White Rose Maths

Spring - Block 4

Fractions

Overview

Small Steps

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

NC Objectives

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?

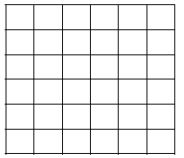
Do equal parts always look the same?

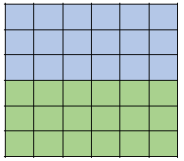
Is there more than one way to split the object/quantity into equal parts?

Varied Fluency

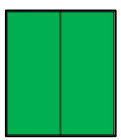
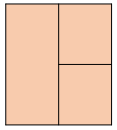
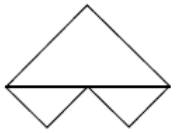
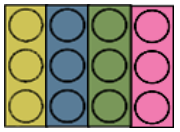
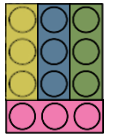
- Use different colours to show how this shape can be split into equal parts.

  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?

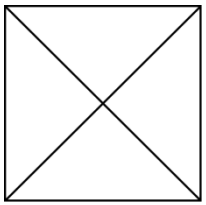
  How many ways can you split the teddies into equal parts?
  Be systematic in your approach.

Make Equal Parts

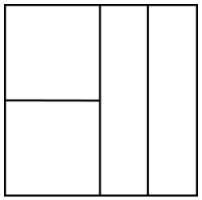
Reasoning and Problem Solving

Three children are splitting a square into equal parts.

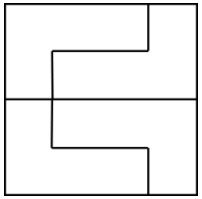
Teddy



Alex



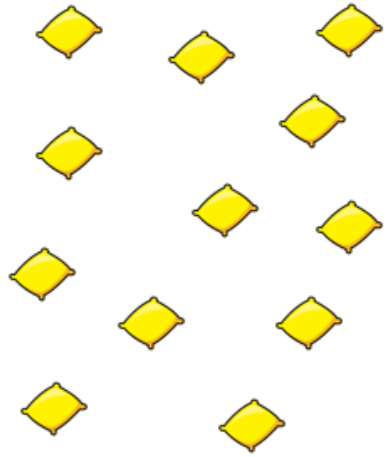
Mo



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?

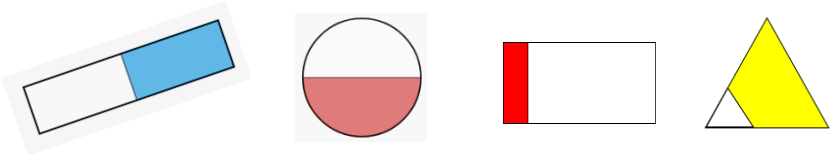
Varied Fluency

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

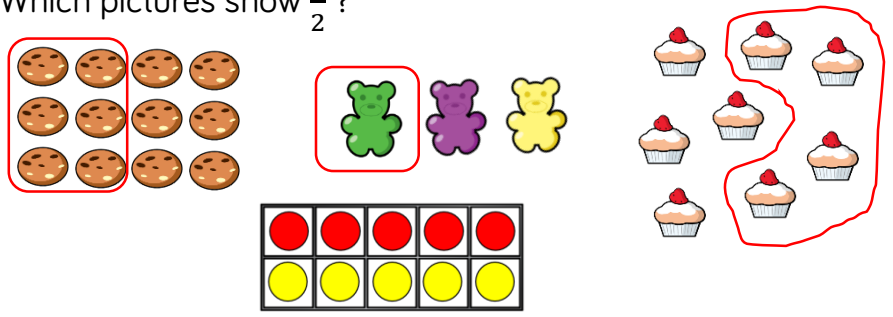
  Each part is worth a _____ .

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

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



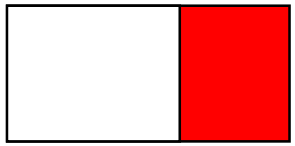
- Which pictures show $\frac{1}{2}$?

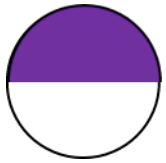


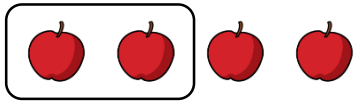
Recognise a Half

Reasoning and Problem Solving

Odd One Out





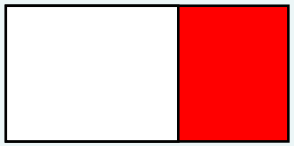


$\frac{1}{2}$

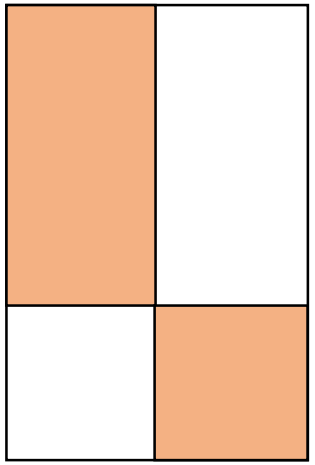
One half

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?

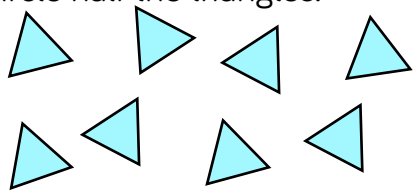
Varied Fluency

- 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 = ☐

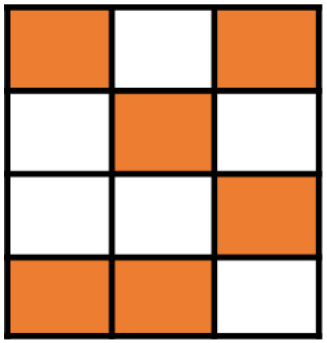
$\frac{1}{2}$ of 6 = ☐ $\frac{1}{2}$ of 60 = ☐

$\frac{1}{2}$ 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.

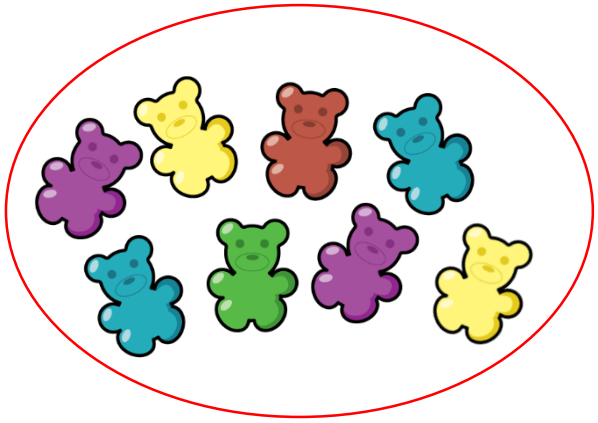
Yes because there are 12 squares altogether and 6 squares are shaded.
12 is the whole, half of 12 is 6

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?

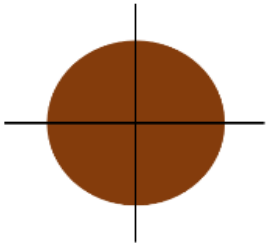
In $\frac{1}{4}$ what does the 1 represent? What does the 4 represent?

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.

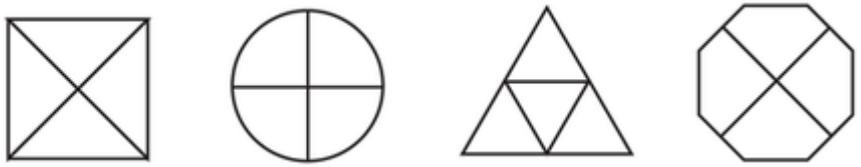


The cake is split into _____ equal parts.

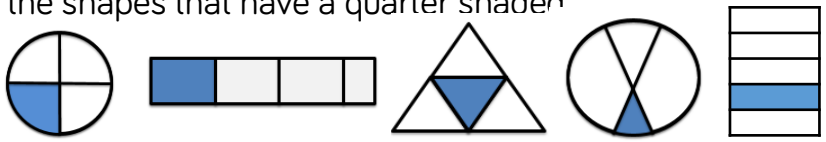
Each part is worth a _____ .

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

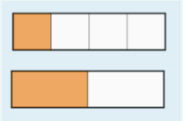
Reasoning and Problem Solving

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

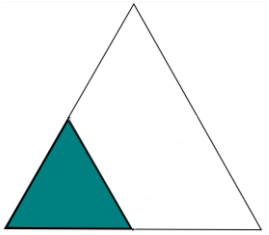
Use paper strips to prove Alex is incorrect.

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.



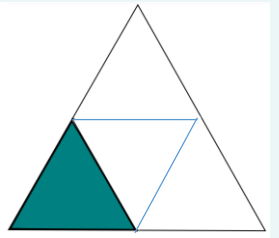
True or False?

$\frac{1}{4}$ 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.

Find a Quarter

Notes and Guidance

Children find quarters of shapes, objects and quantities. They begin by physically sharing amounts into four equal groups, or drawing around quantities then move towards working in the abstract. The link between the concrete, pictorial and abstract representations should be made explicit.
Support children in seeing the relationship between half of an amount and a quarter of an amount.

Mathematical Talk

What is the whole? What is a half? What is a quarter?

Can you circle a quarter in a different way?

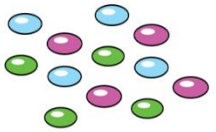
How do you know you have found $\frac{1}{4}$?

What do you notice about half of 12 and one quarter of 12? Can you explain what has happened?

If a quarter is _____ then the whole is _____

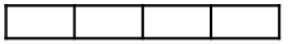
Varied Fluency

Share the smarties equally between 4 people.



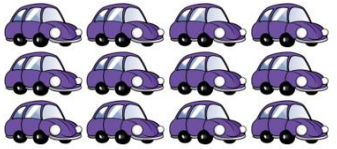
The smarties are split into ____ equal parts.

Each part is worth a _____ .



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

Circle one quarter of the cars.



One quarter of ____ is ____

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

Complete:

$\frac{1}{2}$ of 12 = ☐

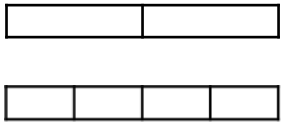
$\frac{1}{4}$ of 12 = ☐

$\frac{1}{2}$ of 20 = ☐

$\frac{1}{4}$ of 20 = ☐

$\frac{1}{2}$ of 8 = ☐

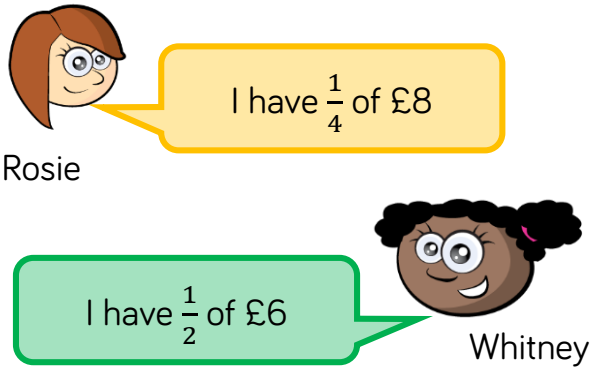
$\frac{1}{4}$ of 8 = ☐



Find a Quarter

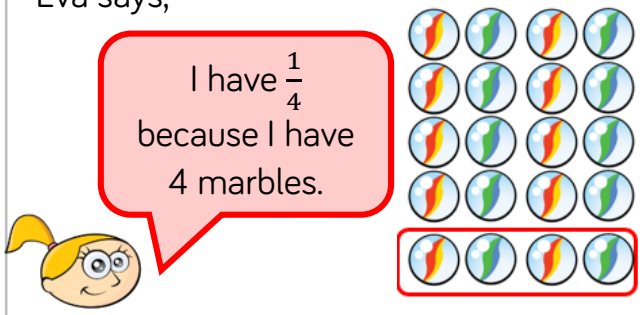
Reasoning and Problem Solving

Who has more? Explain why.



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

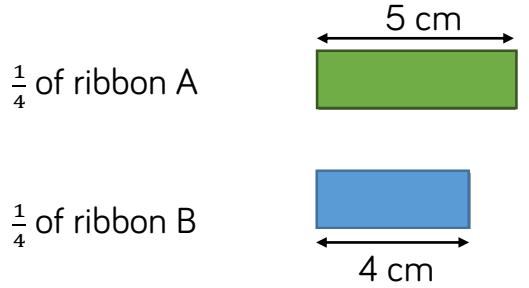
Eva says,



Do you agree? Explain why.

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

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



How long were Mo's whole pieces of ribbon?

Which ribbon was the longest? How much longer?

Ribbon A was 20 cm

Ribbon B was 16 cm

Ribbon A was 4cm longer.

Recognise a Third

Notes and Guidance

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

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

Mathematical Talk

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

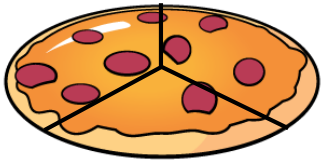
In $\frac{1}{3}$ what does the digit 1 represent? What does the digit 3 represent?

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

How many thirds make a whole?

Varied Fluency

Three friends are sharing a pizza.

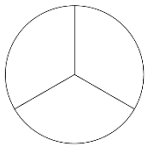
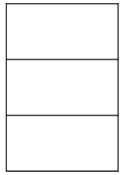
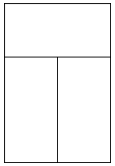
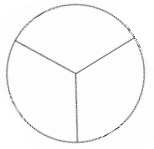


The pizza is split into _____ equal parts.

Each part is worth a _____ .

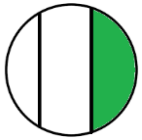
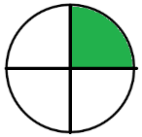
This is the same as $\frac{\square}{\square}$

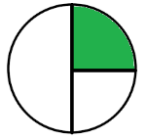
Shade $\frac{1}{3}$ of each shape.

What is the same? What is different?

Which shapes represent one third?

Explain why the other circles do not represent one third.

Recognise a Third

Reasoning and Problem Solving

Dora says,

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

Do you agree? Explain your reasoning.

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

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

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

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

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

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

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

Find a Third

Notes and Guidance

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

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

Mathematical Talk

How many objects make the whole?

Can we split the whole amount into three equal groups?

What is a third of ____ ?

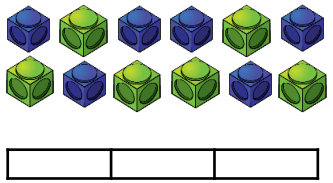
What is staying the same? What is changing?

How does changing the whole amount change the answer?

Is the answer still worth a third? Explain why?

Varied Fluency

Use the cubes to make three equal groups.



There are ____ cubes altogether.

One third of _____ is _____

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

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

Complete:

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

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

Find a third

Reasoning and Problem Solving

Annie has a piece of ribbon.

She cuts it into three equal parts.

One third of the ribbon is 6 cm long.

How long would half the ribbon be?

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

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

Ron is thinking of a number.

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

What could his number be?

27, 30, 33

Unit Fractions

Notes and Guidance

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

Mathematical Talk

How can we represent these unit fractions in different ways?

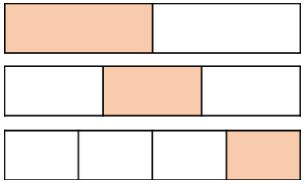
Why do we call them a unit fraction? Where can we see the unit?

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

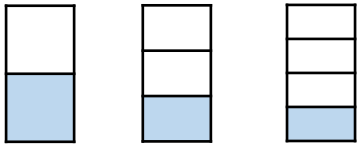
Which unit fraction is bigger/smaller if the whole is the same?

Varied Fluency

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



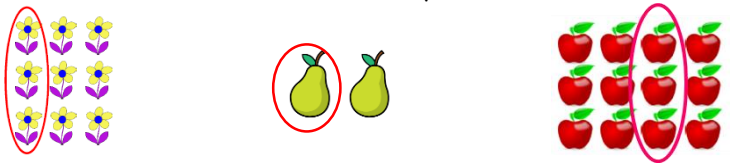
- What fraction is shaded in each diagram?



What do you notice? Complete the sentence.

The _____ the denominator the _____ the fraction.

- Match the unit fraction to the correct picture.



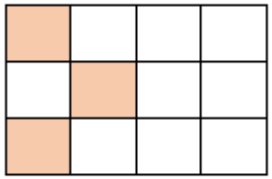
$\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{2}$

Unit Fractions

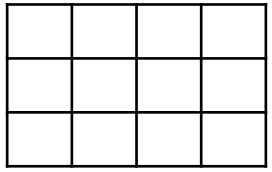
Reasoning and Problem Solving

True or False?

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



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



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

Any 4 squares shaded.

I am thinking of a number.

?

One third of my number is 12

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

Use cubes or a bar model to prove your answer.

The whole number is 36

One half is 18
One quarter is 9

One half of the number will be greater.

Non-Unit Fractions

Notes and Guidance

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

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

Mathematical Talk

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

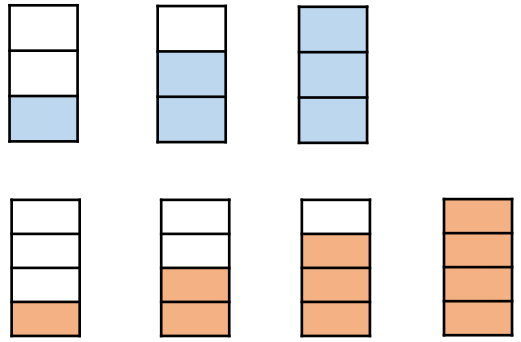
How many quarters are there in $\frac{3}{4}$?

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

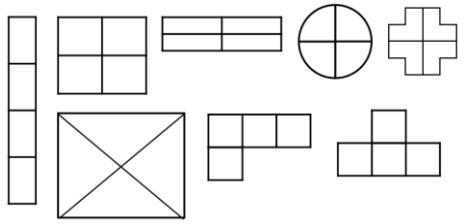
Give me an example of a unit fraction and a non-unit fraction.

Varied Fluency

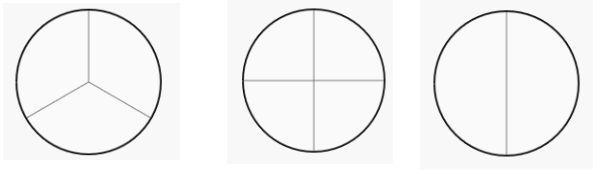
What fraction is shaded in each diagram?



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



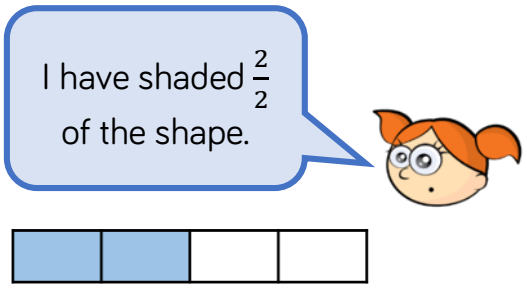
Shade in the whole of each circle. What fraction is represented in each case?



Non-Unit Fractions

Reasoning and Problem Solving

Alex says,



What mistake might Alex have made?

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

Sort the fractions into the table.

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

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

What do you notice?

Are there any boxes in the table empty?

What fraction could you write here?

Top left: Empty

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

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

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

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

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

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

Notes and Guidance

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

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

Mathematical Talk

What does equivalent mean? What symbol do we use?

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

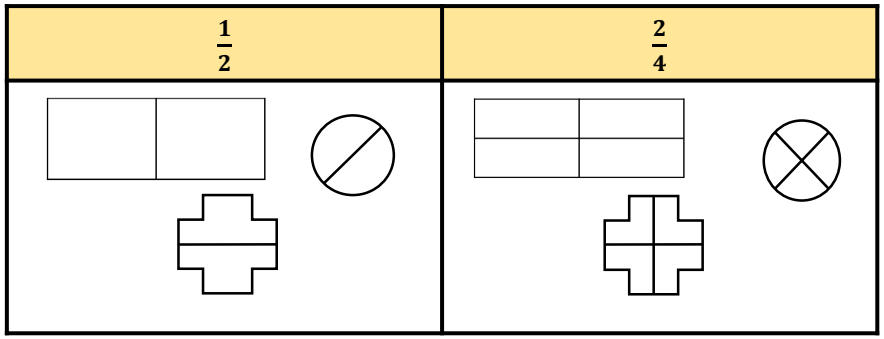
Are the numerators the same? Are the denominators the same?

How many quarters are equivalent to a half?

Varied Fluency

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

- Shade one half and two quarters of each shape.



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

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

Reasoning and Problem Solving

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

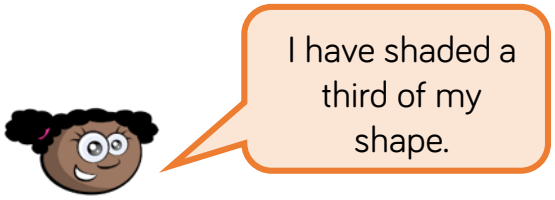
Who gets the most cookies?

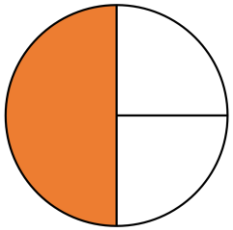
They both get the same amount. They will each get 6 cookies.

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

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

Whitney says:





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?

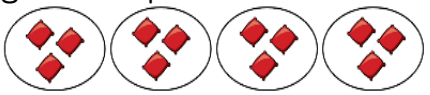
How many equal parts is $\frac{3}{4}$?

Can you spot any patterns?

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

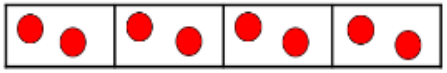
Varied Fluency

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:

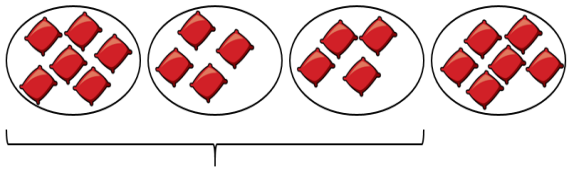
$\frac{1}{4}$ of 24 = ☐	$\frac{1}{4}$ of 4 = ☐	$\frac{1}{4}$ of ☐ = 5
$\frac{2}{4}$ of 24 = ☐	$\frac{3}{4}$ of 4 = ☐	$\frac{3}{4}$ of ☐ = 15
$\frac{3}{4}$ of 24 = ☐	$\frac{1}{4}$ of 8 = ☐	$\frac{1}{4}$ of ☐ = 2
$\frac{4}{4}$ of 24 = ☐	$\frac{3}{4}$ of 8 = ☐	☐ of 8 = 6

Find Three Quarters

Reasoning and Problem Solving

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

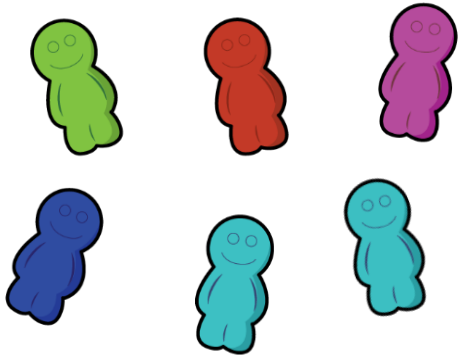
Can you spot his mistake?



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

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

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



How many sweets does Eva have left?

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

Count in Fractions

Notes and Guidance

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

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

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

Mathematical Talk

Which number are you starting on?

How many parts are there in your fraction whole?

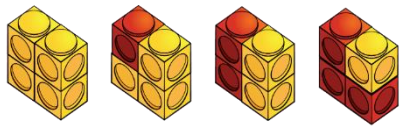
Which fraction will come next?

What patterns can you spot?

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

Varied Fluency

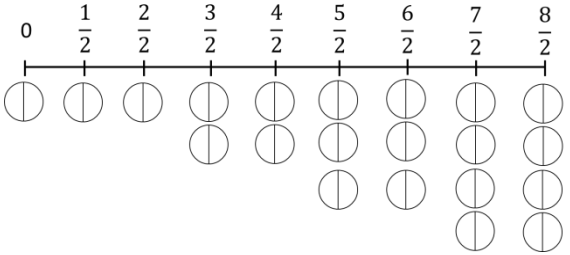
- What would the next image in the sequence look like?



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

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

- Shade the correct number of parts for each fraction.

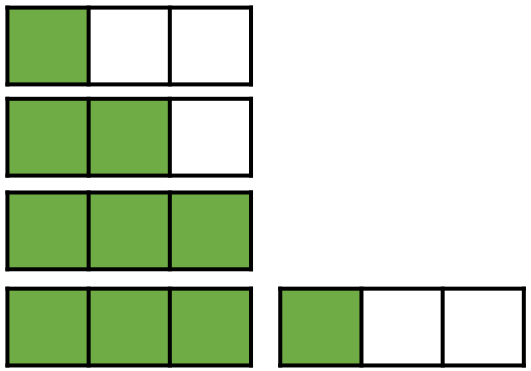


- Complete each number line.
What's the same, what's different?

Count in Fractions

Reasoning and Problem Solving

Look at this pattern.



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

What would be the 8th fraction in the pattern?

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

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

Alex and Whitney are counting in quarters.

Alex

One quarter, two quarters, three quarters, four quarters…

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

Whitney

Who is correct? Explain your answer.

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