Scheme of Learning

Year 2

#MathsEveryoneCan

White Rose Maths

Contents

Meet the Characters

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

Teddy

Rosie

Mo

Eva

Alex

Jack

Whitney

Amir

Dora

Tommy

Dexter

Ron

Annie

White Rose Maths

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

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White Rose Maths

Spring - Block 1

Multiplication & Division

Overview

Small Steps

◣	Make equal groups – sharing
◣	Make equal groups – grouping
◣	Divide by 2
◣	Odd & even numbers
◣	Divide by 5
◣	Divide by 10

NC Objectives

Recall and use multiplication and division facts for the 2, 5 and 10 times tables, including recognising odd and even numbers.

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs.

Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts.

Show that the multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.

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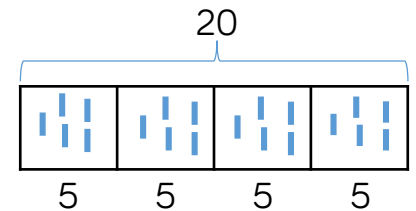There are ___ boxes.
There are ___ cubes in each box.

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

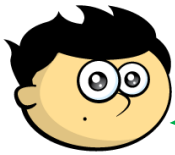What other number sentences could Ron create using his model?

Make Equal Groups - Sharing

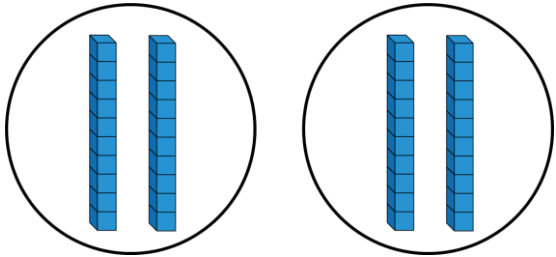## Reasoning and Problem Solving

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 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.
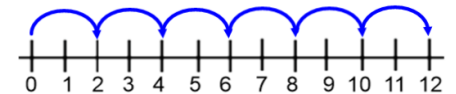There are ___ pots.

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

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

18
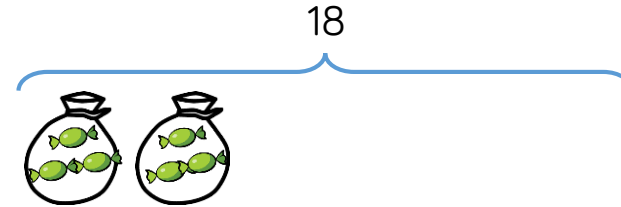
Mo uses a number line to work out how many equal groups of 2 he can make from 12
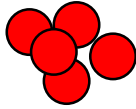
Use a number line to work out how many equal groups of 5 you can make from 30

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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

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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.

12
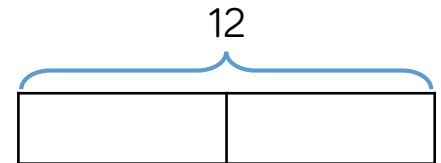
Complete the bar model and write a calculation to match.

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?
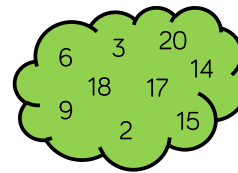
What makes these odd/even?

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.

6   3   20
18   17   14
9   2   15

| 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?
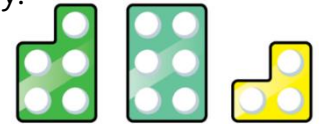
Spot the mistakes:

odd			even		
nine	50p	1		10	
6		3	eight		
			25		

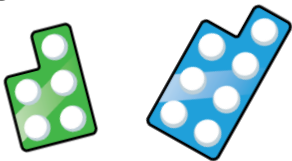Can you make your own odd and even sets?

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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,

I have added two one-digit numbers. My answer divides into 2 equal groups.

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?

$\Box \div \Box = \Box$

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.
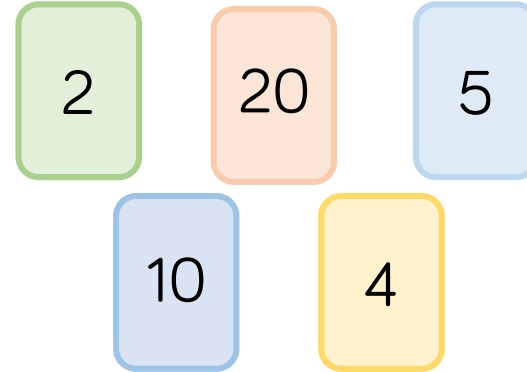
Sweets

Ron has 75 sweets.

How many party bags will he need?

How many jars will he need?

15 party bags.
3 jars.

Use the number cards to make multiplication and division sentences.

How many can you make?

2   20   5

10   4

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

Divide by 10

Notes and Guidance

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

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

Mathematical Talk

What can we use to represent the problem?

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

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

How many groups of 10 are there in ___ ?

Varied Fluency

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

$\square \div \square = \square$

When 30 apples are sold in packs of 10, ___ packs of apples can be made.
Can you show this in a bar model?
Label and explain what each part represents.
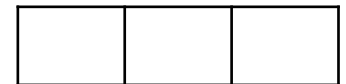
I have 70p in my pocket made up of 10p coins. How many coins do I have? Draw a picture to prove your answer.

Fill in the missing numbers.

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

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Divide by 10

Reasoning and Problem Solving

Mrs Owen has some sweets.

She shares them equally between 10 tables.

How many sweets could each table have?

Find as many ways as you can.

What do you notice about your answers?

They could have:

$10 \div 10 = 1$

$20 \div 10 = 2$

$30 \div 10 = 3$

$40 \div 10 = 4$

$50 \div 10 = 5$

etc

The tens digit is the same as the answer.

True or false?

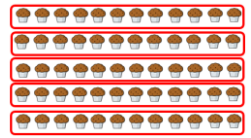Dividing by 10 is the same as dividing by 5 then dividing by 2

True

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

Jack says,

There are 5 groups of 10

Alex says,

There are 6 groups of 10

Who is correct? Explain how you know.

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

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

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Spring - Block 2

Statistics

Overview

Small Steps

NC Objectives

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

Interpret and construct simple pictograms, tally charts, block diagrams and simple tables.

Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity.

Ask and answer questions about totalling and comparing categorical data.

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 |卌 |||	
Red	卌 卌 ||	
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	卌 卌	10
Year 2		19
Year 3	卌 卌 卌 卌 ||	
Year 4	卌 卌 卌 ||	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

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Make Tally Charts

Reasoning and Problem Solving

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

Animal	Tally
(turtle)	‖‖‖
(elephant)	‖‖‖
(panda)	‖‖
(horse)	‖‖‖ ‖‖

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	‖‖‖ ‖‖‖ ‖‖‖
Chocolate	‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖
Strawberry	‖‖‖ ‖‖
Mint		

Class 2	
Flavour	**Total**
Vanilla	‖‖‖ ‖‖‖ ‖‖
Chocolate	‖‖‖ ‖‖‖ ‖‖‖ ‖‖‖
Strawberry	‖‖‖
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

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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	卌 l
Grape	llll
Pear	卌 lll
Apple	lll

Fruit	
Banana	
Grape	
Pear	
Apple	◯ ◯ ◯

Key

◯ = ___

Complete the pictogram using the data given.

Name	Tally
Teddy	ll
Annie	卌 llll
Amir	卌
Whitney	卌 l

Key

⚽ = 1 goal

| Teddy | Annie | Amir | Whitney |

Draw Pictograms (1-1)

Reasoning and Problem Solving

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

Dexter	◯◯ ◯◯◯ ◯
Alex	◯◯◯◯◯◯
Mo	◯◯◯
Rosie	◯◯◯ ◯

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
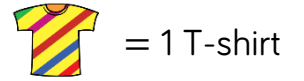
🎽 = 1 T-shirt

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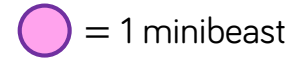
There are ____ ladybirds.
There are ____ centipedes and worms altogether.
There are ____ more worms than centipedes.
What else does the pictogram tell us?

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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

Pictogram to show the number of animals spotted at the farm

| Chickens | Cows | Sheep | Goats | Horses |
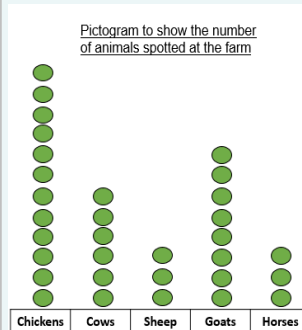
Children may have different numbers from this and still be correct.

Here is a pictogram.

Blue
Red
Yellow
Green
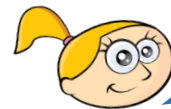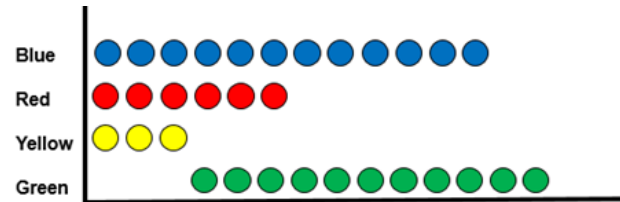
The most popular colour sweet is green.

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:

Number of sweets in a packet

Blue
Red
Yellow
Green

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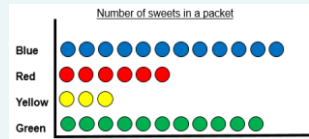
Draw Pictograms (2, 5 & 10)

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	ЖЖ ЖЖ
Cat	ЖЖ ЖЖ IIII
Rabbit	ЖЖ ЖЖ II
Fish	ЖЖ ЖЖ ЖЖ I

Pet	
Dog	
Cat	
Rabbit	
Fish	

☐ = 2 animals

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

Class 1	ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ
Class 2	ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ
Class 3	ЖЖ ЖЖ
Class 4	ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ
Class 5	ЖЖ ЖЖ
Class 6	ЖЖ ЖЖ

Class 1	📖 📖 📖
Class 2	📖 📖 📖 📖
Class 3	📖 📖
Class 4	📖 📖 📖
Class 5	
Class 6	

Key

📖 = 5 books

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

Chocolate	ЖЖ ЖЖ ЖЖ ЖЖ
Lemon	ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ
Red Velvet	ЖЖ ЖЖ ЖЖ ЖЖ
Mint	ЖЖ ЖЖ ЖЖ ЖЖ
Carrot	ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ ЖЖ

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.

🌸	☀️	🍂	❄️
Spring	Summer	Autumn	Winter
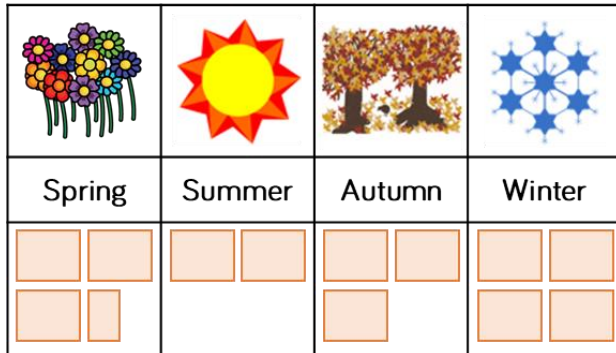
Key

☐ = 2 children

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

| Blue | Red | Silver | Black | Green |

⚪ = 5 cars

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

⚪ = 10 cars
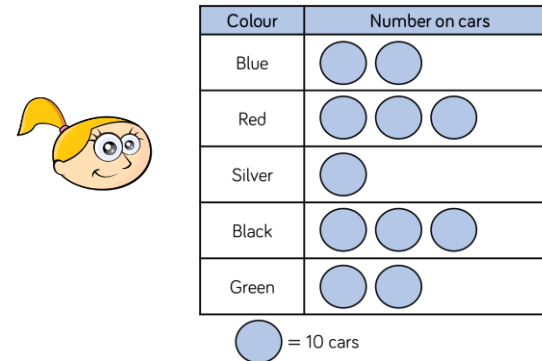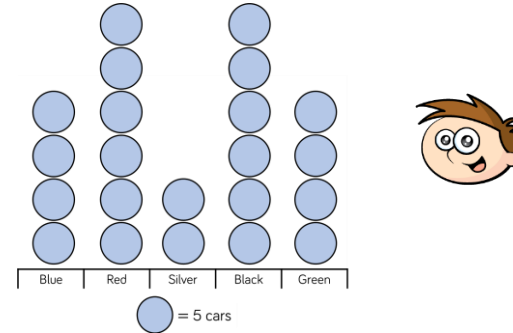
What is the same? What is different? Whose pictogram do you prefer? Why?

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?

| Blackbird | Robin | Sparrow | Thrush | Magpie |

☐ = 5 birds
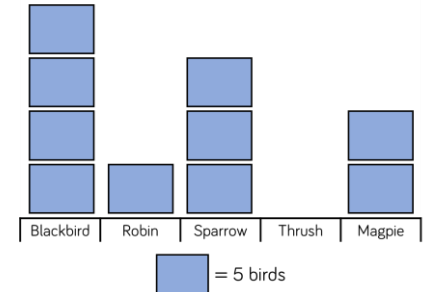
Which is the most popular sport?
How many children voted for football and swimming altogether?
What could the title of this pictogram be?

Sport	
Football	△△△△△
Tennis	△△
Basketball	△△△
Hockey	△△△△
Swimming	△

△ = 2 children
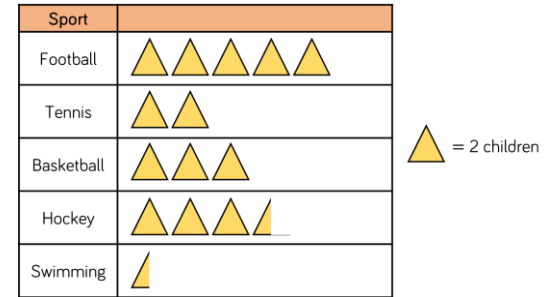
Use the pictogram to decide if the statements are true or false.

Animal	Number on farm
Pigs	★★★★★
Sheep	★★★★
Horses	★
Chickens	★★★
Cows	★★★★★★★

★ = 10 animals

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.	

White Rose Maths

Interpret Pictograms (2, 5 & 10)

Reasoning and Problem Solving

Jack and Whitney have carried out a traffic survey.

Van	⚙️ ⚙️ ◖
Bus	⚙️ ⚙️ ⚙️ ⚙️
Bike	⚙️ ⚙️ ⚙️
Lorry	⚙️ ⚙️
Car	⚙️ ⚙️ ⚙️ ⚙️
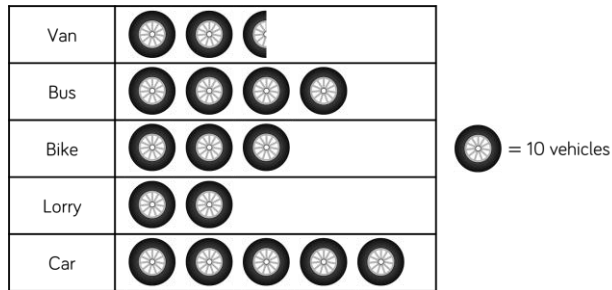
⚙️ = 10 vehicles

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.

Ice creams sold in a week

= 2 ice creams

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 graph to show House Points Collected

White Rose Maths
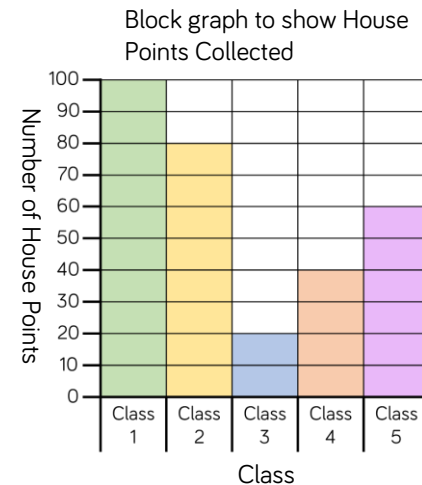
Block Diagrams

Reasoning and Problem Solving

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

Data Set 1

Team	Goals scored
A	20
B	32
C	27
D	16

Data Set 2

Player	Points
1	20
2	65
3	80
4	45

Data Set 3

Name	Score
Ron	20
Eva	12
Amir	6
Mo	16

Block diagram

Pictogram 　○ = 10
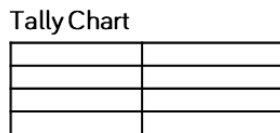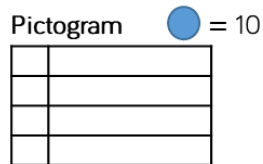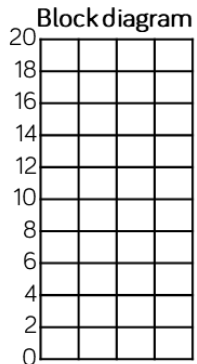
Tally Chart

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:

Boys　Girls

Gymnastics　Swimming　Football
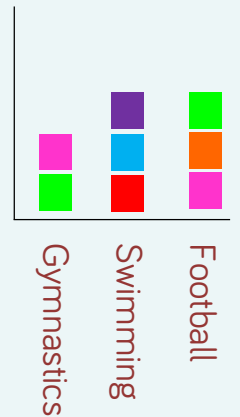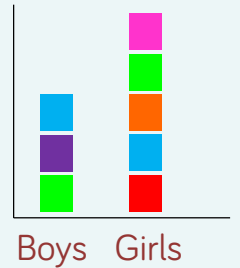
White Rose Maths

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

NC Objectives

Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line.

Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces.

Identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid.]

Compare and sort common 2-D and 3-D shapes and everyday objects.

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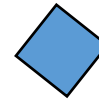
■ Put a combination of 3-D shapes in a feely bag. Can you find the cube, the cone, the cylinder? What do you notice about each shape?

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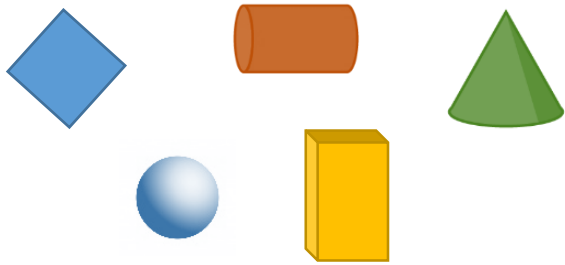
The square is the odd one because it is the only 2-D shape or flat shape.

Which shape is the odd one out? Explain your reasoning.
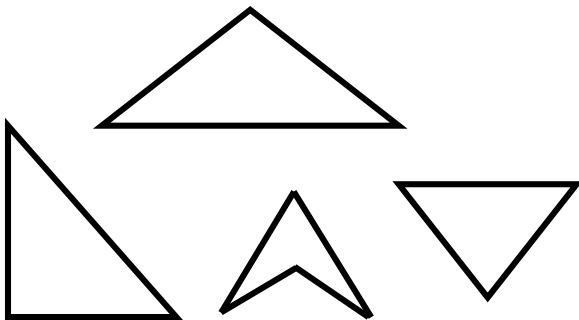
Three of the shapes are triangles, one is not. Three of them have three sides, one has four.

Other answers can be accepted with a clear explanation.

I'm thinking of a 2-D shape with more than 3 sides.

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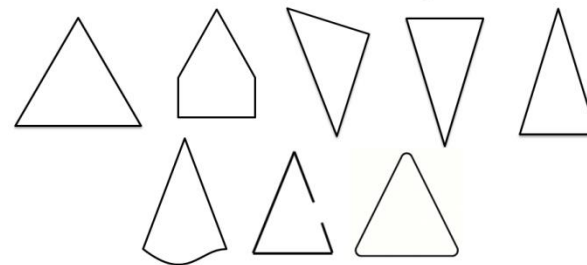
True, false, true, true, true, false, false, false

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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
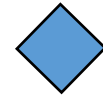
Colour the four-sided shapes.
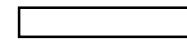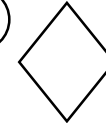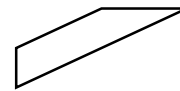
Complete the table.

Name	Shape	Number of sides
Pentagon		
Rectangle		
Square		
Triangle		
Hexagon		

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White Rose Maths

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?

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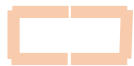
How many identical rectangles could he make with 18 sticks?
Make your own rectangle. How many sticks did you use? Is your rectangle the same as your friend's?

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 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?
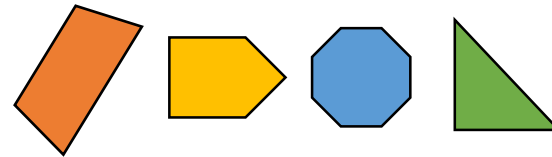
Where would a hexagon come in the list? Why?

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
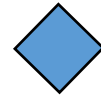
Colour the shapes with 4 vertices.
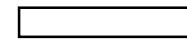
Complete the table.

Name	Shape	Number of vertices
Pentagon		
Rectangle		
Square		
Triangle		
Hexagon		

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Count Vertices on 2-D Shapes

Reasoning and Problem Solving

Amir says:

My shape has half the number of vertices as an octagon.

What shape could he have?

Square
Rectangle

Put these shapes in order based upon the number of vertices they have.
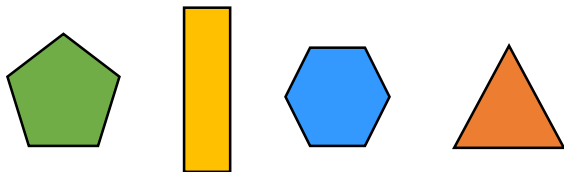
Triangle, rectangle, pentagon, hexagon

Jack has created a pattern using shapes.

1   2   3
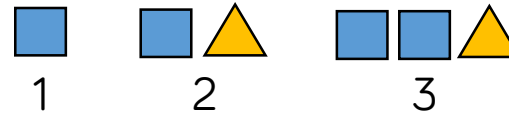
How many vertices does each step in the pattern have?

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?
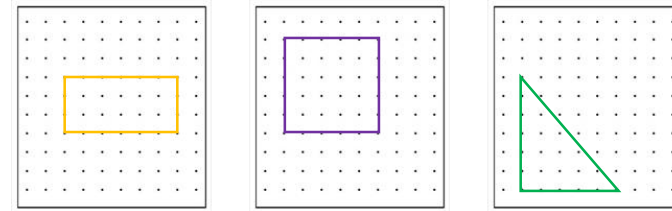
Can you draw a rectangle on dotted paper? Start at a vertex and use a ruler to draw your first straight side. How many straight sides will you need? Rotate the paper to help you draw the shape more accurately.
Try drawing other shapes in the same way.
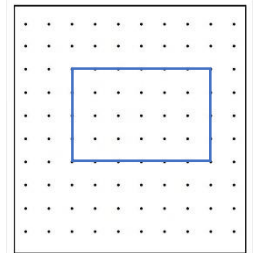
Choose a 2-D shape.
Build it on a geo-board.
Can you copy the shape onto dotted paper and squared paper?

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:
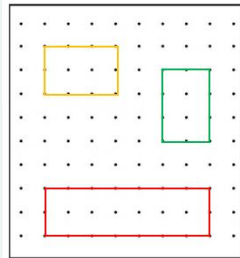
What shape could be hiding under the spilt paint?
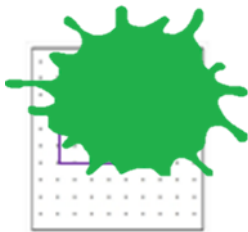
Prove your answer by drawing it.

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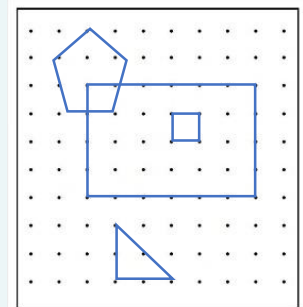
Children may end up with a different picture from above however they should have four shapes drawn.

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?
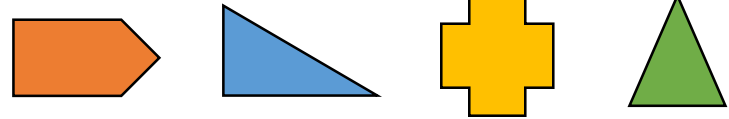
Draw the vertical lines of symmetry on these shapes.
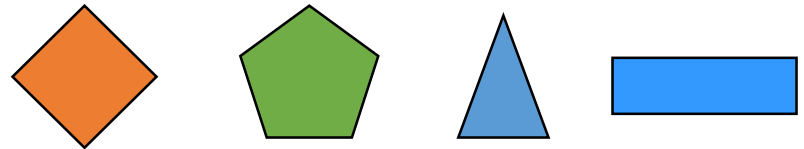
Circle the shape with an incorrect line of symmetry. Can folding help you prove your answers.
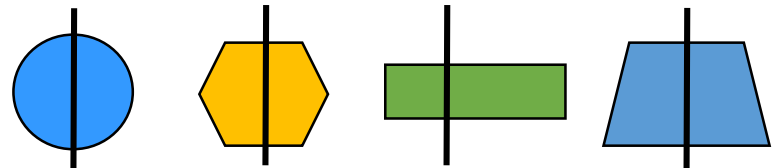
Lines of Symmetry

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:
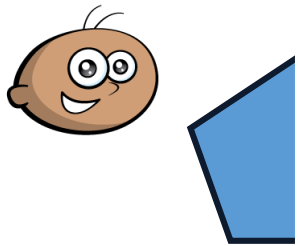
Can you complete the other half of the shape?
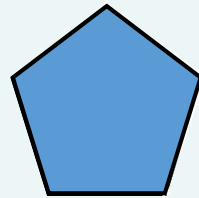
Which 2-D shapes can be made when a vertical line of symmetry is drawn on a square?

Rectangle and triangle.

44
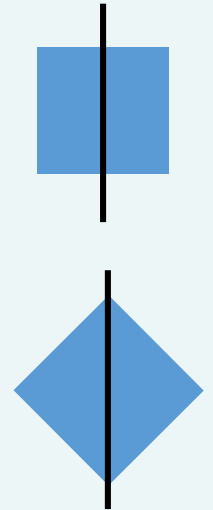
Sort 2-D Shapes

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:

Rectangle   Triangle   Pentagon

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

45

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?

4 sides   Orange
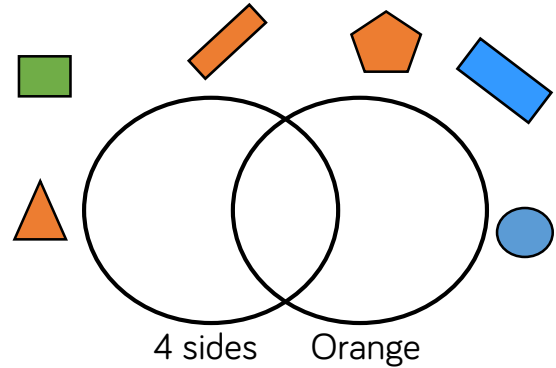
Create your own labels and sort the shapes in a different way.
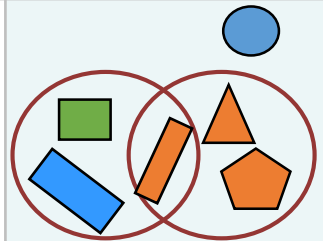
Possible labels:
Blue
Less than 4 vertices.

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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:
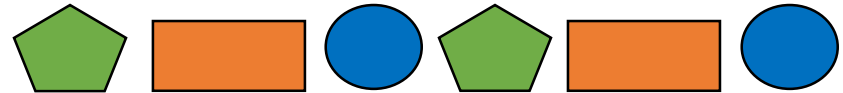
Can you circle the set of shapes that repeat?

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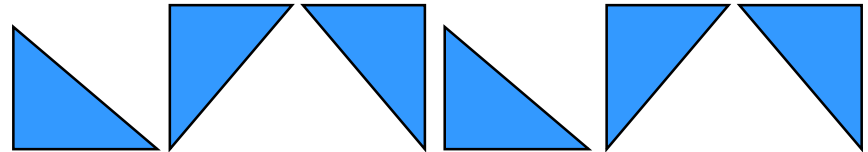
Can you make your own repeating patterns using only one shape?

Make Patterns with 2-D Shapes

Reasoning and Problem Solving
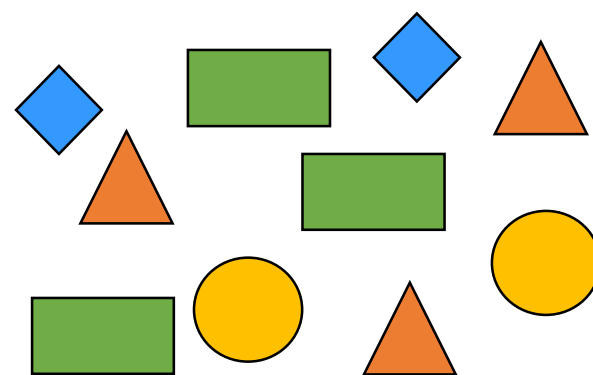
Dora says that the 12ᵗʰ shape in this pattern will be a triangle.

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?

Can you translate this pattern using shapes?

Clap, clap, snap, clap, clap, snap, clap, clap ......

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

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?
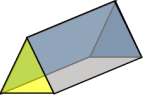
Varied Fluency

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?

Flat faces

Curved surfaces

Both

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:
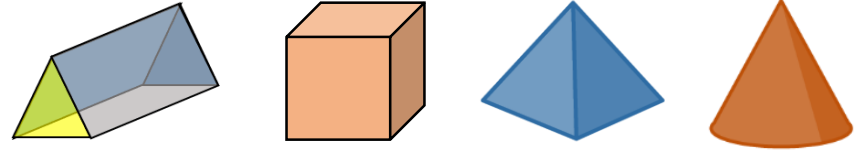
How many edges does each shape have?

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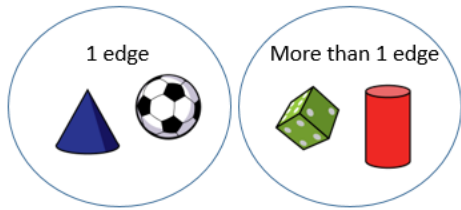
The sphere (football) is in the wrong place because it doesn't have any edges, it has one curved surface.

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.
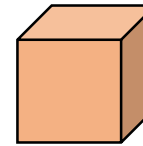
What is the same and what is different?

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:
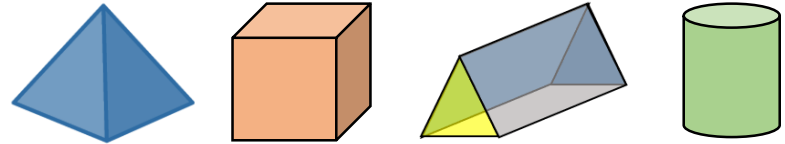
How many vertices does each shape have?

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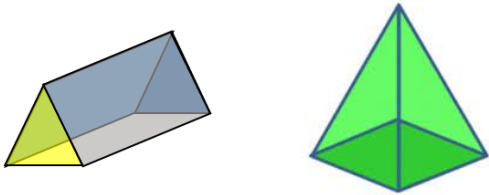
What is different about them?
Talk about faces, edges and vertices in your answer.

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:

All 3-D shapes have at least one vertex.

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.

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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?
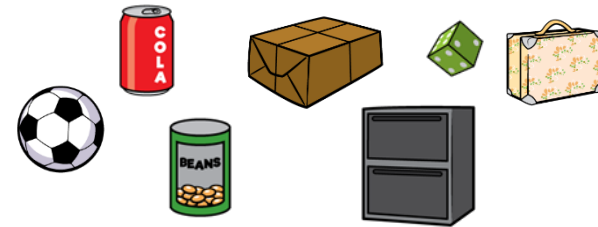
How are these shapes grouped?
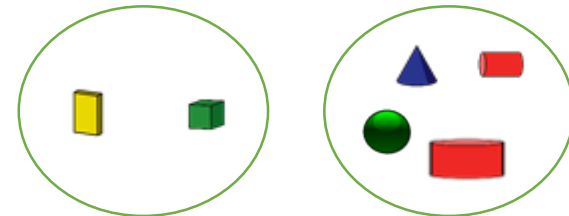
Could you group them in a different way?

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?

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Sort 3-D Shapes

Reasoning and Problem Solving

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

A cube is a type of cuboid.

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:

Some shapes will stack **and** roll.

Is he correct?

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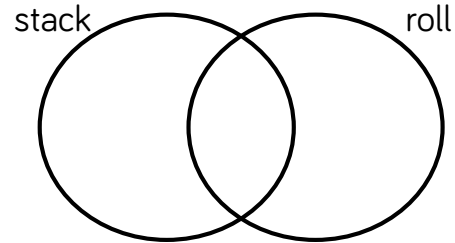
Sort your shapes using the Venn diagram.
Explain what you notice about each set.
Do all shapes with flat surfaces stack?

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)

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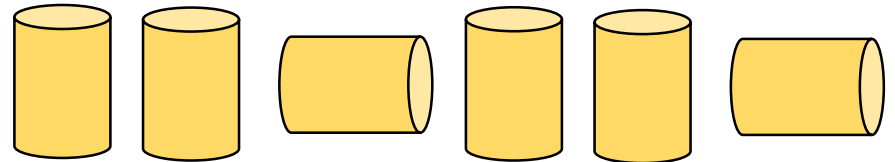
Can you make your own repeating patterns using only one 3-D shape?

Make Patterns with 3-D Shapes

Reasoning and Problem Solving

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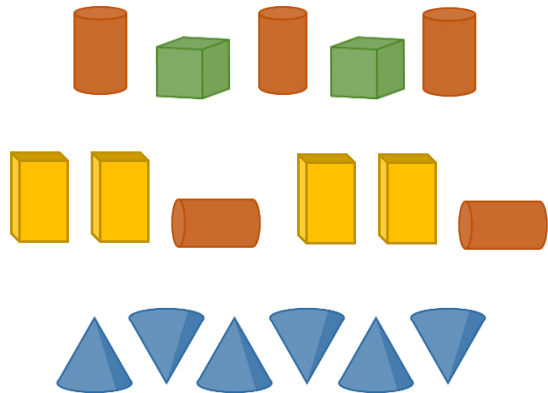
The first and second patterns use two shapes. Colour is a difference to note. In the 3rd pattern, one shape is used in different orientations. In the 2nd pattern, the shape is used twice each time.

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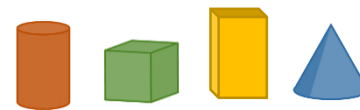
- Make a repeating pattern where there are more cones than cuboids.
- Make a repeating pattern where the third shape is always a cylinder.

Answer will depend on the shapes used.

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Spring - Block 4

Fractions

Overview

Small Steps

NC Objectives

- 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

Recognise, find, name and write fractions $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity.

Write simple fractions for example, $\frac{1}{2}$ of $6 = 3$ and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$

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.
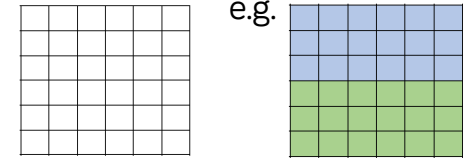
How many ways can you find?

e.g.

Look at the representations. Decide which show equal parts and which show unequal parts.
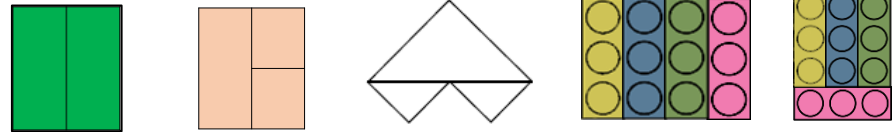
Can you make some of your own representations of equal and unequal parts?

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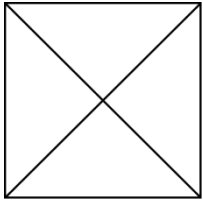
Alex
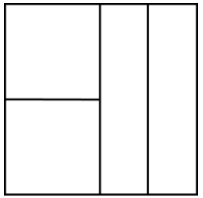
Mo
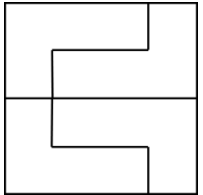
Who has split the square into equal parts? Explain why.

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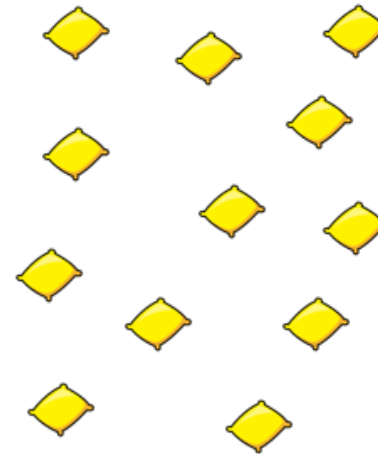
Children can sort the beanbags into groups of 1, 2, 3, 4, 6 and 12

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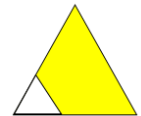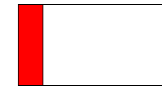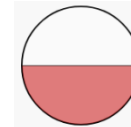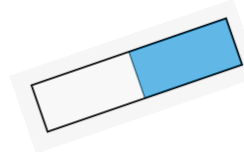
- Which pictures show $\frac{1}{2}$?
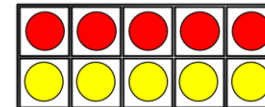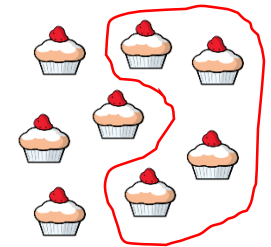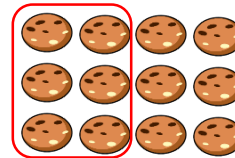
Recognise a Half

Reasoning and Problem Solving

Odd One Out

$$\frac{1}{2}$$

One half

Which is the odd one out?
Explain your answer.
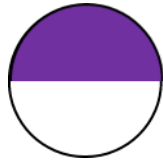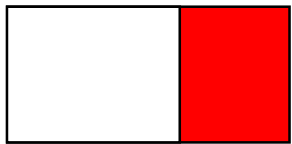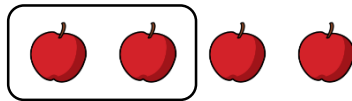
Children need to link their explanation to the shape not having two equal parts.

Rosie says the shaded part of the shape does not show a half because there are four parts, not two equal parts.
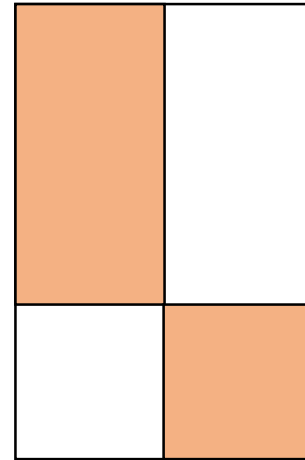
Do you agree? Explain why.

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.
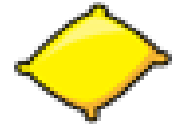
The whole is ____. Half of ____ is ____.

Circle half the cakes.

Circle half the triangles.
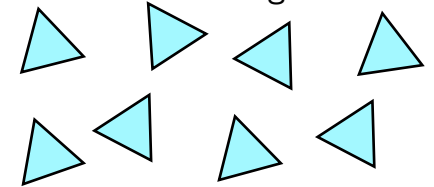
Fill in the blanks. Use counters to help you if needed.

$\frac{1}{2}$ 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

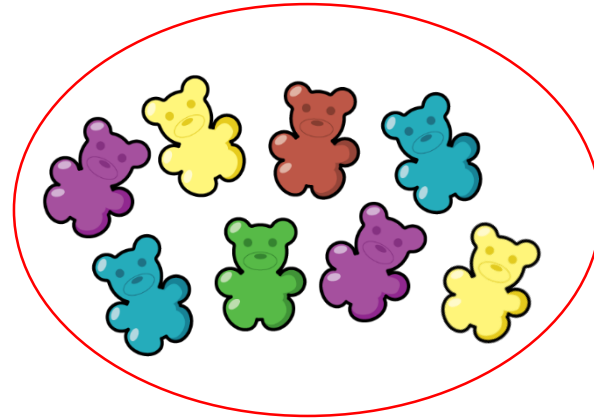Dora is asked to shade half of her shape.
This is what she shades.
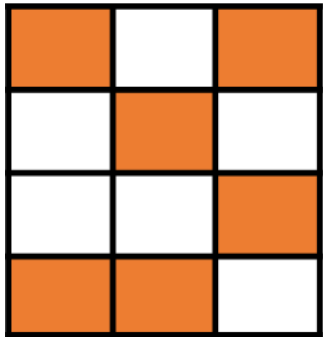
Is she correct? Explain why.

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.
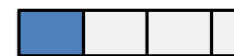
The cake is split into _____ equal parts.
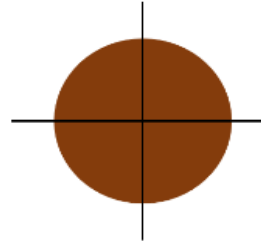
Each part is worth a _____ .

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

◻ Shade $\frac{1}{4}$ of each shape.
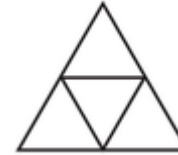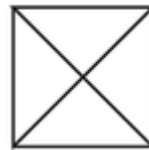
◻ Circle the shapes that have a quarter shaded
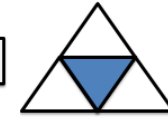
Which shapes do not have a quarter shaded? How do you know?
Draw the shapes again and split them into quarters correctly?

Recognise a Quarter

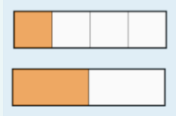## Reasoning and Problem Solving

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
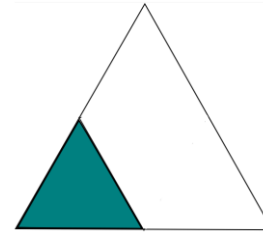
Use paper strips to prove Alex is incorrect.

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.
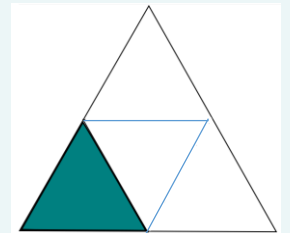
True or False?

$\frac{1}{4}$ 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.

White Rose Maths

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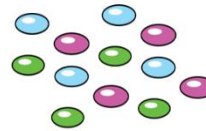
How do you know you have found $\frac{1}{4}$?

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 _____
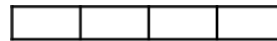
Varied Fluency

Share the smarties equally between 4 people.

The smarties are split into ____ equal parts.

Each part is worth a _____ .

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

Circle one quarter of the cars.

One quarter of ____ is ____

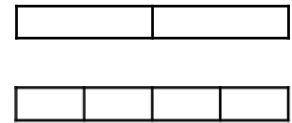____ is $\frac{1}{4}$ of ____

Complete:

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

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

$\frac{1}{2}$ of 8 = $\square$ $\frac{1}{4}$ of 8 = $\square$
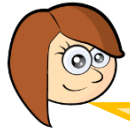
Find a Quarter

Reasoning and Problem Solving

Who has more? Explain why.

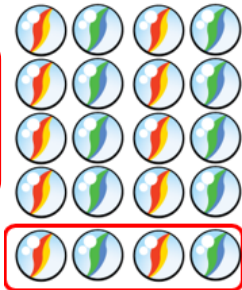Rosie: I have $\frac{1}{4}$ of £8

Whitney: I have $\frac{1}{2}$ of £6

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

Eva says,

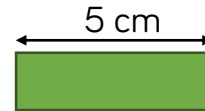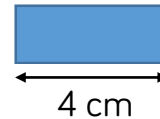I have $\frac{1}{4}$ because I have 4 marbles.

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 — 5 cm

$\frac{1}{4}$ of ribbon B — 4 cm

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.

70

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

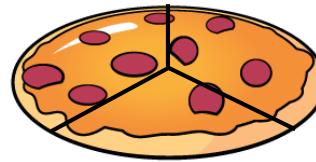How many equal parts have you split the whole in to if you have split it into thirds?

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?
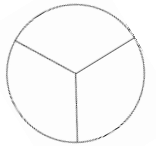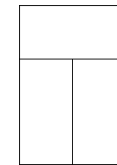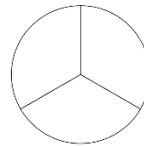
Varied Fluency

Three friends are sharing a pizza.

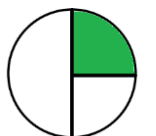The pizza is split into _____ equal parts.

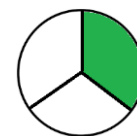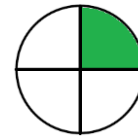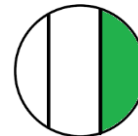Each part is worth a _____ .

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?

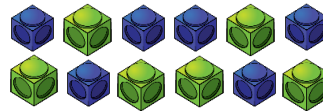Can we split the whole amount into three equal groups?

What is a third of _____ ?

What is staying the same? What is changing?

How does changing the whole amount change the answer?

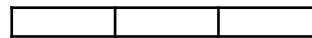Is the answer still worth a third? Explain why?

Varied Fluency

◼ Use the cubes to make three equal groups.

There are _____ cubes altogether.

One third of _____ is _____
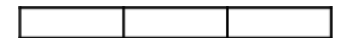
$\dfrac{\square}{\square}$ of ____ is ____

◼ 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 = $\boxed{}$ $\frac{1}{3}$ of 15 = $\boxed{}$

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

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

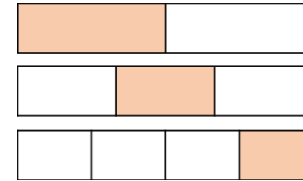How can we represent these unit fractions in different ways?

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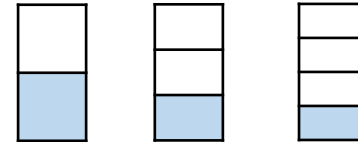
Which unit fraction is bigger/smaller if the whole is the same?

Varied Fluency

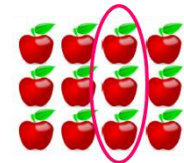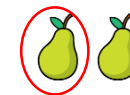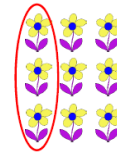What is the same and what is different about each bar model?

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 $\frac{1}{4}$
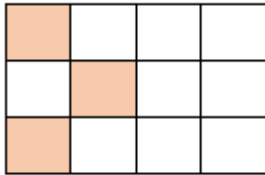
Can you shade the same shape so that it shows $\frac{1}{3}$?
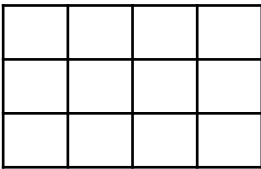
True.
There are 12 squares altogether and 3 are shaded.
One quarter of 12 is 3

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.

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Non-Unit Fractions

Notes and Guidance

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

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

Mathematical Talk

How many quarters make a whole? How many thirds make a whole? What do you notice?
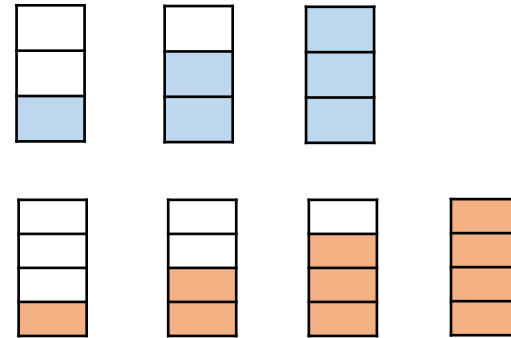
How many quarters are there in $\frac{3}{4}$?

In $\frac{3}{4}$ what does the digit 3 represent? What does the digit 4 represent?
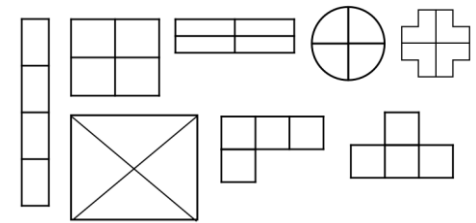
Give me an example of a unit fraction and a non-unit fraction.
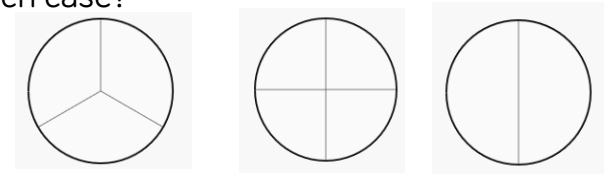
Varied Fluency

What fraction is shaded in each diagram?

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

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

Non-Unit Fractions

Reasoning and Problem Solving

Alex says,

I have shaded $\frac{2}{2}$ of the shape.

What mistake might Alex have made?

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

Sort the fractions into the table.

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

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

What do you notice?

Are there any boxes in the table empty?

What fraction could you write here?

Top left: Empty

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

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

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

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

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

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

Notes and Guidance

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

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

Mathematical Talk

What does equivalent mean? What symbol do we use?

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

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

How many quarters are equivalent to a half?

Varied Fluency

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

Shade one half and two quarters of each shape.

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

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.

Cookies

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.
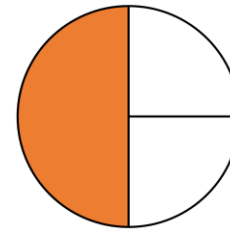
Do you agree? Explain why.

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?
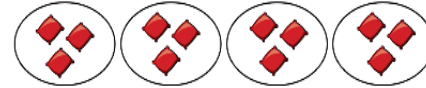
Can you represent this in a bar model?

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.
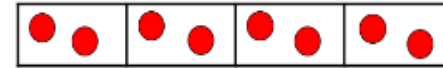Use the image to complete the sentences.

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?

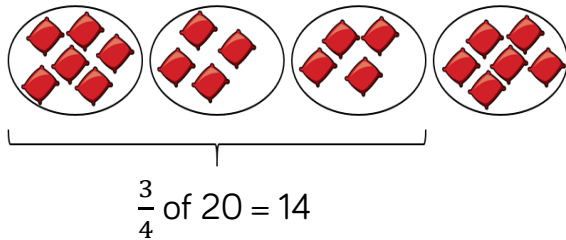Use counters, cubes, or bar models to help you fill in the blanks:

$\frac{1}{4}$ of 24 = ☐	$\frac{1}{4}$ of 4 = ☐	$\frac{1}{4}$ of ☐ = 5
$\frac{2}{4}$ of 24 = ☐	$\frac{3}{4}$ of 4 = ☐	$\frac{3}{4}$ of ☐ = 15
$\frac{3}{4}$ of 24 = ☐	$\frac{1}{4}$ of 8 = ☐	$\frac{1}{4}$ of ☐ = 2
$\frac{4}{4}$ of 24 = ☐	$\frac{3}{4}$ of 8 = ☐	$\frac{\square}{4}$ of 8 = 6

Find Three Quarters

Reasoning and Problem Solving

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

Can you spot his mistake?

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

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

Eva eats three-quarters of her sweets. She eats these sweets.
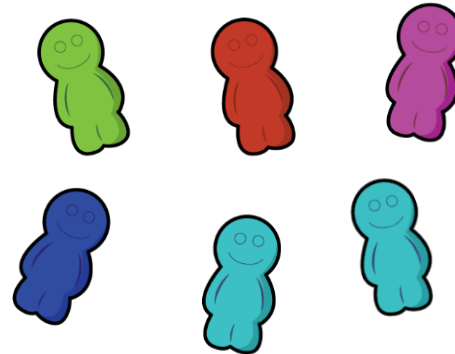
How many sweets does Eva have left?

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

Count in Fractions

Notes and Guidance

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

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

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

Mathematical Talk

Which number are you starting on?
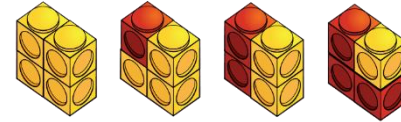
How many parts are there in your fraction whole?

Which fraction will come next?

What patterns can you spot?

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

Varied Fluency

What would the next image in the sequence look like?

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

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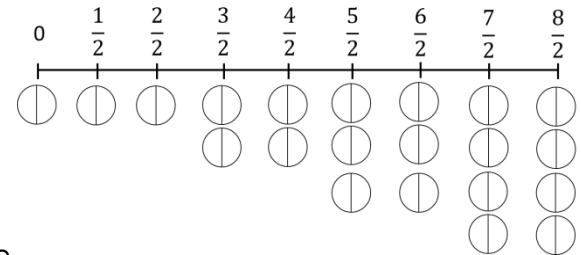
Shade the correct number of parts for each fraction.

Complete each number line. What's the same, what's different?
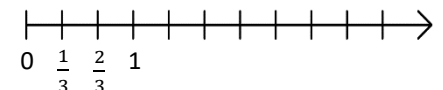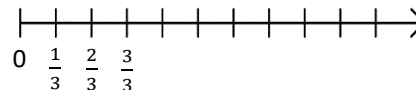
Count in Fractions

Reasoning and Problem Solving

Look at this pattern.
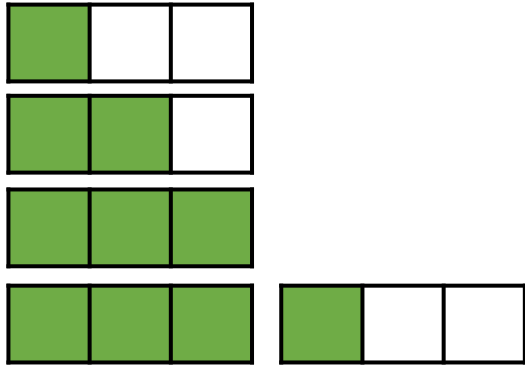
What would come next?
Write the next fraction and draw the representation.

What would be the 8th fraction in the pattern?

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

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

Alex and Whitney are counting in quarters.

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

Alex

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.

White Rose Maths

Length & Height

Overview

Small Steps

- Measure length (cm)
- Measure length (m)
- Compare lengths
- Order lengths
- Four operations with lengths

NC Objectives

Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels.

Compare and order lengths, mass, volume/capacity and record the results using >, < and =.

Measure Length (cm)

Notes and Guidance

Children measure to the nearest centimetre using a ruler or tape measure.

They measure both length and height and focus on the importance of measuring from 0 rather than the end of the ruler or tape measure.

Mathematical Talk

What is the length?

How can the numbers on the ruler help us?

How do you know you have drawn a line that is 5cm long? How can you check?

Why is it important to start measuring from 0 on the ruler?

Varied Fluency

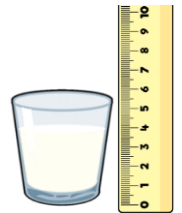Choose a variety of objects and practice measuring them using a centimetre ruler.
Remember to line up the object to the 0 mark on the ruler.

e.g. How long is the pencil to the nearest centimetre?
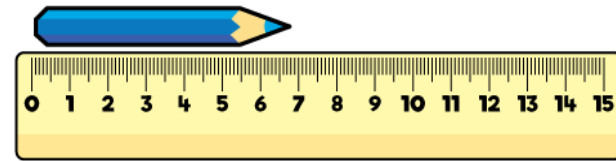
How tall is the glass?

What other objects can you find to measure the height of?

Draw a line that is:

- 5 cm long
- 8 cm long
- Longer than 4 cm but shorter than 7 cm.

Measure Length (cm)

Reasoning and Problem Solving

How long is this piece of string?
How could you find out?
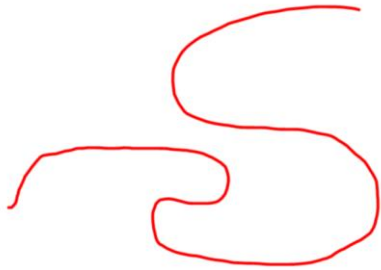
Does the length change if you change the orientation?

The length will not change if you change the orientation so it will be easier to measure if you put it in a straight line.

Mo has used the ruler to measure the length of the car.
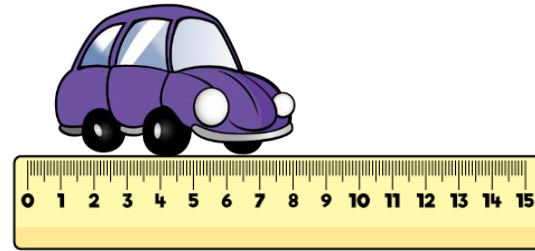
Mo says the car is 8 centimetres long.
Do you agree?
Explain your answer.

Mo is incorrect because he has not lined the car up with the 0 marker. If he had measured from 0 he would see that the car is 7 cm long.

Measure Length (m)

Notes and Guidance

Children begin to measure larger objects using metres. They think about whether it is better to measure items in centimetres or metres and discuss the reasons why.

Children do not yet convert from metres to centimetres; however they may see that 100 centimetres is the same as 1 metre and measurements can be written as mixed units e.g. the child is 1 metre and 25 centimetres tall.

Mathematical Talk

When would it be appropriate to use metres?

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

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

Varied Fluency

Use a metre stick to measure objects in your classroom and place them into the groups.

Longer than a metre   Shorter than a metre
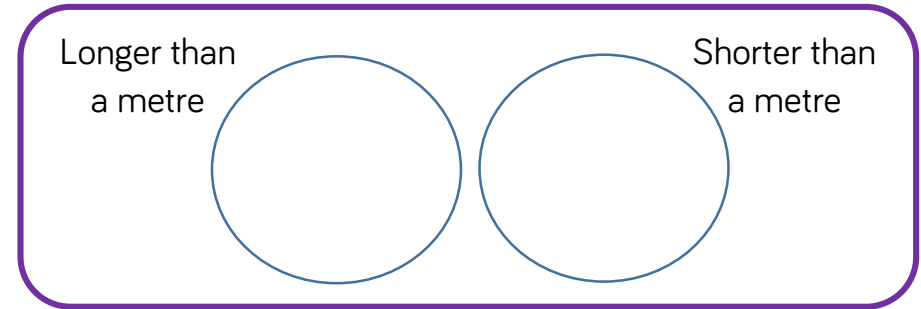
Can you find anything that is exactly one metre?

Use a metre stick to count up in 10 cm blocks. What do you notice about 100 cm?
Possible responses: it is the same a metre, 1 m is written, it is the end of the stick.

Measure the length of the school hall.
Record the length in metres and centimetres, e.g. 15 metres and 13 centimetres.

Measure Length (m)

Reasoning and Problem Solving

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

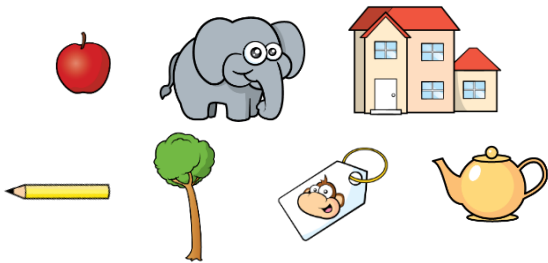How far do you think you can run in 10 seconds? Do you think it will be more or less than 100 m?

Measure how far you and your friends can run in 10 seconds.
Record your answers in metres and centimetres.

Children will have a variety of answers. They could measure using different equipment including metre sticks and trundle wheels.

Circle the objects that you would measure in metres. Tick the objects that you would measure in centimetres.

Circle elephant, school and tree

Amir has a metre stick.

He wants to measure the length of his classroom.

I can't measure the length of the classroom because my metre stick isn't long enough.

Explain to Amir how he could measure the length of his classroom.

Amir can measure the length of the classroom by putting a marker at the end of the metre stick and then starting again at that point, moving his metre stick as he measures.

Compare Lengths

Notes and Guidance

Children compare lengths of objects using comparison language and symbols. They use language such as longer than, shorter than, taller than, longest, shortest and tallest.

Children only compare using the same unit of length in a question. However, the same number but different unit of measure could also be used to check that children understand metres are bigger than centimetres.

Mathematical Talk

Which is longer: 10 centimetres or 10 metres?

Which symbols can we use to compare lengths?

What is the difference between using taller than and longer than? When would we use taller than instead of longer than?

Varied Fluency

◻ Compare the lengths using **longer than**, **shorter than**, or **the same as**.

15 cm is		60 cm
Sixty metres is		60 m
96 m is		69 m
80 cm is		80 m

◻ Use $<$, $>$ or $=$ to complete the statements.

7 metres ◯ 17 metres

18 cm ◯ 18 m

32 cm ◯ 32 centimetres

◻ Choose 2 objects from your classroom. Estimate the length of each object. Then measure both objects and compare the lengths using $<$, $>$ or $=$
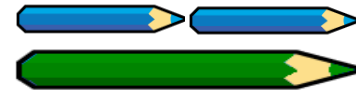Try this again, but this time measuring your friends' heights.

Compare Lengths

Reasoning and Problem Solving

Compare the measurements using <, > or =

55 cm + 10 cm ◯ 55 cm − 10 cm

42 m + 6 m ◯ 42 m + 7 m

6 cm − 5 cm ◯ 6 m − 5 m

80 m − 5 m ◯ 70 m + 5 m

>

<

<

=

A green pencil is twice as long as a blue pencil.

Using this, complete the statements using **longer than, shorter than** or **equal to.**

3 green pencils are _____ 2 blue pencils

2 green pencils are _____ 5 blue pencils

4 green pencils are _____ 8 blue pencils

3 green pencils are longer than two blue pencils.
2 green pencils are shorter than 5 blue pencils.
4 green pencils are equal to 8 blue pencils.

Order Lengths

Notes and Guidance

Children order more than two lengths from shortest to longest and vice versa. This will help them recap their understanding of ordering numbers to 100

Children will order given lengths as well as ordering objects by measuring each length themselves.

They will use the language of shorter, shortest, longer and longest to describe the order.
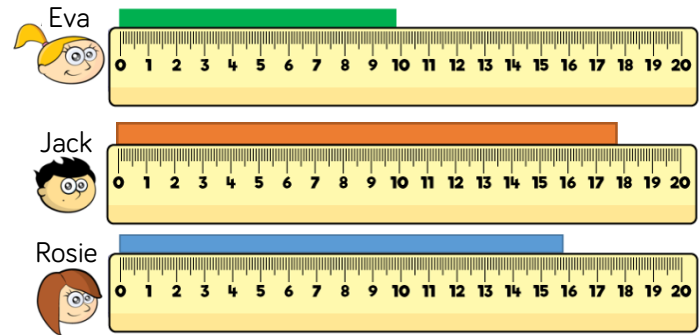
Mathematical Talk

How is ordering lengths similar to ordering numbers on a number line? Can we use a number line to help us?

Can we estimate which object is the longest before measuring?

Varied Fluency

◻ Eva, Jack and Rosie are comparing the length of ribbons. Complete the sentences.

Eva

Jack

Rosie

_____ has the longest ribbon.

_____ has the shortest ribbon.

_____ 's ribbon is shorter than _____'s.

_____'s ribbon is longer than _____'s.

◻ Choose five objects in your classroom.
Measure them using a ruler.
Order the objects from longest to shortest.
Write at least three sentences to describe the objects using the words **longer**, **longest**, **shorter** and **shortest**.

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Order Lengths

Reasoning and Problem Solving

Four children are measuring their heights.

Eva is taller than Rosie, but not as tall as Mo.

Dexter is taller than Mo.

Write down their names in order of their heights, starting with the shortest.

Shortest: Rosie
Eva
Mo
Tallest: Dexter

Dora says,

The taller you are, the longer your shoes are.

Measure the height of people in your class and measure the length of their shoes.

Is Dora correct?

Children will find different results depending on their class.

Four Operations with Lengths

Notes and Guidance

Children draw on their skills of the four operations and apply their understanding to length.

They solve one-step and two-step problems relating to length and use concrete and pictorial representations to calculate efficiently.
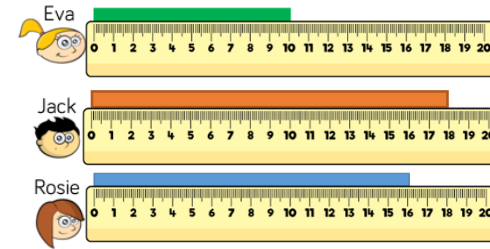
Mathematical Talk

Can you draw a bar model to help to decide which operations to use?

What are the key words in the question?

Can you ask and answer any different questions using the objects and information given?

Varied Fluency

Eva, Jack and Rosie each have a piece of ribbon.

- How much longer is Jack's ribbon than Eva's?
- Jack and Rosie put their ribbons together. How long are they altogether?
- Eva cuts three more ribbons of the same length as hers. What is the total length of all four ribbons?
- Eva cuts her ribbon in half. What is the length of each piece?

Teddy has a toy train and a toy plane.
The train is 28 cm long. The plane is 16 cm longer. How long is the plane?

The toy train is double the length of a toy car. How long is the toy car?

Draw bar models to help you.

Four Operations with Lengths
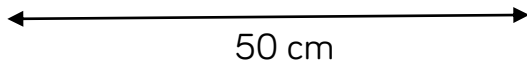
Reasoning and Problem Solving

Here is a strip of orange paper.

A blue strip is four times longer than a orange strip.

The strips are joined end to end.

50 cm

How long is the orange strip?

How long is the blue strip?

The orange strip is 10 cm long and a blue strip is 40 cm long.

There are 3 teddies in a box.

The brown teddy is 15 cm taller than the yellow teddy.

The yellow teddy is 3 cm shorter than the pink teddy.

The pink teddy is 42 cm tall.

How tall are the brown and yellow teddies?

How much taller is the brown teddy than the pink teddy?

The yellow teddy is 39 cm tall.

The brown teddy is 54 cm tall.

The brown teddy is 12 cm taller.