each step in the pattern have?

What do you notice?

Can you predict how many vertices the next step in the pattern will have?

Is there more than one way to continue the pattern?

Can you create your own pattern and explore how the vertices change?

Possible answer:
4, 7, 11

The next step could have another square (15 vertices) or another triangle (14 vertices).

Draw 2-D Shapes

Notes and Guidance

Children use their knowledge of properties of shape to accurately create 2-D shapes. Children could use geo-boards to make shapes with elastic bands and look carefully at the number of sides and vertices.

Using geo-boards is a practical step to take before children draw their own shapes on dotted or squared paper.

Mathematical Talk

Compare your shape with a friend's shape. Is it in the same position? Is it the same size?

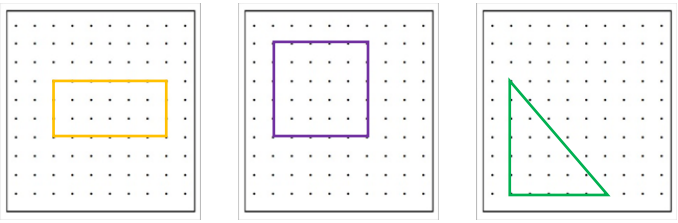
Where are you going to start drawing the shape?
In the middle of a side? At a vertex?
Which is the most efficient way?

Why is it important to use a ruler?

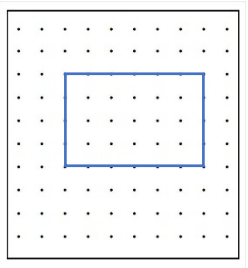
Is your shape an exact copy? How do you know?

Varied Fluency

- Use a geoboard to make different 2-D shapes. Can you make a rectangle? Can you make a square? Can you make a triangle?



- Can you draw a rectangle on dotted paper? Start at a vertex and use a ruler to draw your first straight side. How many straight sides will you need? Rotate the paper to help you draw the shape more accurately.
Try drawing other shapes in the same way.



- Choose a 2-D shape.
Build it on a geo-board.
Can you copy the shape onto dotted paper and squared paper?

Draw 2-D Shapes

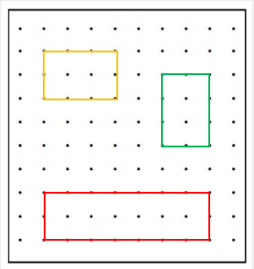
Reasoning and Problem Solving

Using geoboards, how many different rectangles can you make?

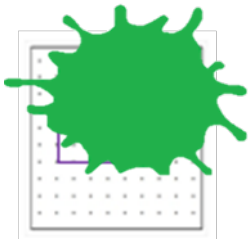
What's the same about the rectangles? What's different?

Has your friend made any different rectangles?

Possible answer:



What shape could be hiding under the spilt paint?



Prove your answer by drawing it.

Could be any 2-D shape.

Encourage children to think about irregular pentagons, hexagon, etc.

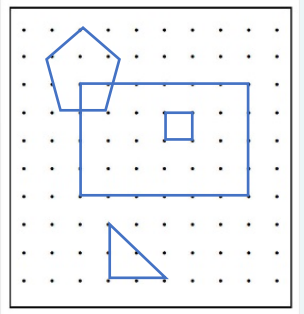
Draw a large rectangle on squared paper or dotted paper.

Draw a square inside the rectangle.

Draw a triangle below the rectangle.

Draw a pentagon that is bigger than the square.

Can you give instructions to your partner to help them draw different shapes?



Children may end up with a different picture from above however they should have four shapes drawn.

Lines of Symmetry

Notes and Guidance

Children are introduced to the concept of vertical lines of symmetry. They should be exposed to examples that are symmetrical and also examples that are not.

Children use a range of practical resources (mirrors, geoboards, paper folding) to explore shapes being halved along their vertical line of symmetry.

Mathematical Talk

Where is the vertical line of symmetry?

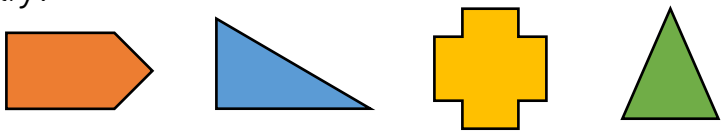
What does vertical mean?

Which is the odd shape out? How do you know?

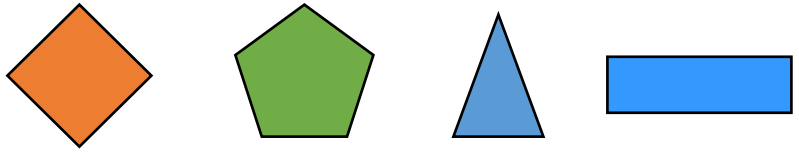
What resources could you use to check if a shape has a vertical line of symmetry?

Varied Fluency

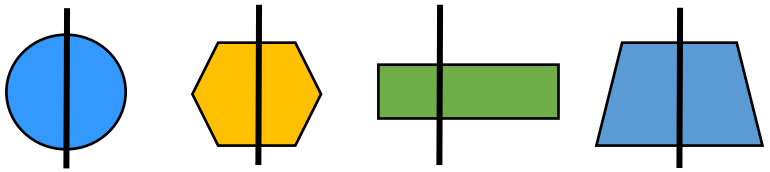
- Can you fold these shapes to find a vertical line of symmetry?



- Draw the vertical lines of symmetry on these shapes.



- Circle the shape with an incorrect line of symmetry. Can folding help you prove your answers.



Lines of Symmetry

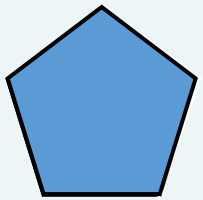
Reasoning and Problem Solving

Can you draw more than one four-sided shape that has a vertical line of symmetry?

Possible answers: square, rectangle, kite.

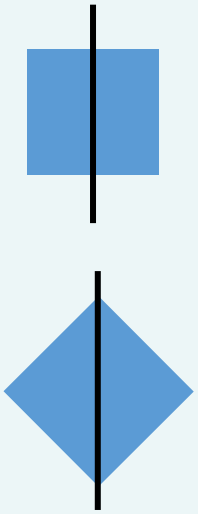
Tommy has placed a mirror on the vertical line of symmetry. This is what he sees:

Can you complete the other half of the shape?



Which 2-D shapes can be made when a vertical line of symmetry is drawn on a square?

Rectangle and triangle.



Sort 2-D Shapes

Notes and Guidance

Children recognise and sort 2-D shapes including circle, square, triangle, rectangle, pentagon, hexagon and octagon using a range of different orientations.
Children should be encouraged to sort the shapes in more than one way. They can then describe how they have sorted them using key language including side, vertex and symmetrical.

Mathematical Talk

How have you sorted your shapes?

How do you know you have sorted your shapes correctly?

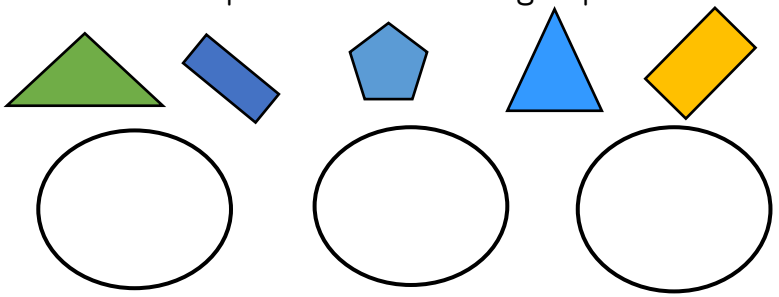
Can you sort the shapes in a different way?

Can you find a shape which is in the wrong place?

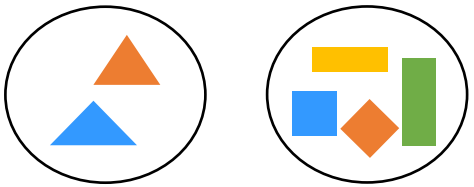
Can you see how these shapes have been sorted?

Varied Fluency

- Sort the 2-D shapes into the correct group:



- How have the shapes been sorted?



- Whitney sorted her shapes by the number of sides.
What shapes could belong to each group?

4 sides	Not 4 sides

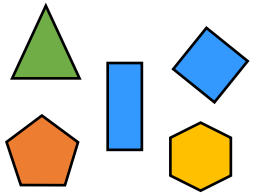
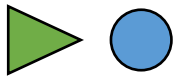
Sort 2-D Shapes

Reasoning and Problem Solving

Ron sorted the shapes in order of the number of sides. Has he ordered them correctly?
Explain why.

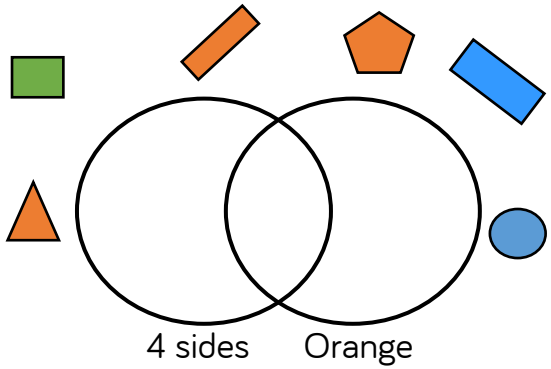
No because the square should be before the pentagon.

Which shape is in the wrong set?
Explain why.

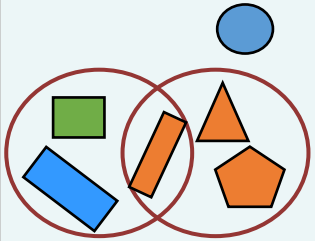
Vertical line of symmetry	No vertical line of symmetry
	

The circle is in the wrong set because it does have a vertical line of symmetry.

Where should these shapes go in the Venn diagram?



Create your own labels and sort the shapes in a different way.



Possible labels:
Blue
Less than 4 vertices.

Make Patterns with 2-D Shapes

Notes and Guidance

Children use their knowledge of the properties of 2-D shapes to create patterns.

They are encouraged to place the shapes in different orientations when making patterns and recognise that it is still the same shape. In particular, squares do not become diamonds when turned sideways.

Mathematical Talk

Can you explain the pattern? How does circling the set of shapes that repeat help you see the pattern?

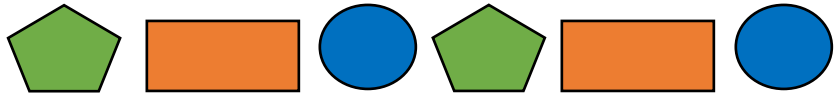
Continue the pattern. Which shape will be next?

How are these patterns similar? How are these patterns different?

How can you work out which shape will come ___th ?

Varied Fluency

- Continue this pattern:



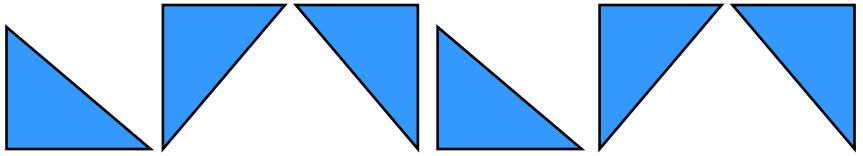
Can you circle the set of shapes that repeat?

What is the next shape in the pattern? What is the 9th shape in the pattern?

- Draw pictures to represent this pattern:

Square, circle, triangle, triangle, square, circle, triangle, triangle.

- How many times does the pattern repeat?
Which shape would be 10th?



Can you make your own repeating patterns using only one shape?

Make Patterns with 2-D Shapes

Reasoning and Problem Solving

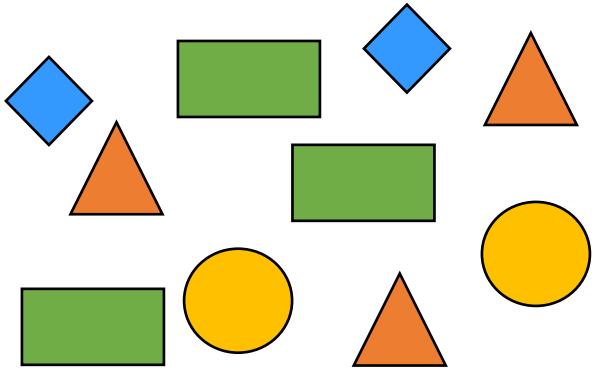
Dora says that the 12th shape in this pattern will be a triangle.

Is she correct?

How do you know?

The 12th shape will be a triangle. Children may physically continue the pattern to find the answer or recognise that the triangle is the 3rd and count in 3s.

How many different ways can you arrange these shapes to make a repeating pattern?



There are many ways to make different repeating patterns. Encourage children to orally describe the pattern they have created.

Can you translate this pattern using shapes?

Clap, clap, snap, clap, clap, snap, clap, clap ……

Possible answer:

Square, square, triangle or pentagon, pentagon, circle.

Count Faces on 3-D Shapes

Notes and Guidance

Children use their knowledge of 2-D shapes to identify the shapes of faces on 3-D shapes. To avoid miscounting the faces children need to mark each face in some way. Children identify and visualise 3-D shapes from 2-D representations. Cones should be described as having 1 face and 1 curved surface; cylinders as having 2 faces and 1 curved surface and spheres having 1 curved surface.

Mathematical Talk

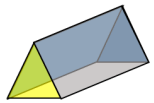
What do we mean by the 'face' of a shape?
What is the difference between a face and a curved surface?
What real life objects have 6 faces like a cube?
Does a cuboid always have 2 square faces and 4 rectangular faces?
Which 2-D shapes can you see on different 3-D shapes?
How can you make sure that you don't count the faces more than once?

Varied Fluency

- Look at these 3-D shapes:

Which 2-D shapes can you see on the surface of each one?

- Complete the table:

Shape	Name of shape	Number of flat faces	Draw the faces
			
			
			
			

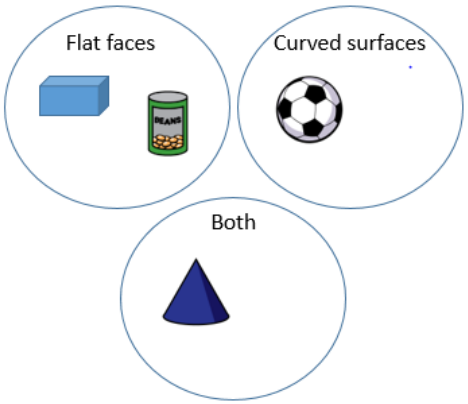
Count Faces on 3-D Shapes

Reasoning and Problem Solving

Teddy says my 3-D shape has 6 faces.
Mo says he must have a cube.
Is Mo correct?
Explain your answer.

No because Teddy could have a cube or a cuboid.

Annie has sorted these 3-D shapes.
Can you spot her mistake?
Can you add another shape to each set?



The can should be in the 'both' set because it has flat faces and a curved surface.

Whitney says,

I have a 3-D shape with 2 square faces and 4 rectangular faces.

What shape does Whitney have?

Play this game with a friend. Describe the faces of a 3-D shape and they need to guess what it is.

Whitney has a cuboid.

Count Edges on 3-D Shapes

Notes and Guidance

Children use their knowledge of faces and curved surfaces to help them to identify edges on 3-D shapes. They learn that an edge is where 2 faces meet or where a face and a curved surface meet. To avoid over counting the edges children need to mark each edge in some way. Children identify and visualise the 3-D shape from a 2-D representation.

Mathematical Talk

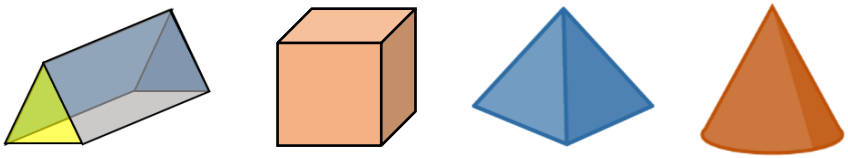
What do we mean by the 'edge' of a shape?

How can you make sure that you don't count the edges more than once?

What do you notice about the shapes with ____ edges?

Varied Fluency

- Look at these 3-D shapes:



How many edges does each shape have?

- Complete the table:

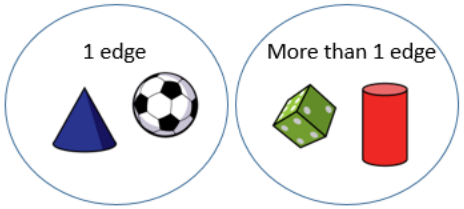
Shape	Name	Edges	Faces
			
			
			

- How many edges does this shape have?

Count Edges on 3-D Shapes

Reasoning and Problem Solving

Ron has sorted these shapes according to the number of edges.
Which shape is in the wrong place?
Explain why.



The sphere (football) is in the wrong place because it doesn't have any edges, it has one curved surface.

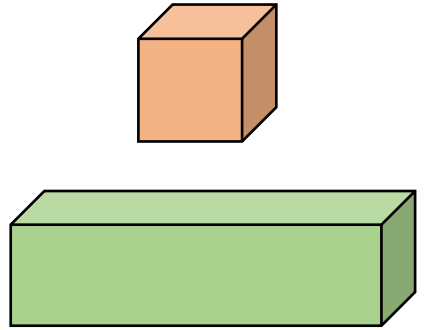
Eva says her 3-D shape has 12 edges.

Dora says she could have a cube, cuboid or square-based pyramid.

Is Dora correct?
Explain your answer.

Dora is not correct, because a square-based pyramid has 8 edges.

Compare these 3-D shapes.



What is the same and what is different?

Same – both have square faces, 6 faces, 12 edges, don't roll, can stack, no curved edges.

Different – name, colour, size, one only has square faces the other has squares and rectangles….

Count Vertices on 3-D Shapes

Notes and Guidance

Children use their knowledge of edges to help them to identify vertices on 3-D shapes. They understand that a vertex is where 2 or more edges meet. To avoid over-counting the vertices children need to mark each vertex in some way.

The point at the top of a cone can be referred to as an apex or a vertex.

Mathematical Talk

What is the difference between vertex and vertices?

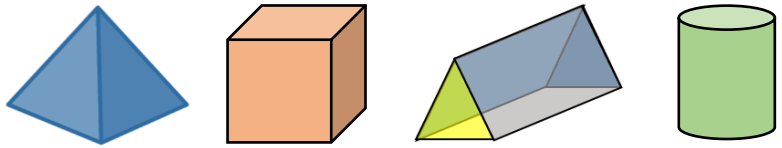
How can you make sure that you don't count the vertices more than once?

How many edges meet to make a vertex on a 3-D shape?

How many sides meet to make a vertex on a 2-D shape?

Varied Fluency

- Look at these 3-D shapes:



How many vertices does each shape have?

- Complete the table:

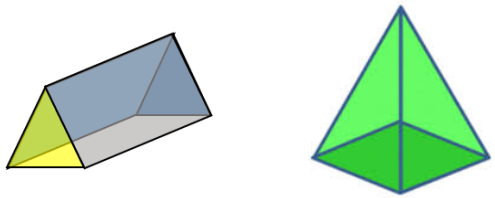
Shape	Name	Faces	Edges	Vertices
				
				
				

- Place 3-D shapes in order starting with the shape with the fewest vertices.

Count Vertices on 3-D Shapes

Reasoning and Problem Solving

What is the same about these 2 shapes?



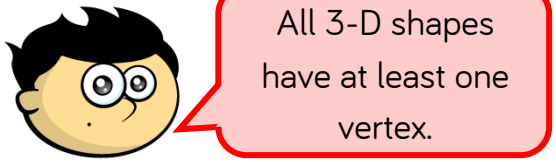
What is different about them?
Talk about faces, edges and vertices in your answer.

Example answer:

Same – both have a triangular face, both have 5 faces.

Different – name, colour, size, one has 6 vertices the other has 5 vertices, one has a rectangular face, one has a square face….

Jack says:



Is this true or false?
Explain why

False.

A sphere has no vertices.

Could also be an opportunity to talk about the words apex and vertex.

Alex has a shape with 8 vertices.

What 3-D shape could it be?

Cube or cuboid.

Sort 3-D Shapes

Notes and Guidance

Children use their knowledge of shape properties to sort 3-D shapes in different ways e.g. faces, shapes of faces, edges, vertices, if they roll, if they stack…

They should have access to a range of real life objects to sort and compare. Before sorting it may be useful to give children the opportunity to match the object e.g. a can of pop to a cylinder etc.

Mathematical Talk

How have you sorted your shapes?

How do you know you have sorted your shapes correctly?

Which method have you used to sort your shapes?

Can you sort your shapes in a different way?

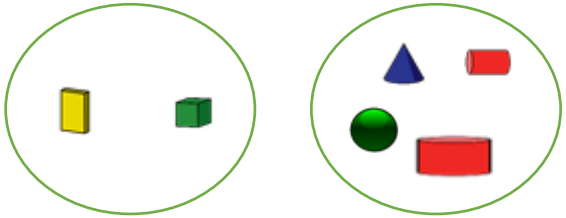
Can your friend guess how you have sorted them?

Can you group your solids by shape, type of faces and size?

Varied Fluency

- How could you sort these objects?
  Can you find some other classroom objects to add to each set?

- How are these shapes grouped?



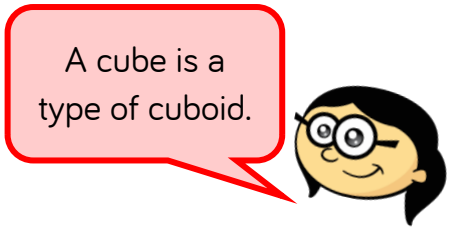
  Could you group them in a different way?

- Sort the 3-D shapes on your table.
  Label the groups.
  Can you find more than one way?
  Remove the labels. Can someone guess how you sorted?

Sort 3-D Shapes

Reasoning and Problem Solving

Annie is sorting 3-D shapes.
She puts a cube in the cuboid pile.



Do you agree? Why?

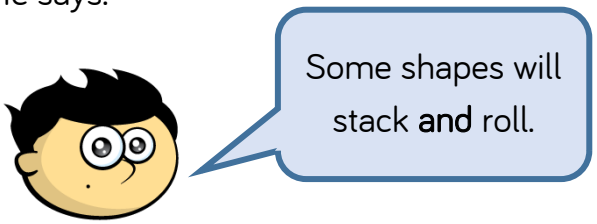
Annie is right.

They both have 6 faces.
They both have 12 edges.

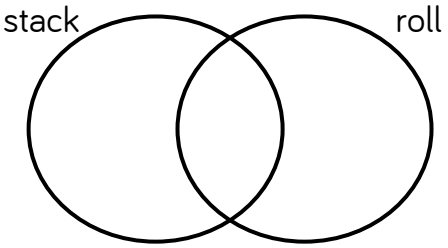
A cube is a special kind of cuboid where all faces are squares.

Jack is investigating which shapes stack and which shapes roll.

He says:



Is he correct?



Sort your shapes using the Venn diagram.
Explain what you notice about each set.
Do all shapes with flat surfaces stack?

Some shapes with flat faces will stack – they will need to have flat faces on opposite sides. (cubes, cylinders, cuboids)

Shapes with a curved surface will roll. (cone, sphere, cylinder)

Some shapes with a flat face cannot be stacked (square based pyramid, cone)

Make Patterns with 3-D Shapes

Notes and Guidance

Children use their knowledge of the properties of 3-D shapes to create patterns. They are encouraged to place the shapes in different orientations.

A wide range of examples of shapes should be used, including, construction shapes, cereal boxes, different sized balls etc.

Mathematical Talk

Where can you see real life patterns with 3-D shapes?

Can you explain your pattern to a partner?

Does the shape always have to be a certain way up?

Can you work out what shape would be the ___th?

Varied Fluency

- Use some different coloured cubes to make a repeating pattern. Can you describe the pattern to your partner?

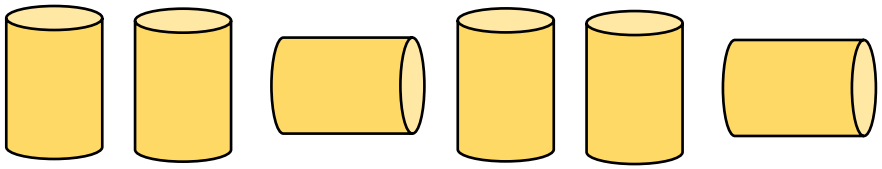
  Using colours? Using letters? Using sounds?

- Make a sequence of 3-D shapes.

  Can you build a similar pattern with real life objects?

  You could use food cans, boxes, balls, or other things in your classroom. Describe the pattern.

- How many times does the pattern repeat?
  What will the 10th cylinder look like?

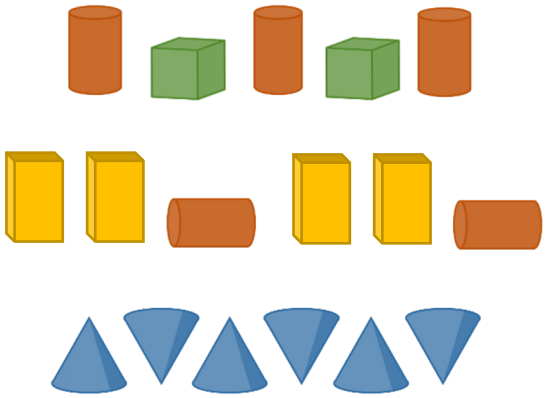


Can you make your own repeating patterns using only one 3-D shape?

Make Patterns with 3-D Shapes

Reasoning and Problem Solving

What is the same about these patterns?
What is different about these patterns?



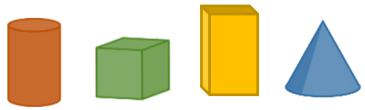
The first and second patterns use two shapes. Colour is a difference to note. In the 3rd pattern, one shape is used in different orientations. In the 2nd pattern, the shape is used twice each time.

Choose two 3-D shapes.
What different repeating patterns could be made?

Possible answer:
Cube, cylinder, cube….

Cube, cube, cylinder…

Using the 3-D shapes:



- Make a repeating pattern where there are more cones than cuboids.
- Make a repeating pattern where the third shape is always a cylinder.

Answer will depend on the shapes used.

White Rose Maths

Spring - Block 4

Fractions

Overview

Small Steps

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

Notes for 2020/21

Concrete manipulatives and real life representations are important in these early stages of learning with fractions.

Don't worry too much about formal learning at this stage, instead focus on activities and play based learning.

All of this content will be formalised and built upon in Year 3.

Make Equal Parts

Notes and Guidance

Children understand the concept of a whole as being one object or one quantity.

Children explore making and recognising equal and unequal parts. They should do this using both real life objects and pictorial representations of a variety of shapes and quantities.

Mathematical Talk

What is the whole? What are the parts?

How many parts is the object/quantity split into?

Are the parts equal? How do you know?

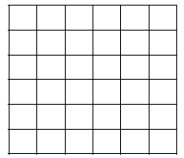
Do equal parts always look the same?

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

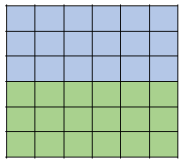
Varied Fluency

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

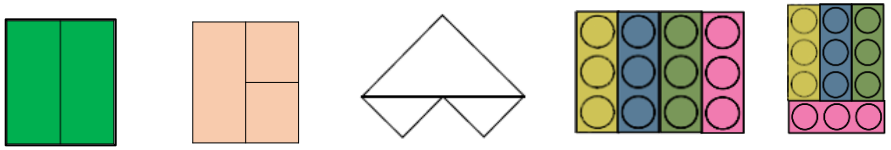
  How many ways can you find?

  e.g.

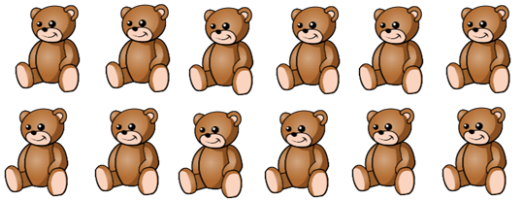
  

- Look at the representations. Decide which show equal parts and which show unequal parts.

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

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

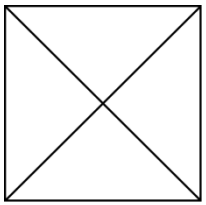
  How many ways can you split the teddies into equal parts?
  Be systematic in your approach.

Make Equal Parts

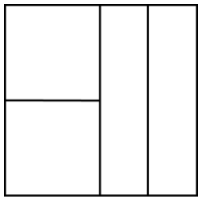
Reasoning and Problem Solving

Three children are splitting a square into equal parts.

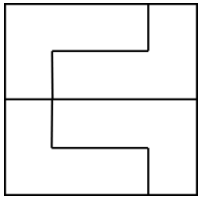
Teddy



Alex



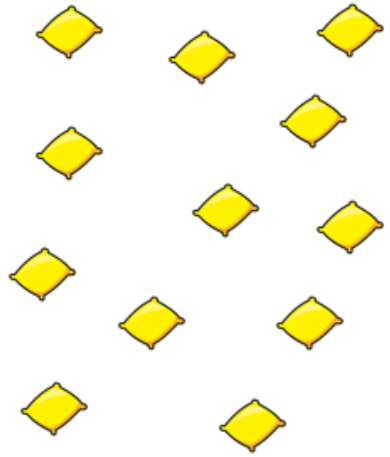
Mo



Who has split the square into equal parts? Explain why.

All children have split the square into equal parts. Children may need to cut out the pieces and manipulate them to prove why.

How many different ways can you put these beanbags into equal groups?



Children can sort the beanbags into groups of 1, 2, 3, 4, 6 and 12

Recognise a Half

Notes and Guidance

Children understand that halving is splitting a whole into two equal parts. They are introduced to the notation $\frac{1}{2}$ for the first time and will use this alongside sentence stems and 'half' or 'halves'.
They should be introduced to the language of numerator, denominator and what these represent.
Children must explore halves in different contexts, for example, half of a length, shape or set object.

Mathematical Talk

How many equal parts has the shape/object/length been split into?

What fraction is this part worth?

In the notation $\frac{1}{2}$, what does the 1 represent? What does the 2 represent?

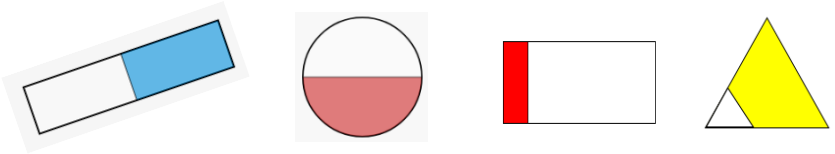
Varied Fluency

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

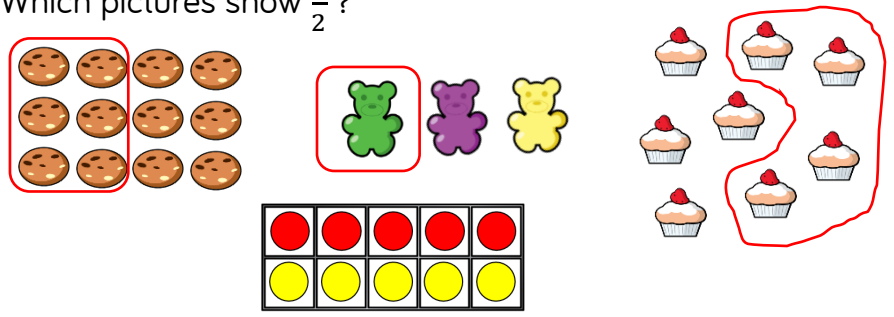
  Each part is worth a _____ .

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

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



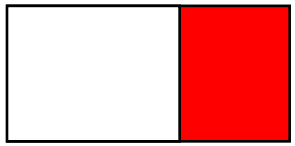
- Which pictures show $\frac{1}{2}$?

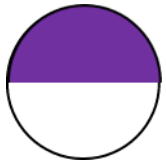


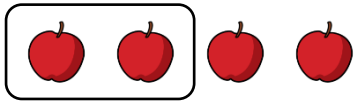
Recognise a Half

Reasoning and Problem Solving

Odd One Out





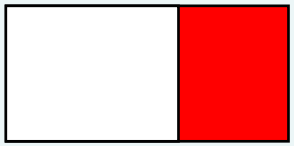


$\frac{1}{2}$

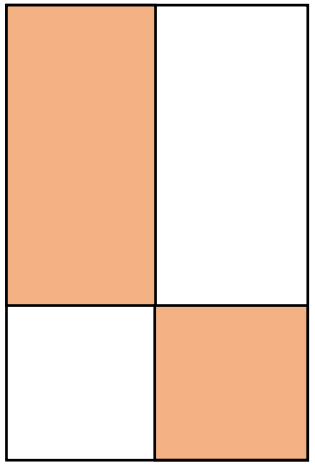
One half

Which is the odd one out?
Explain your answer.

Children need to link their explanation to the shape not having two equal parts.



Rosie says the shaded part of the shape does not show a half because there are four parts, not two equal parts.



Do you agree? Explain why.

Possible answer:
I disagree because you can swap the red and white squares/rectangles and you would have two equal parts with one part shaded.

Find a Half

Notes and Guidance

In this small step children find a half of a set of objects or quantity.

Links should be made here to dividing by 2. Children may need to use the concept of sharing to find a half. Paper plates, hoops and containers can be used to share objects into 2 equal groups.

Mathematical Talk

How did you halve the sweets?

What is the value of the whole? What is the value of half of the whole? What do you notice?

What do you notice about your answers?

How can you use your answer to a half of 4 to help you work out a half of 40?

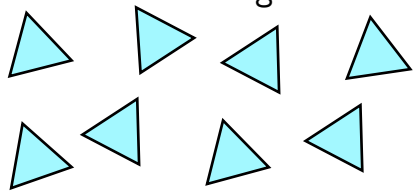
Varied Fluency

- Share 20 beanbags equally between two containers, then complete the stem sentences.

The whole is ____. Half of ____ is ____.

- Circle half the cakes.

Circle half the triangles.



- Fill in the blanks. Use counters to help you if needed.

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

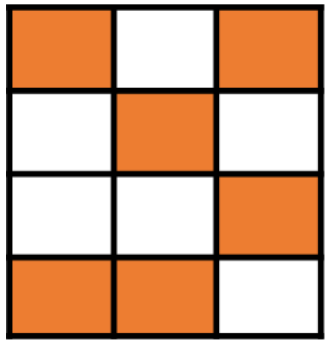
$\frac{1}{2}$ of 6 = ☐ $\frac{1}{2}$ of 60 = ☐

$\frac{1}{2}$ of 8 = ☐ $\frac{1}{2}$ of 80 = ☐

Find a Half

Reasoning and Problem Solving

Dora is asked to shade half of her shape.
This is what she shades.



Is she correct? Explain why.

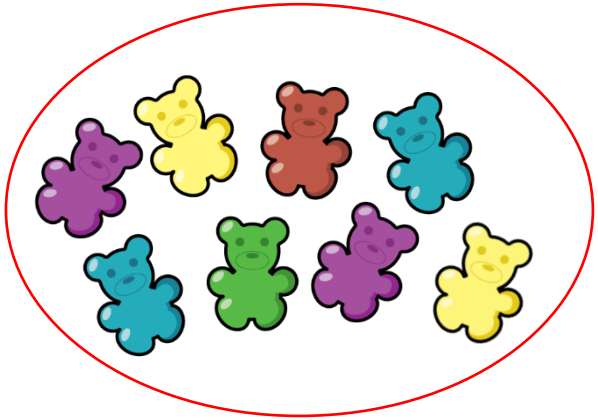
Yes because there are 12 squares altogether and 6 squares are shaded.
12 is the whole, half of 12 is 6

I am thinking of a number.
Half of my number is more than 10 but less than 15.
What could my number be?

22, 24, 26, 28

Annie has some gummy bears.

She circles half of them.



How many gummy bears did she have at the start?

Annie started with 16 gummy bears.

Recognise a Quarter

Notes and Guidance

Children extend their knowledge of the whole and halves to recognise quarters of shapes, objects and quantities.

They continue to work concretely and pictorially, understanding that they are splitting the whole into 4 equal parts and that each part is one quarter.

Mathematical Talk

How many equal parts have you split the whole into if you have split it into quarters?

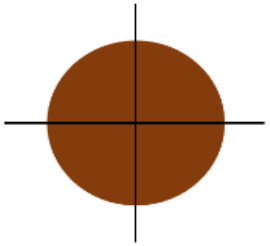
In $\frac{1}{4}$ what does the 1 represent? What does the 4 represent?

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

How many quarters make a whole?

Varied Fluency

- Four friends are sharing a cake.

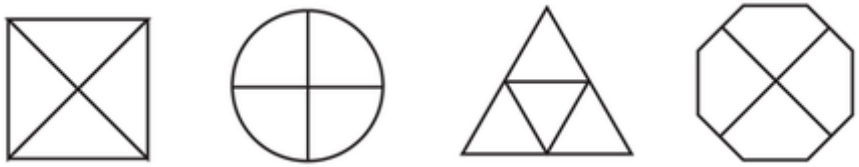


The cake is split into _____ equal parts.

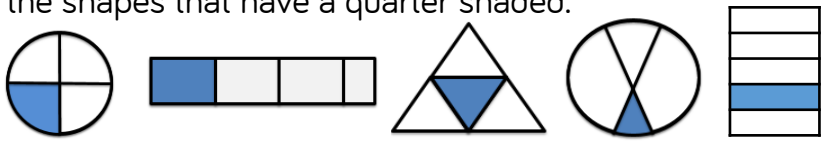
Each part is worth a _____ .

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

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



- Circle the shapes that have a quarter shaded.



Which shapes do not have a quarter shaded? How do you know?

Draw the shapes again and split them into quarters correctly?

Recognise a Quarter

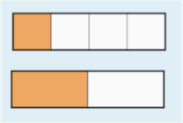
Reasoning and Problem Solving

Alex is folding two identical paper strips.

I think $\frac{1}{4}$ of the strip will be bigger than $\frac{1}{2}$ of the strip because 4 is bigger than 2

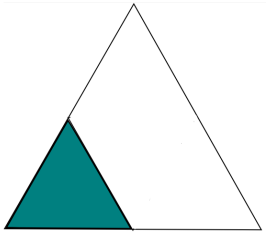
Use paper strips to prove Alex is incorrect.

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.



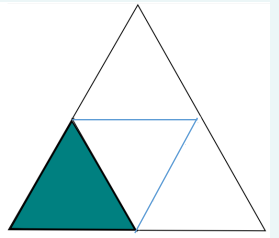
True or False?

$\frac{1}{4}$ 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?

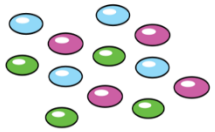
How do you know you have found $\frac{1}{4}$?

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 _____

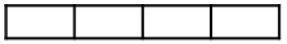
Varied Fluency

Share the smarties equally between 4 people.



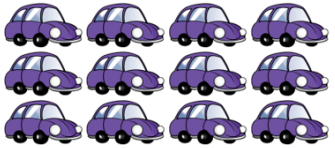
The smarties are split into ____ equal parts.

Each part is worth a _____ .



This can be written as $\square$ over $\square$

Circle one quarter of the cars.



One quarter of ____ is ____

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

Complete:

$\frac{1}{2}$ of 12 = ☐

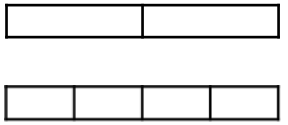
$\frac{1}{4}$ of 12 = ☐

$\frac{1}{2}$ of 20 = ☐

$\frac{1}{4}$ of 20 = ☐

$\frac{1}{2}$ of 8 = ☐

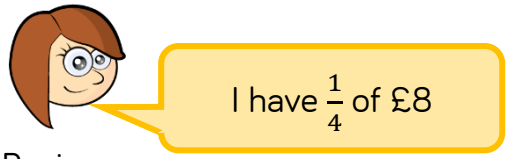
$\frac{1}{4}$ of 8 = ☐



Find a Quarter

Reasoning and Problem Solving

Who has more? Explain why.

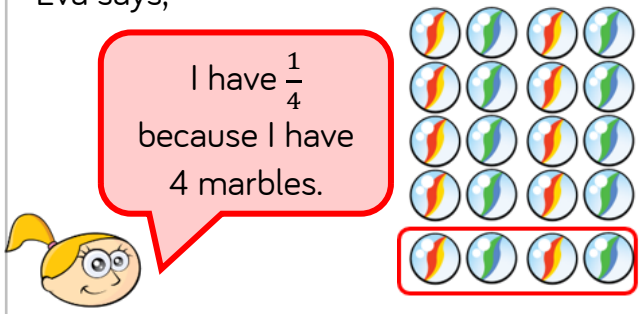


Rosie

Whitney

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

Eva says,

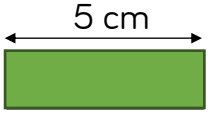


Do you agree? Explain why.

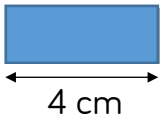
This is incorrect, one quarter means 4 equal groups not just 4
One quarter of the marbles would be 5

Mo has two ribbons. He cuts $\frac{1}{4}$ from each ribbon.

$\frac{1}{4}$ of ribbon A



$\frac{1}{4}$ of ribbon B



How long were Mo's whole pieces of ribbon?

Which ribbon was the longest? How much longer?

Ribbon A was 20 cm

Ribbon B was 16 cm

Ribbon A was 4cm longer.

Recognise a Third

Notes and Guidance

Children apply understanding of fractions to finding thirds. They continue to use the language of 'whole' and 'equal parts' and understand that one third is equal to one part out of three equal parts.

They write one third as a fraction and explain what each of the digits represents in the fractional notation.

Mathematical Talk

How many equal parts have you split the whole in to if you have split it into thirds?

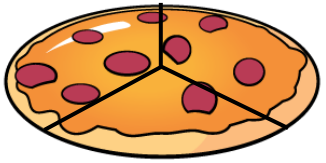
In $\frac{1}{3}$ what does the digit 1 represent? What does the digit 3 represent?

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

How many thirds make a whole?

Varied Fluency

Three friends are sharing a pizza.

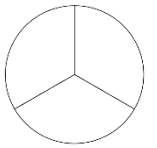
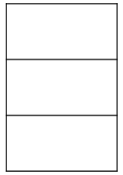
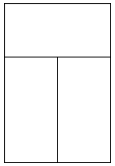
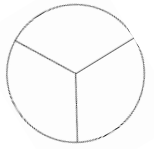


The pizza is split into _____ equal parts.

Each part is worth a _____ .

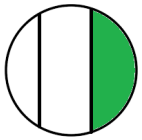
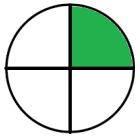
This is the same as $\frac{\square}{\square}$

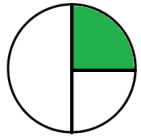
Shade $\frac{1}{3}$ of each shape.

What is the same? What is different?

Which shapes represent one third?

Explain why the other circles do not represent one third.

Recognise a Third

Reasoning and Problem Solving

Dora says,

I have one third of a pizza because I have one slice and there are three slices left.

Do you agree? Explain your reasoning.

Dora is incorrect. She has one quarter of a pizza because there were four slices altogether and she has one of them. There would need to only be three slices altogether for her to have one third.

Alex, Annie and Whitney each show a piece of ribbon.

Whitney shows $\frac{1}{2}$ of her whole ribbon.

Alex shows $\frac{1}{4}$ of her whole ribbon.

Annie shows $\frac{1}{3}$ of her whole ribbon.

Whose whole piece is the longest?
Whose is the shortest?
Explain why.

Alex's piece will be the longest because she will have four parts altogether. Whitney's piece will be the shortest because she will only have two parts.

Find a Third

Notes and Guidance

Children build on their understanding of a third and three equal parts to find a third of a quantity.

They use their knowledge of division and sharing in order to find a third of different quantities using concrete and pictorial representations to support their understanding.

Mathematical Talk

How many objects make the whole?

Can we split the whole amount into three equal groups?

What is a third of ____ ?

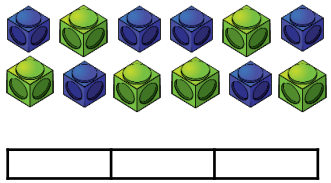
What is staying the same? What is changing?

How does changing the whole amount change the answer?

Is the answer still worth a third? Explain why?

Varied Fluency

Use the cubes to make three equal groups.



There are ____ cubes altogether.

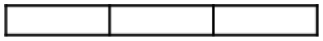
One third of _____ is _____

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

Rosie is organising her teddy bears.
She donates $\frac{1}{3}$ of them to charity.
How many bears does she have left?

Complete:

$\frac{1}{3}$ of 9 = ☐ $\frac{1}{3}$ of 15 = ☐



$\frac{1}{3}$ of 12 = ☐ $\frac{1}{3}$ of 18 = ☐

Find a third

Reasoning and Problem Solving

Annie has a piece of ribbon.

She cuts it into three equal parts.

One third of the ribbon is 6 cm long.

How long would half the ribbon be?

Half the ribbon would be 9cm.
(6 × 3 = 18cm
Half of 18 = 9cm)

A bar model would be a particularly useful pictorial representation of this question.

Ron is thinking of a number.

One third of his number is greater than 8 but smaller than 12.

What could his number be?

27, 30, 33

Unit Fractions

Notes and Guidance

Children understand the concept of a unit fraction by recognising it as one equal part of a whole. They link this to their understanding of recognising and finding thirds, quarters and halves.
Children also need to understand that the denominator represents the number of parts that a shape or quantity is split into.

Mathematical Talk

How can we represent these unit fractions in different ways?

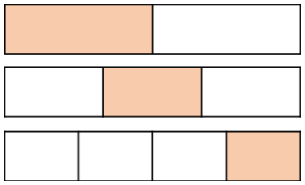
Why do we call them a unit fraction? Where can we see the unit?

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

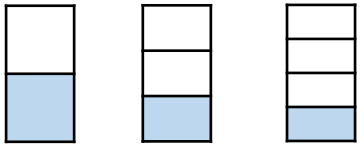
Which unit fraction is bigger/smaller if the whole is the same?

Varied Fluency

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



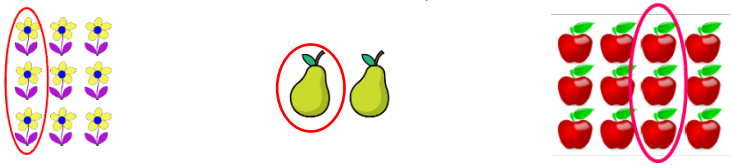
What fraction is shaded in each diagram?



What do you notice? Complete the sentence.

The _____ the denominator the _____ the fraction.

Match the unit fraction to the correct picture.



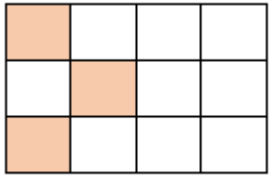
$\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$

Unit Fractions

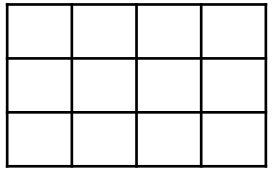
Reasoning and Problem Solving

True or False?

This shows $\frac{1}{4}$



Can you shade the same shape so that it shows $\frac{1}{3}$?



True.
There are 12 squares altogether and 3 are shaded.
One quarter of 12 is 3

Any 4 squares shaded.

I am thinking of a number.

?

One third of my number is 12

Which will be greater, one half of my number or one quarter of my number?

Use cubes or a bar model to prove your answer.

The whole number is 36

One half is 18
One quarter is 9

One half of the number will be greater.

Non-Unit Fractions

Notes and Guidance

Children are introduced to the non-unit fractions $\frac{2}{3}$ and $\frac{3}{4}$ for the first time.

They also need to look at fractions where the whole is shaded and how these fractions are written. Children see that the numerator and denominator are the same when the fraction is equivalent to one whole.

Mathematical Talk

How many quarters make a whole? How many thirds make a whole? What do you notice?

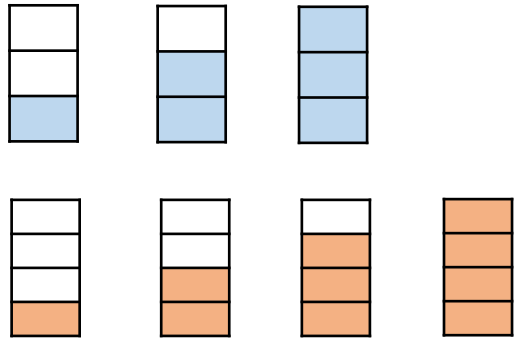
How many quarters are there in $\frac{3}{4}$?

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

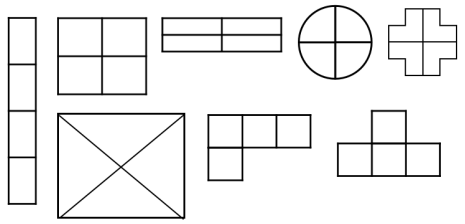
Give me an example of a unit fraction and a non-unit fraction.

Varied Fluency

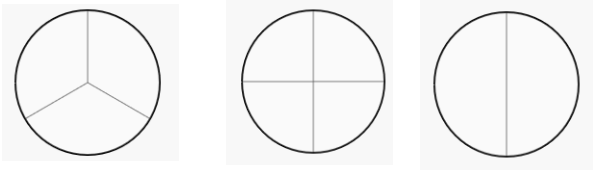
What fraction is shaded in each diagram?



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



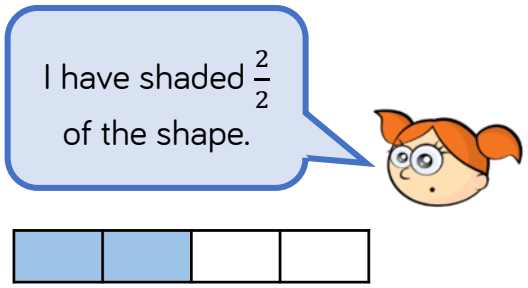
Shade in the whole of each circle. What fraction is represented in each case?



Non-Unit Fractions

Reasoning and Problem Solving

Alex says,



What mistake might Alex have made?

She has shaded two quarters of the shape. She may have thought that the numerator represents the number of parts that are shaded and the denominator represents the number of parts that aren't. She doesn't realise the denominator represents the whole.

Sort the fractions into the table.

	Fractions equal to one whole	Fractions less than one whole
Unit fractions		
Non-unit fractions		

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

What do you notice?

Are there any boxes in the table empty?

What fraction could you write here?

Top left: Empty

Top right: $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{2}$

Bottom left: $\frac{2}{2}$, $\frac{3}{3}$ and $\frac{4}{4}$

Bottom right: $\frac{3}{4}$ and $\frac{2}{3}$

There are no unit fractions that are equal to one whole.

$\frac{1}{1}$ would fit here.

Equivalence of $\frac{1}{2}$ and $\frac{2}{4}$

Notes and Guidance

Children explore the equivalence of two quarters and one half of the same whole and understand that they are the same.

Children tackle this practically, using strips of paper and concrete apparatus (e.g. counters, Cuisenaire rods, number pieces).

Mathematical Talk

What does equivalent mean? What symbol do we use?

Are these two fractions equal? (half and two quarters)

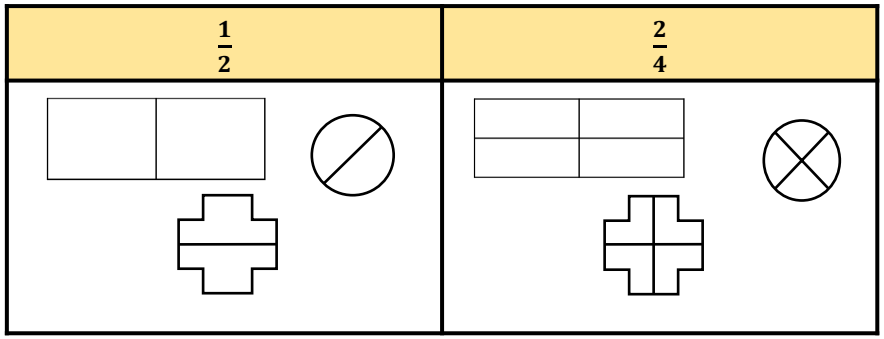
Are the numerators the same? Are the denominators the same?

How many quarters are equivalent to a half?

Varied Fluency

- Using two identical strips of paper, explore what happens when you fold the strips into two equal pieces and four equal pieces.
  Compare one of the two equal pieces with two of the four equal pieces. What do you notice?

- Shade one half and two quarters of each shape.



- Give children an amount of counters or concrete objects, can you find one half of them? Can you find two quarters of them? What do you notice?

Equivalence of $\frac{1}{2}$ and $\frac{2}{4}$

Reasoning and Problem Solving

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

Who gets the most cookies?

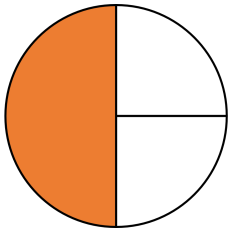
They both get the same amount. They will each get 6 cookies.

Using red and blue cubes, build two towers to convince me that $\frac{1}{2}$ and $\frac{2}{4}$ are equal.

Answers vary depending on the amount of cubes used. Key point is that the towers should be the same height.

Whitney says:

I have shaded a third of my shape.



Do you agree?
Explain why.

Why do you think Whitney thinks this?

Whitney has shaded half or 2 quarters of her shape.

She thinks that she has shaded one third because one part out of three is shaded, but the parts are not equal.

Find Three Quarters

Notes and Guidance

Children use their understanding of quarters to find three quarters of a quantity.

They work concretely and pictorially to make connections to the abstract.

Children should be encouraged to spot patterns and relationships between quarters of amounts.

Mathematical Talk

How many quarters make a whole?

Can you represent this in a bar model?

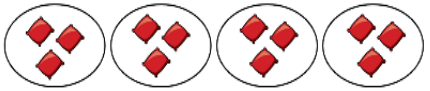
How many equal parts is $\frac{3}{4}$?

Can you spot any patterns?

What has stayed the same? What has changed? What do you notice?

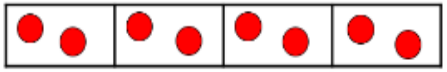
Varied Fluency

- Amir shares 12 beanbags into 4 equal groups.
  Use the image to complete the sentences.



One quarter of 12 is equal to _____
Two quarters of 12 is equal to _____
Three quarter of 12 is equal to _____
Four quarters of 12 is equal to _____

- Use counters and a bar model to help you find $\frac{3}{4}$ of 8 and $\frac{3}{4}$ of 16. What do you notice?



- Use counters, cubes, or bar models to help you fill in the blanks:

$\frac{1}{4}$ of 24 = ☐
$\frac{2}{4}$ of 24 = ☐
$\frac{3}{4}$ of 24 = ☐
$\frac{4}{4}$ of 24 = ☐

$\frac{1}{4}$ of 4 = ☐
$\frac{3}{4}$ of 4 = ☐
$\frac{1}{4}$ of 8 = ☐
$\frac{3}{4}$ of 8 = ☐

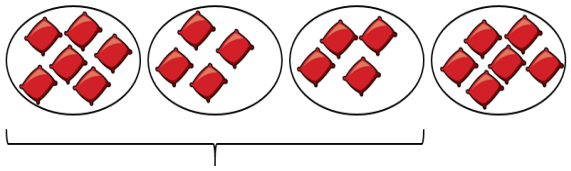
$\frac{1}{4}$ of ☐ = 5
$\frac{3}{4}$ of ☐ = 15
$\frac{1}{4}$ of ☐ = 2
☐/4 of 8 = 6

Find Three Quarters

Reasoning and Problem Solving

Amir is using beanbags and hoops to find three quarters of 20

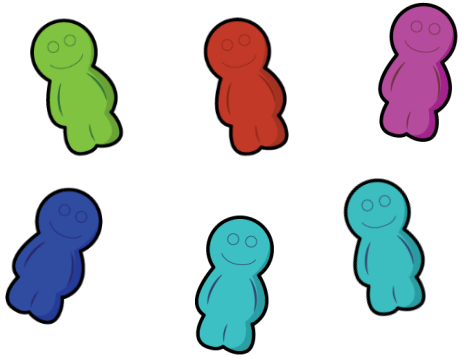
Can you spot his mistake?



$\frac{3}{4}$ of 20 = 14

Amir hasn't created equal groups. 20 should be shared into 4 equal parts. There should be 5 beanbags in each hoop so three quarters of 20 is 15 not 14

Eva eats three-quarters of her sweets.
She eats these sweets.



How many sweets does Eva have left?

Eva has 2 sweets left.
Encourage children to do this practically.

Count in Fractions

Notes and Guidance

Using their knowledge of halves, thirds and quarters, children count in fractions from any number up to 10.

They begin to understand that fractions can be larger than one whole.

Teachers can use a number line, counting stick or hoop to support them in counting in fractions.

Mathematical Talk

Which number are you starting on?

How many parts are there in your fraction whole?

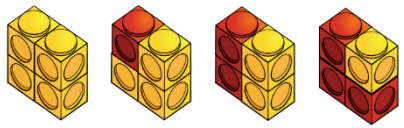
Which fraction will come next?

What patterns can you spot?

Continue the pattern: $\frac{1}{3}$, $\frac{2}{3}$, 1, $1\frac{1}{3}$, $1\frac{2}{3}$, 2, $2\frac{1}{3}$, $2\frac{2}{3}$,

Varied Fluency

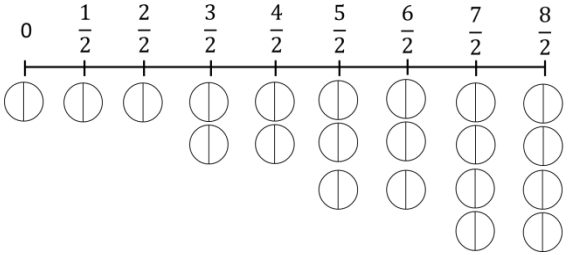
- What would the next image in the sequence look like?



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

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

- Shade the correct number of parts for each fraction.

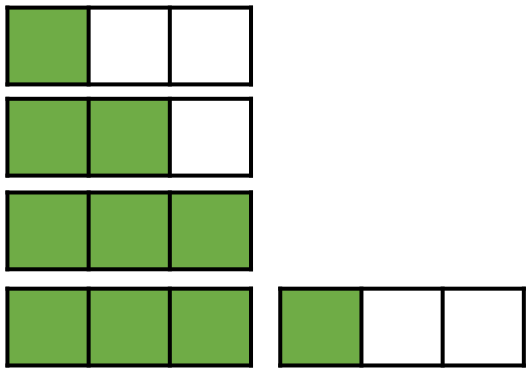


- Complete each number line.
What's the same, what's different?

Count in Fractions

Reasoning and Problem Solving

Look at this pattern.



What would come next?
Write the next fraction and draw the representation.

What would be the 8th fraction in the pattern?

Five thirds, $\frac{5}{3}$
Children may think that the later models are in sixths, it is important to stress that the whole one is still made up of three and so we are still counting in thirds.

The 8th fraction would be $\frac{8}{3}$ or $2\frac{2}{3}$

Alex and Whitney are counting in quarters.

Alex

One quarter, two quarters, three quarters, four quarters...

One quarter, one half, three quarters, one whole...

Whitney

Who is correct? Explain your answer.

They are both correct. Two quarters is equivalent to one half and four quarters is equivalent to one whole.