Spring - Block 3

Fractions

Overview

Small Steps

Unit and non-unit fractions	R
What is a fraction?	
Tenths	R
Count in tenths	R
Equivalent fractions (1)	R
Equivalent fractions (2)	R
Equivalent fractions (1)	
Equivalent fractions (2)	
Fractions greater than 1	
Count in fractions	
Add fractions	R
Add 2 or more fractions	

Notes for 2020/21

Year 3 fractions work was in the summer term and learning may have been missed. We have therefore added a number of recap steps to ensure children have a thorough understanding of tenths and equivalent fractions before moving into adding and subtracting.

The progression from paper folding and finding two equivalent fractions is explored before moving onto looking at numerical relationships in a more abstract way.

Overview

Small Steps

- Subtract fractions R
- Subtract 2 fractions
- Subtract from whole amounts
- Fractions of a set of objects (1) R
- Fractions of a set of objects (2) R
- Calculate fractions of a quantity
- Problem solving – calculate quantities

Notes for 2020/21

The recap step here suggests children use practical equipment and pictorial representations to subtract fractions with the same denominator within one whole. They can then apply this to subtracting more than one fraction and from whole amounts.

Unit and Non-unit Fractions

Notes and Guidance

Children recap their understanding of unit and non-unit fractions from Year 2. They explain the similarities and differences between unit and non-unit fractions.

Children are introduced to fractions with denominators other than 2, 3 and 4, which they used in Year 2. Ensure children understand what the numerator and denominator represent.

Mathematical Talk

What is a unit fraction?

What is a non-unit fraction?

Show me $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ What's the same? What's different?

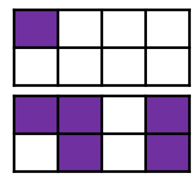
What fraction is shaded? What fraction is not shaded?

What is the same about the fractions? What is different?

Varied Fluency

R

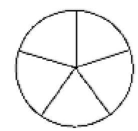
- Complete the sentences to describe the images.



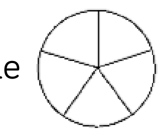
___ out of ___ equal parts are shaded.

$\frac{\square}{\square}$ of the shape is shaded.

- Shade $\frac{1}{5}$ of the circle.



Shade $\frac{3}{5}$ of the circle



Circle $\frac{1}{5}$ of the beanbags.

Circle $\frac{3}{5}$ of the beanbags.

What's the same and what's different about $\frac{1}{5}$ and $\frac{3}{5}$?

- Complete the sentences.

A unit fraction always has a numerator of _____
A non-unit fraction has a numerator that is ______ than _____
An example of a unit fraction is _____
An example of a non-unit fraction is ____

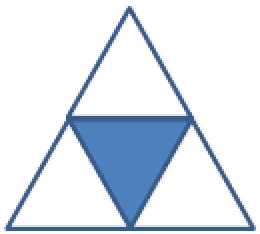
Can you draw a unit fraction and a non-unit fraction with the same denominator?

Unit and Non-unit Fractions

Reasoning and Problem Solving

R

True or False?



$\frac{1}{3}$ of the shape is shaded.

False, one quarter is shaded. Ensure when counting the parts of the whole that children also count the shaded part.

Sort the fractions into the table.

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

Are there any boxes in the table empty? Why?

$\frac{3}{4}$	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{2}{2}$	$\frac{4}{4}$	$\frac{2}{5}$	$\frac{1}{2}$

Top left: Empty

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

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

Bottom right: $\frac{3}{4}$, $\frac{3}{5}$ and $\frac{2}{5}$

There are no unit fractions that are equal to one whole other than $\frac{1}{1}$ but this isn't in our list.

What is a Fraction?

Notes and Guidance

Children explore fractions in different representations, for example, fractions of shapes, quantities and fractions on a number line.

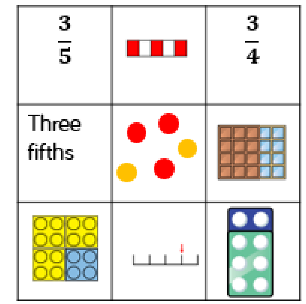
They explore and recap the meaning of numerator and denominator, non-unit and unit fractions.

Mathematical Talk

How can we sort the fraction cards?
What fraction does each one represent?
Could some cards represent more than one fraction?
Is $\frac{1.5}{3}$ an example of a non-unit fraction? Why?
Using Cuisenaire, how many white rods are equal to an orange rod? How does this help us work out what fraction the white rod represents?

Varied Fluency

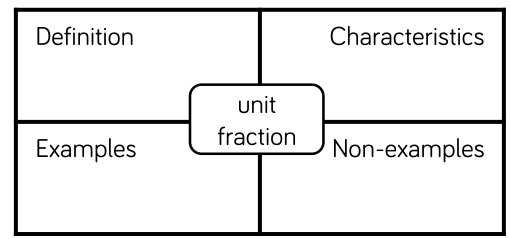
Here are 9 cards.
Sort the cards into different groups.
Can you explain how you made your decision?
Can you sort the cards in a different way?
Can you explain how your partner has sorted the cards?



Complete the Frayer model to describe a unit fraction.

Can you use the model to describe the following terms?

Non-unit fraction
Numerator
Denominator



Use Cuisenaire rods.
If the orange rod is one whole, what fraction is represented by:
- The white rod
- The red rod
- The yellow rod
- The brown rod

Choose a different rod to represent one whole.; what do the other rods represent now?

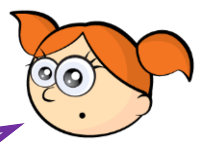
What is a Fraction?

Reasoning and Problem Solving

Always, Sometimes, Never?

Alex says,

If I split a shape into 4 parts, I have split it into quarters.

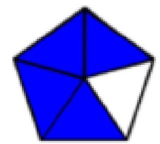


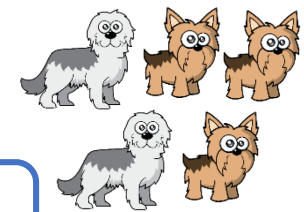
Explain your answer.

Sometimes

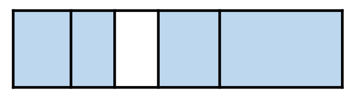
If the shape is not split equally, it will not be in quarters.

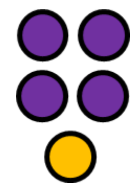
Which representations of $\frac{4}{5}$ are incorrect?





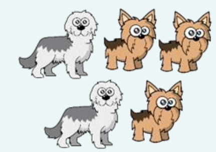
$\boxed{\frac{4}{5}}$



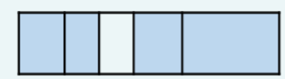


Explain how you know.

The image of the dogs could represent $\frac{2}{5}$ or $\frac{3}{5}$



The bar model is not divided into equal parts so this does not represent $\frac{4}{5}$



Tenths

Notes and Guidance

Children explore what a tenth is. They recognise that tenths arise from dividing one whole into 10 equal parts.

Children represent tenths in different ways and use words and fractions to describe them. For example, one tenth and $\frac{1}{10}$

Mathematical Talk

How many tenths make the whole?

How many tenths are shaded?

How many more tenths do I need to make a whole?

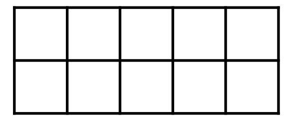
When I am writing tenths, the ___________ is always 10

How are fractions linked to division?

Varied Fluency

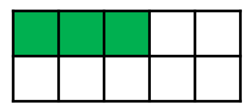
If the frame represents 1 whole, what does each box represent?
Use counters to represent:

- One tenth
- Two tenths
- Three tenths
- One tenth less than eight tenths

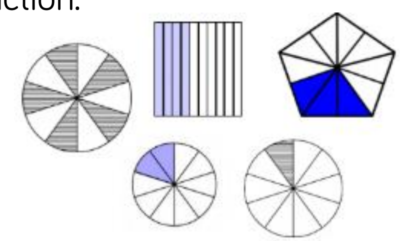


Identify what fraction of each shape is shaded.
Give your answer in words and as a fraction.

e.g.



Three tenths $\frac{3}{10}$



Annie has 2 cakes. She wants to share them equally between 10 people. What fraction of the cakes will each person get?

There are ____ cakes.
They are shared equally between ___ people.
Each person has $\frac{\square}{\square}$ of the cake.

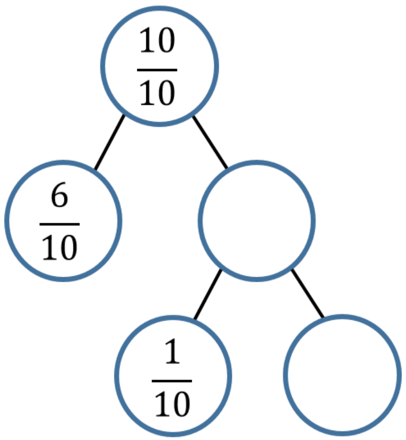
___ ÷ ____ = _____

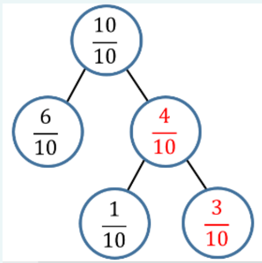
What fraction would they get if Annie had 4 cakes?

Tenths

Reasoning and Problem Solving

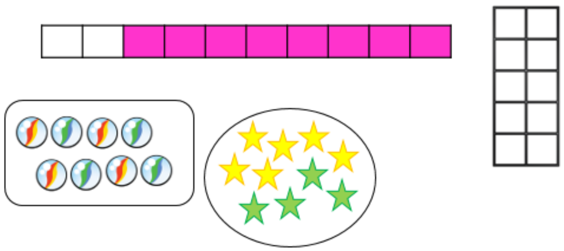
Fill in the missing values.
Explain how you got your answers.





Children could use practical equipment to explain why and how, and relate back to the counting stick.

Odd One Out



Which is the odd one out?
Explain your answer.

The marbles are the odd one out because they represent 8 or eighths. All of the other images have a whole which has been split into ten equal parts.

Count in Tenths

Notes and Guidance

Children count up and down in tenths using different representations.

Children also explore what happens when counting past $\frac{10}{10}$. They are not required to write mixed numbers, however children may see the $\frac{11}{10}$ as $1\frac{1}{10}$ due to their understanding of 1 whole.

Mathematical Talk

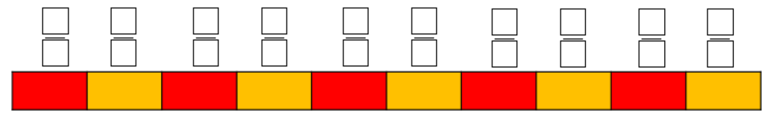
Let's count in tenths. What comes next? Explain how you know.

If I start at ___ tenths, what will be next?

When we get to $\frac{10}{10}$ what else can we say? What happens next?

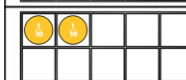
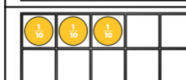
Varied Fluency

The counting stick is worth 1 whole. Label each part of the counting stick. Can you count forwards and backwards along the counting stick?

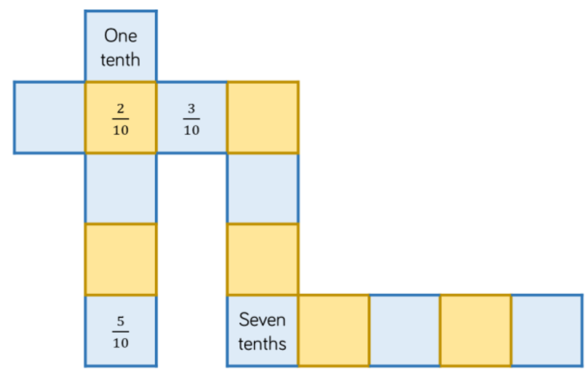


Continue the pattern in the table.

- What comes between $\frac{4}{10}$ and $\frac{6}{10}$?
- What is one more than $\frac{10}{10}$?
- If I start at $\frac{8}{10}$ and count back $\frac{4}{10}$, where will I stop?

Representation	Words	Fraction
	One tenth	$\frac{1}{10}$
		
		

Complete the sequences.

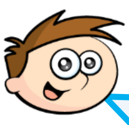


Count in Tenths

Reasoning and Problem Solving

R

Teddy is counting in tenths.



Seven tenths, eight tenths, nine tenths, ten tenths, one eleventh, two elevenths, three elevenths…

Can you spot his mistake?

Teddy thinks that after ten tenths you start counting in elevenths. He does not realise that ten tenths is the whole, and so the next number in the sequence after ten tenths is eleven tenths or one and one tenth.

True or False?

Five tenths is $\frac{2}{10}$ smaller than 7 tenths.

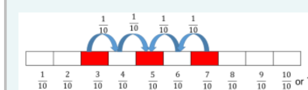
Five tenths is $\frac{2}{10}$ larger than three tenths.

Do you agree?

Explain why.

This is correct. Children could show it using pictures, ten frames, number lines etc.

For example:



Equivalent Fractions (1)

Notes and Guidance

Children begin by using Cuisenaire or number rods to investigate and record equivalent fractions. Children then move on to exploring equivalent fractions through bar models.

Children explore equivalent fractions in pairs and can start to spot patterns.

Mathematical Talk

If the ___ rod is worth 1, can you show me $\frac{1}{2}$? How about $\frac{1}{4}$?
Can you find other rods that are the same? What fraction would they represent?

How can you fold a strip of paper into equal parts?
What do you notice about the numerators and denominators?
Do you see any patterns?

Can a fraction have more than one equivalent fraction?

Varied Fluency

R

- The pink Cuisenaire rod is worth 1 whole.

  Which rod would be worth $\frac{1}{4}$?
  Which rods would be worth $\frac{2}{4}$?
  Which rod would be worth $\frac{1}{2}$?
  Use Cuisenaire to find rods to investigate other equivalent fractions.

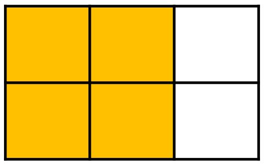
- Use two strips of equal sized paper. Fold one strip into quarters and the other into eighths. Place the quarters on top of the eighths and lift up one quarter, how many eighths can you see? How many eighths are equivalent to one quarter? Which other equivalent fractions can you find?

- Using squared paper, investigate equivalent fractions using equal parts. e.g. $\frac{\square}{4} = \frac{\square}{8}$
  Start by drawing a bar 8 squares along. Label each square $\frac{1}{8}$
  Underneath compare the same length bar split into four equal parts. What fraction is each part now?

Equivalent Fractions (1)

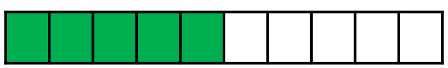
Reasoning and Problem Solving

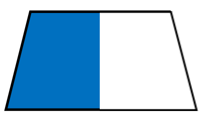
Explain how the diagram shows both $\frac{2}{3}$ and $\frac{4}{6}$

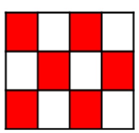


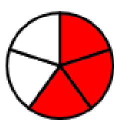
The diagram is divided in to six equal parts and four out of the six are yellow. You can also see three **columns** and two columns are yellow.

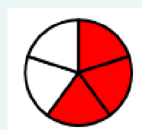
Which is the odd one out? Explain why



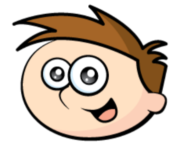








This is the odd one out because the other fractions are all equivalent to $\frac{1}{2}$



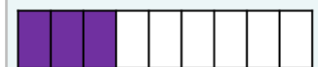
Teddy makes this fraction:

Mo says he can make an equivalent fraction with a denominator of 9

Dora disagrees. She says it can’t have a denominator of 9 because the denominator would need to be double 3

Who is correct? Who is incorrect? Explain why.

Mo is correct. He could make three ninths which is equivalent to one third.



Dora is incorrect. She has a misconception that you can only double to find equivalent fractions.

Equivalent Fractions (2)

Notes and Guidance

Children use Cuisenaire rods and paper strips alongside number lines to deepen their understanding of equivalent fractions.
Encourage children to focus on how the number line can be divided into different amounts of equal parts and how this helps to find equivalent fractions e.g. a number line divided into twelfths can also represent halves, thirds, quarters and sixths.

Mathematical Talk

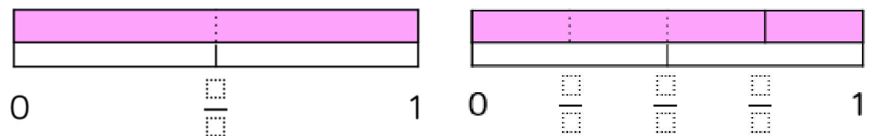
The number line represents 1 whole, where can we see the fraction $\frac{\square}{\square}$? Can we see any equivalent fractions?

Look at the number line divided into twelfths. Which unit fractions can you place on the number line as equivalent fractions? e.g. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ etc. Which unit fractions are not equivalent to twelfths?

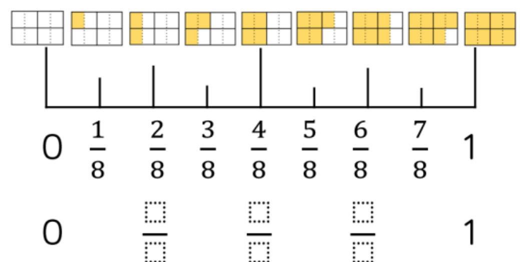
Varied Fluency

R

- Use the models on the number line to identify the missing fractions. Which fractions are equivalent?



- Complete the missing equivalent fractions.



- Place these equivalent fractions on the number line.

$\frac{1}{4}$ $\frac{3}{4}$ $\frac{1}{6}$ $\frac{1}{3}$ $\frac{2}{3}$

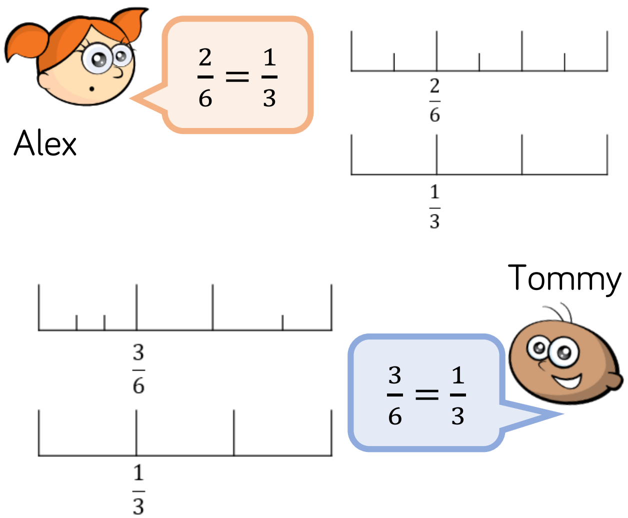
Are there any other equivalent fractions you can identify on the number line?

Equivalent Fractions (2)

Reasoning and Problem Solving

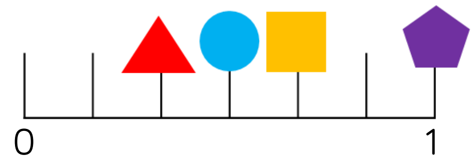
R

Alex and Tommy are using number lines to explore equivalent fractions.



Who do you agree with? Explain why.

Alex is correct. Tommy's top number line isn't split into equal parts which means he cannot find the correct equivalent fraction.

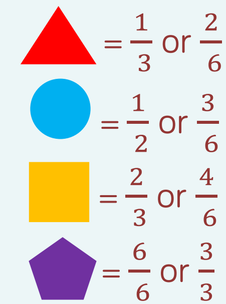


Use the clues to work out which fraction is being described for each shape.

- My denominator is 6 and my numerator is half of my denominator.
- I am equivalent to $\frac{4}{12}$
- I am equivalent to one whole
- I am equivalent to $\frac{2}{3}$

Can you write what fraction each shape is worth? Can you record an equivalent fraction for each one?

- Circle
- Triangle
- Square
- Pentagon



Accept other correct equivalences

Equivalent Fractions (1)

Notes and Guidance

Children use strip diagrams to investigate and record equivalent fractions.

They start by comparing two fractions before moving on to finding more than one equivalent fraction on a fraction wall.

Mathematical Talk

Look at the equivalent fractions you have found.
What relationship can you see between the numerators and denominators? Are there any patterns?

Can a fraction have more than one equivalent fraction?

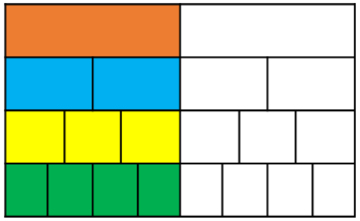
Can you use Cuisenaire rods or pattern blocks to investigate equivalent fractions?

Varied Fluency

- Use two strips of equal sized paper.
Fold one strip into quarters and the other into eighths.
Place the quarters on top of the eighths and lift up one quarter; how many eighths can you see?
How many eighths are equivalent to one quarter?
Which other equivalent fractions can you find?

- Using squared paper, investigate equivalent fractions using equal parts e.g. $\frac{2}{4} = \frac{?}{8}$
Start by drawing a bar 8 squares long.
Underneath, compare the same length bar split into four equal parts.

- How many fractions that are equivalent to one half can you see on the fraction wall?

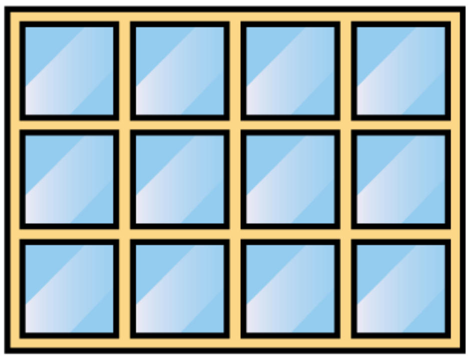


Draw extra rows to show other equivalent fractions.

Equivalent Fractions (1)

Reasoning and Problem Solving

How many equivalent fractions can you see in this picture?

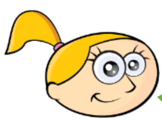


Children can give a variety of possibilities.
Examples:

$$\frac{1}{2} = \frac{6}{12} = \frac{3}{6}$$

$$\frac{1}{4} = \frac{3}{12}$$

Eva says,



I know that $\frac{3}{4}$ is equivalent to $\frac{3}{8}$ because the numerators are the same.

Is Eva correct?
Explain why.

Eva is not correct.
$\frac{3}{4}$ is equivalent to $\frac{6}{8}$
When the numerators are the same, the larger the denominator, the smaller the fraction.

Ron has two strips of the same sized paper.
He folds the strips into different sized fractions.
He shades in three equal parts on one strip and six equal parts on the other strip.
The shaded areas are equal.

What fractions could he have folded his strips into?

Ron could have folded his strips into sixths and twelfths, quarters and eighths or any other fractions where one of the denominators is double the other.

Equivalent Fractions (2)

Notes and Guidance

Children continue to understand equivalence through diagrams. They move onto using proportional reasoning to find equivalent fractions.

Attention should be drawn to the method of multiplying the numerators and denominators by the same number to ensure that fractions are equivalent.

Mathematical Talk

What other equivalent fractions can you find using the diagram?

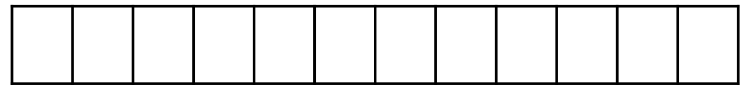
What relationships can you see between the fractions?

If I multiply the numerator by a number, what do I have to do to the denominator to keep it equivalent? Is this always true?

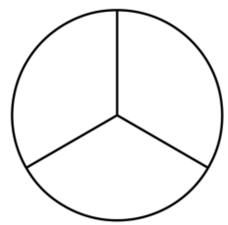
What relationships can you see between the numerator and denominator?

Varied Fluency

- Using the diagram, complete the equivalent fractions.



$\frac{1}{4} = \frac{\square}{12}$ $\quad \frac{1}{\square} = \frac{6}{12}$ $\quad \frac{2}{3} = \frac{\square}{12}$ $\quad \frac{5}{12} = \frac{\square}{24}$

- 

Using the diagram, complete the equivalent fractions.

$\frac{1}{3} = \frac{\square}{6} = \frac{\square}{12} = \frac{\square}{24}$

- Complete:

$\frac{1}{4} = \frac{2}{\square} = \frac{\square}{12} = \frac{4}{\square} = \frac{\square}{100} = \frac{\square}{500}$

Equivalent Fractions (2)

Reasoning and Problem Solving

Tommy is finding equivalent fractions.

$$\frac{3}{4} = \frac{5}{6} = \frac{7}{8} = \frac{9}{10}$$

He says,

I did the same thing to the numerator and the denominator so my fractions are equivalent.

Do you agree with Tommy?
Explain your answer.

Tommy is wrong. He has added two to the numerator and denominator each time. When you find equivalent fractions you either need to multiply or divide the numerator and denominator by the same number.

Use the digit cards to complete the equivalent fractions.

1 2 3
4 6 8

$$\frac{\square}{\square} = \frac{\square}{\square}$$

How many different ways can you find?

Possible answers:

$\frac{1}{2} = \frac{3}{6}$, $\frac{1}{2} = \frac{4}{8}$,

$\frac{1}{3} = \frac{2}{6}$, $\frac{1}{4} = \frac{2}{8}$,

$\frac{3}{4} = \frac{6}{8}$, $\frac{2}{3} = \frac{4}{6}$

Fractions Greater than 1

Notes and Guidance

Children use manipulatives and diagrams to show that a fraction can be split into wholes and parts.

Children focus on how many equal parts make a whole dependent on the number of equal parts altogether. This learning will lead on to Year 5 where children learn about improper fractions and mixed numbers.

Mathematical Talk

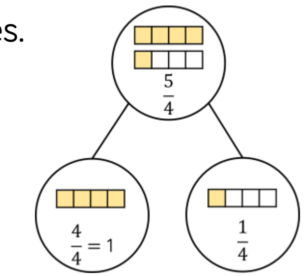
How many ____ make a whole?

If I have _____ eighths, how many more do I need to make a whole?

What do you notice about the numerator and denominator when a fraction is equivalent to a whole?

Varied Fluency

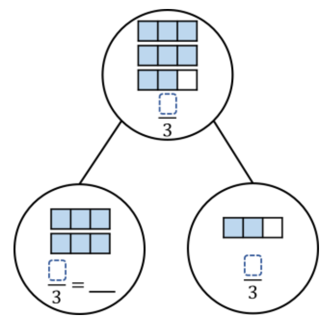
Complete the part-whole models and sentences.

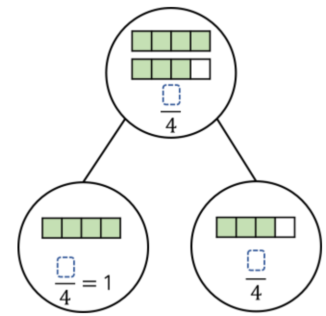


There are ____ quarters altogether.

___ quarters = ____ whole and ____ quarter.

Write sentences to describe these part-whole models.





Complete. You may use part-whole models to help you.

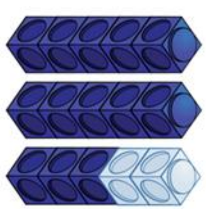
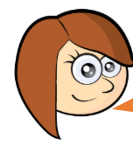
$$\frac{10}{3} = \frac{9}{3} + \frac{\square}{3} = 3\frac{\square}{3}$$

$$\frac{\square}{3} = \frac{6}{3} + \frac{2}{3} = \square\frac{2}{3}$$

$$\frac{\square}{8} = \frac{16}{8} + \frac{3}{8} = \square\frac{\square}{\square}$$

Fractions Greater than 1

Reasoning and Problem Solving

3 friends share some pizzas. Each pizza is cut into 8 equal slices. Altogether, they eat 25 slices. How many whole pizzas do they eat?	They eat 3 whole pizzas and 1 more slice.
Spot the mistake.  $\frac{13}{5}$ = 10 wholes and 3 fifths	There are 2 wholes not 10 $\frac{10}{5}$ = 2 wholes $\frac{13}{5}$ = 2 wholes and 3 fifths
Rosie says,  $\frac{16}{4}$ is greater than $\frac{8}{2}$ because 16 is greater than 8 Do you agree? Explain why.	I disagree with Rosie because both fractions are equivalent to 4 Children may choose to build both fractions using cubes, or draw bar models.

Count in Fractions

Notes and Guidance

Children explore fractions greater than one on a number line and start to make connections between improper and mixed numbers.

They use cubes and bar models to represent fractions greater than a whole. This will support children when adding and subtracting fractions greater than a whole.

Mathematical Talk

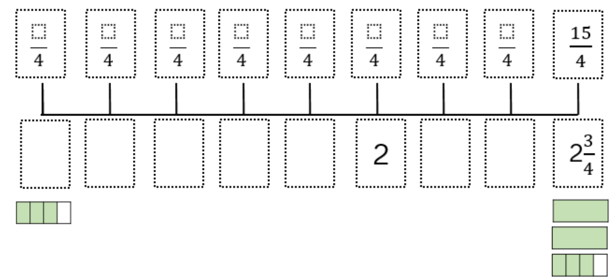
How many ____ make a whole?

Can you write the missing fractions in more than one way?

Are the fractions ascending or descending?

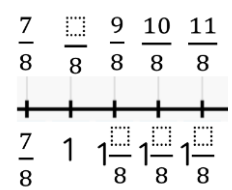
Varied Fluency

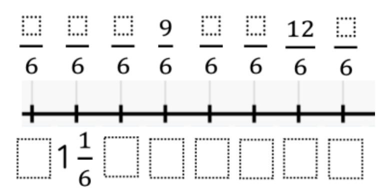
Complete the number line.



Draw bar models to represent each fraction.

Fill in the blanks using cubes or bar models to help you.





Write the next two fractions in each sequence.

a) $\frac{12}{7}, \frac{11}{7}, \frac{10}{7}$, ____, ____

b) $3\frac{1}{3}, 3, 2\frac{2}{3}$, ____, ____

c) $\frac{4}{11}, \frac{6}{11}, \frac{8}{11}$, ____, ____

d) $12\frac{3}{5}, 13\frac{1}{5}, 13\frac{4}{5}$, ____, ____

Count in Fractions

Reasoning and Problem Solving

Here is a number sequence.

$\frac{5}{12}, \frac{7}{12}, \frac{10}{12}, \frac{14}{12}, \frac{19}{12}, \_\_\_\_$

Which fraction would come next?
Can you write the fraction in more than one way?

The fractions are increasing by one more twelfth each time. The next fraction would be $\frac{25}{12}$

Circle and correct the mistakes in the sequences.

$\frac{5}{12}, \frac{8}{12}, \frac{11}{12}, \frac{15}{12}, \frac{17}{12}$

$\frac{9}{10}, \frac{7}{10}, \frac{6}{10}, \frac{3}{10}, \frac{1}{10}$

$\frac{5}{12}, \frac{8}{12}, \frac{11}{12}, \frac{14}{12}, \frac{17}{12}$

$\frac{9}{10}, \frac{7}{10}, \frac{5}{10}, \frac{3}{10}, \frac{1}{10}$

Play the fraction game for four players.
Place the four fraction cards on the floor.
Each player stands in front of a fraction.
We are going to count up in tenths starting at 0
When you say a fraction, place your foot on your fraction.

$\frac{1}{10}$ $\frac{2}{10}$

$\frac{3}{10}$ $\frac{5}{10}$

How can we make 4 tenths?
What is the highest fraction we can count to?
How about if we used two feet?

2 children can make four tenths by stepping on one tenth and three tenths at the same time.
Alternatively, one child can make four tenths by stepping on $\frac{2}{10}$ with 2 feet.
With one foot, they can count up to 11 tenths or one and one tenth.
With two feet they can count up to 22 tenths.

Add Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to add two or more fractions with the same denominator where the total is less than 1

They understand that we only add the numerators and the denominators stay the same.

Mathematical Talk

Using your paper circles, show me what $\frac{\square}{4} + \frac{\square}{4}$ is equal to.

How many quarters in total do I have?

How many parts is the whole divided into?
How many parts am I adding?
What do you notice about the numerators?
What do you notice about the denominators?

Varied Fluency

- Take a paper circle. Fold your circle to split it into 4 equal parts. Colour one part red and two parts blue. Use your model to complete the sentences.
  ______ quarter is red.
  ______ quarters are blue.
  ______ quarters are coloured in.
  Show this as a number sentence. $\frac{\square}{4} + \frac{\square}{4} = \frac{\square}{4}$

- 

  We can use this model to calculate $\frac{3}{8} + \frac{1}{8} = \frac{4}{8}$
  Draw your own models to calculate

  $\frac{1}{5} + \frac{2}{5} = \frac{\square}{5}$ $\quad$ $\frac{2}{7} + \frac{3}{7} + \frac{1}{7} = \frac{\square}{\square}$ $\quad$ $\frac{7}{10} + \frac{\square}{\square} = \frac{9}{10}$

- Eva eats $\frac{5}{12}$ of a pizza and Annie eats $\frac{1}{12}$ of a pizza.
  What fraction of the pizza do they eat altogether?

White Rose Maths

Add Fractions

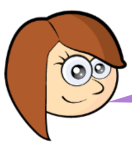
Reasoning and Problem Solving

R

Rosie and Whitney are solving:

$$\frac{4}{7} + \frac{2}{7}$$

Rosie says,



The answer is $\frac{6}{7}$

Whitney says,

The answer is $\frac{6}{14}$

Who do you agree with?
Explain why.

Rosie is correct.
Whitney has made the mistake of also adding the denominators.
Children could prove why Whitney is wrong using a bar model or strip diagram.

Mo and Teddy share these chocolates.

They both eat an odd number of chocolates.
Complete this number sentence to show what fraction of the chocolates they each could have eaten.

$$\frac{\square}{\square} + \frac{\square}{\square} = \frac{12}{12}$$

Possible answers:

$\frac{1}{12} + \frac{11}{12}$

$\frac{3}{12} + \frac{9}{12}$

$\frac{5}{12} + \frac{7}{12}$

(In either order)

Add 2 or More Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to add two or more fractions. Children record their answers as an improper fraction when the total is more than 1

A common misconception is to add the denominators as well as the numerators. Use bar models to support children's understanding of why this is incorrect.

Children can also explore adding fractions more efficiently by using known facts or number bonds to help them.

Mathematical Talk

How many equal parts is the whole split into? How many equal parts am I adding?

Which bar model do you prefer when adding fractions? Why?

Can you combine any pairs of fractions to make one whole when you are adding three fractions?

Varied Fluency

- Take two identical strips of paper.
  Fold your paper into quarters.
  Can you use the strips to solve

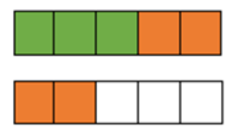
  $\frac{1}{4} + \frac{1}{4}$ $\quad$ $\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$ $\quad$ $\frac{3}{4} + \frac{3}{4}$ $\quad$ $\frac{\square}{4} + \frac{\square}{4} = \frac{7}{4}$

  What other fractions can you make and add?

- Use the models to add the fractions:

  $\frac{2}{7} + \frac{2}{7} =$

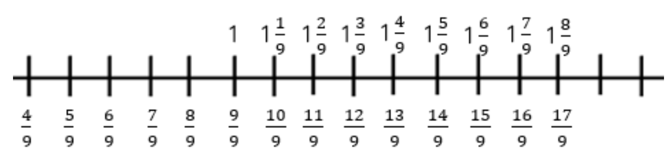
  

  $\frac{3}{5} + \frac{4}{5} =$

  Choose your preferred model to add:

  $\frac{2}{5} + \frac{1}{5}$ $\quad$ $\frac{3}{7} + \frac{6}{7}$ $\quad$ $\frac{7}{9} + \frac{4}{9}$

- Use the number line to add the fractions.

  $\frac{4}{9} + \frac{4}{9} + \frac{8}{9} =$

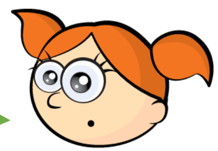
  $\frac{4}{9} + \frac{5}{9} + \frac{8}{9}$ $\quad$ $\frac{1}{9} + \frac{11}{9} + 1$ $\quad$ $\frac{\square}{9} + \frac{5}{9} + \frac{7}{9} = \frac{17}{9}$

Add 2 or More Fractions

Reasoning and Problem Solving

Alex is adding fractions.

$$\frac{3}{9} + \frac{2}{9} = \frac{5}{18}$$



Is she correct? Explain why.

Alex is incorrect. Alex has added the denominators as well as the numerators.

How many different ways can you find to solve the calculation?

$$\frac{\square}{\square} + \frac{\square}{\square} = \frac{11}{9}$$

Any combination of ninths where the numerators total 11.

Mo and Teddy are solving:

$$\frac{6}{13} + \frac{5}{13} + \frac{7}{13}$$

Mo

The answer is 1 and $\frac{5}{13}$

Teddy

The answer is $\frac{18}{13}$

Who do you agree with? Explain why.

They are both correct.

Mo has added $\frac{6}{13} + \frac{7}{13}$ to make 1 whole and then added $\frac{5}{13}$

Subtract Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to subtract fractions with the same denominator within one whole.

They understand that we only subtract the numerators and the denominators stay the same.

Mathematical Talk

What fraction is shown first? Then what happens? Now what is left? Can we represent this in a number story?

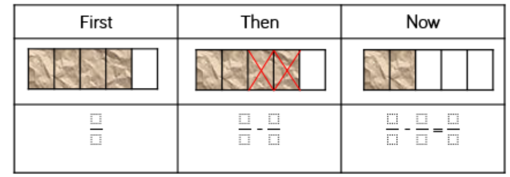
Which models show take away? Which models show finding the difference? What's the same? What's different?
Can we represent these models in a number story?

Can you partition $\frac{9}{11}$ in a different way?

Varied Fluency

R

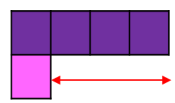
- Eva is eating a chocolate bar. Fill in the missing information.



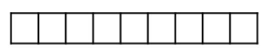
Can you write a number story using 'first', 'then' and 'now' to describe your calculation?

- Use the models to help you subtract the fractions.

$\frac{5}{7} - \frac{\square}{7} = \frac{\square}{7}$

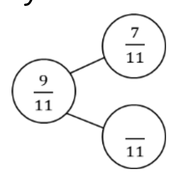


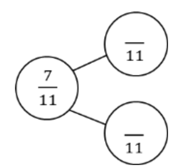
$\frac{4}{8} - \frac{\square}{8} = \frac{\square}{8}$

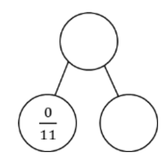


$\frac{\square}{9} - \frac{\square}{9} = \frac{4}{9}$

- Complete the part whole models. Use equipment if needed. Can you write fact families for each model?







Subtract Fractions

Reasoning and Problem Solving

Find the missing fractions:

$$\frac{7}{7} - \frac{3}{7} = \frac{2}{7} + \frac{\square}{7}$$

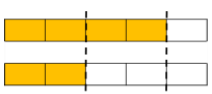
$$\frac{\square}{9} - \frac{5}{9} = \frac{4}{9} - \frac{2}{9}$$

$$\frac{7}{7} - \frac{3}{7} = \frac{2}{7} + \frac{2}{7}$$

$$\frac{7}{9} - \frac{5}{9} = \frac{4}{9} - \frac{2}{9}$$

Jack and Annie are solving $\frac{4}{5} - \frac{2}{5}$

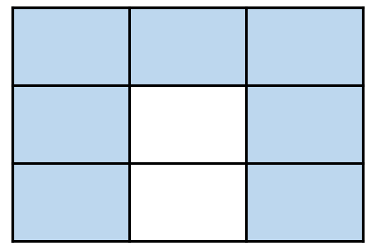
Jack's method: 

Annie's method: 

They both say the answer is two fifths. Can you explain how they have found their answers?

Jack has taken two fifths away. Annie has found the difference between four fifths and two fifths.

How many fraction addition and subtractions can you make from this model?



There are lots of calculations children could record. Children may even record calculations where there are more than 2 fractions e.g. $\frac{3}{9} + \frac{1}{9} + \frac{3}{9} = \frac{7}{9}$ Children may possibly see the red representing one fraction and the white another also.

White Rose Maths

Subtract 2 Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to subtract fractions with the same denominator.

Encourage children to explore subtraction as take away and as difference. Difference can be represented on a bar model by using a comparison model and making both fractions in the subtraction.

Mathematical Talk

Have you used take away or difference to subtract the eighths using the strips of paper? How are they the same? How are they different?

How can I find a missing number in a subtraction? Can you count on to find the difference?

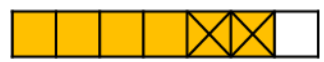
Can I partition my fraction to help me subtract?

Varied Fluency

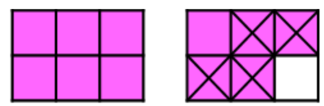
- Use identical strips of paper and fold them into eighths. Use the strips to solve the calculations.

$\frac{8}{8} - \frac{3}{8} =$ $\qquad \frac{7}{8} - \frac{3}{8} =$ $\qquad \frac{16}{8} - \frac{9}{8} =$ $\qquad \frac{13}{8} - \frac{\square}{8} = \frac{7}{8}$

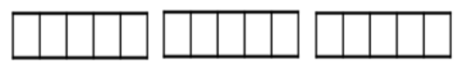
- Use the bar models to subtract the fractions.



$\frac{6}{7} - \frac{2}{7} =$

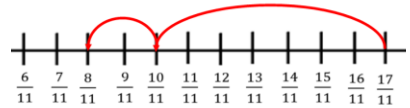


$\frac{11}{6} - \frac{\square}{6} = \frac{\square}{6}$



$\frac{13}{5} - \frac{\square}{5} = \frac{6}{5}$

- Annie uses the number line to solve $\frac{17}{11} - \frac{9}{11}$



Use a number line to solve:

$\frac{16}{13} - \frac{9}{13}$ $\qquad \frac{16}{9} - \frac{9}{9}$ $\qquad \frac{16}{7} - \frac{9}{7}$ $\qquad \frac{16}{16} - \frac{9}{16}$

Subtract 2 Fractions

Reasoning and Problem Solving

Match the number stories to the correct calculations.

Teddy eats $\frac{7}{8}$ of a pizza. Dora eats $\frac{4}{8}$ How much do they eat altogether?	$\frac{7}{8}+\frac{3}{8}=\frac{\ }{\ }$
Teddy eats $\frac{7}{8}$ of a pizza. Dora eats $\frac{4}{8}$ less. How much do they eat altogether?	$\frac{7}{8}+\frac{4}{8}=\frac{\ }{\ }$
Teddy eats $\frac{7}{8}$ of a pizza. Dora eats $\frac{3}{8}$ less. How much does Dora eat?	$\frac{7}{8}-\frac{3}{8}=\frac{\ }{\ }$

1st question matches with second calculation. 2nd question with first calculation. 3rd question with third calculation.

How many different ways can you find to solve the calculation?

$$\frac{\square}{7}-\frac{3}{7}=\frac{\square}{7}+\frac{\square}{7}$$

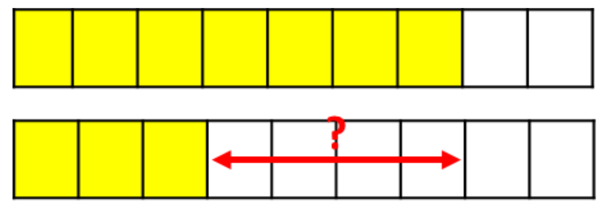
$$\frac{\square}{7}-\frac{3}{7}=\frac{\square}{7}-\frac{\square}{7}$$

Children may give a range of answers as long as the calculation for the numerators is correct.

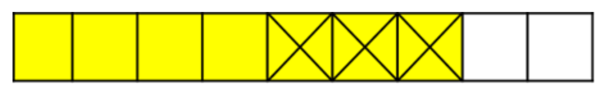
Annie and Amir are working out the answer to this problem.

$$\frac{7}{9}-\frac{3}{9}$$

Annie uses this model.



Amir uses this model.



Which model is correct? Explain why.

Can you write a number story for each model?

They are both correct. The first model shows finding the difference and the second model shows take away.

Ensure the number stories match the model of subtraction. For Annie's this will be finding the difference. For Amir this will be take away.

Subtract from Whole Amounts

Notes and Guidance

Children continue to use practical equipment and pictorial representations to subtract fractions.

Children subtract fractions from a whole amount. Children need to understand how many equal parts are equivalent to a whole e.g. $\frac{9}{9} = 1$, $\frac{18}{9} = 2$ etc.

Mathematical Talk

What do you notice about the numerator and denominator when a fraction is equal to one whole?

Using Jack's method, what's the same about your bar models? What's different?

How many more thirds/quarters/ninths do you need to make one whole?

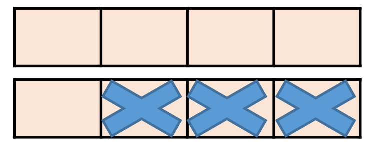
Varied Fluency

Use cubes, strips of paper or a bar model to solve:

$\frac{9}{9} - \frac{4}{9} = \frac{\square}{9}$ $\frac{9}{9} - \frac{\square}{9} = \frac{2}{9}$ $\frac{13}{9} - \frac{9}{9} = \frac{\square}{9}$

What's the same? What's different?

Jack uses a bar model to subtract fractions.

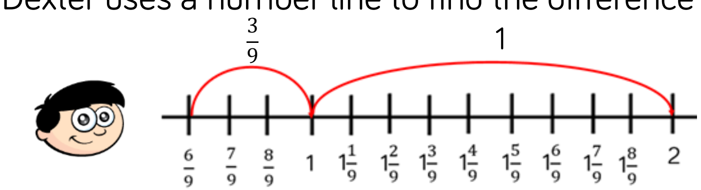


$2 - \frac{3}{4} = \frac{8}{4} - \frac{3}{4} = \frac{5}{4} = 1\frac{1}{4}$

Use Jack's method to calculate.

$3 - \frac{3}{4} =$ $3 - \frac{3}{8} =$ $3 - \frac{7}{8} =$ $3 - \frac{15}{8} =$

Dexter uses a number line to find the difference between 2 and $\frac{6}{9}$



$2 - \frac{6}{9} = 1\frac{3}{9}$

Use a number line to find the difference between:

2 and $\frac{2}{3}$ 2 and $\frac{2}{5}$ $\frac{2}{5}$ and 4

Subtract from Whole Amounts

Reasoning and Problem Solving

Dora is subtracting a fraction from a whole. $5 - \frac{3}{7} = \frac{2}{7}$  Can you spot her mistake? What should the answer be?	Dora has not recognised that 5 is equivalent to $\frac{35}{7}$ $5 - \frac{3}{7} = \frac{33}{7} = 4\frac{5}{7}$
How many ways can you make the statement correct? $2 - \frac{\square}{8} = \frac{5}{8} + \frac{\square}{8}$	Lots of possible responses. e.g. $2 - \frac{1}{8} = \frac{5}{8} + \frac{10}{8}$ $2 - \frac{7}{8} = \frac{5}{8} + \frac{4}{8}$ $2 - \frac{9}{8} = \frac{5}{8} + \frac{2}{8}$

Whitney has a piece of ribbon that is 3 metres long. She cuts it into 12 equal pieces and gives Teddy 3 pieces. How many metres of ribbon does Whitney have left?	Cutting 3 metres of ribbon into 12 pieces means each metre of ribbon will be in 4 equal pieces. Whitney will have $\frac{12}{4}$ to begin with. $\frac{12}{4} - \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$ Whitney has $2\frac{1}{4}$ metres of ribbon left.

Fraction of an Amount (1)

Notes and Guidance

Children find a unit fraction of an amount by dividing an amount into equal groups.

They build on their understanding of division by using place value counters to find fractions of larger quantities including where they need to exchange tens for ones.

Mathematical Talk

Which operation do we use to find a fraction of an amount?

How many equal groups do we need?

Which part of the fraction tells us this?

How does the bar model help us?

Varied Fluency

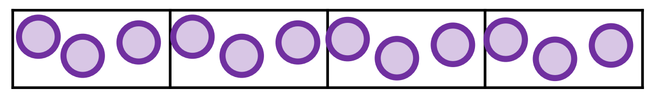
- Find $\frac{1}{5}$ of Eva's marbles.

I have divided the marbles into $\boxed{}$ equal groups.

There are $\boxed{}$ marbles in each group.

$\frac{1}{5}$ of Eva's marbles is $\boxed{}$ marbles.

- Dexter has used a bar model and counters to find $\frac{1}{4}$ of 12



Use Dexter's method to calculate:

$\frac{1}{6}$ of 12 $\quad$ $\frac{1}{3}$ of 12 $\quad$ $\frac{1}{3}$ of 18 $\quad$ $\frac{1}{9}$ of 18

- Amir uses a bar model and place value counters to find one quarter of 84

Use Amir's method to find:

$\frac{1}{3}$ of 36 $\quad$ $\frac{1}{3}$ of 45 $\quad$ $\frac{1}{5}$ of 65

Fraction of an Amount (1)

Reasoning and Problem Solving

R

Whitney has 12 chocolates.

On Friday, she ate $\frac{1}{4}$ of her chocolates and gave one to her mum.

On Saturday, she ate $\frac{1}{2}$ of her remaining chocolates, and gave one to her brother.

On Sunday, she ate $\frac{1}{3}$ of her remaining chocolates.

How many chocolates does Whitney have left?

Whitney has two chocolates left.

Fill in the Blanks

$$\frac{1}{3} \text{ of } 60 = \frac{1}{4} \text{ of } \boxed{}$$

$$\frac{1}{\boxed{}} \text{ of } 50 = \frac{1}{5} \text{ of } 25$$

80

10

Fraction of an Amount (2)

Notes and Guidance

Children need to understand that the denominator of the fraction tells us how many equal parts the whole will be divided into. E.g. $\frac{1}{3}$ means dividing the whole into 3 equal parts.

They need to understand that the numerator tells them how many parts of the whole there are. E.g. $\frac{2}{3}$ means dividing the whole into 3 equal parts, then counting the amount in 2 of these parts.

Mathematical Talk

What does the denominator tell us?

What does the numerator tell us?

What is the same and what is different about two thirds and two fifths?

How many parts is the whole divided into and why?

Varied Fluency

- Find $\frac{2}{5}$ of Eva's marbles.

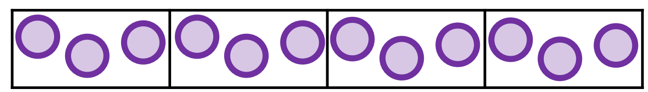
  

  I have divided the marbles into $\square$ equal groups.

  There are $\square$ marbles in each group.

  $\frac{2}{5}$ of Eva's marbles is $\square$ marbles.

- Dexter has used a bar model and counters to find $\frac{3}{4}$ of 12

  Use Dexter's method to calculate:

  $\frac{5}{6}$ of 12 $\quad$ $\frac{2}{3}$ of 12 $\quad$ $\frac{2}{3}$ of 18 $\quad$ $\frac{7}{9}$ of 18

- Amir uses a bar model and place value counters to find three quarters of 84

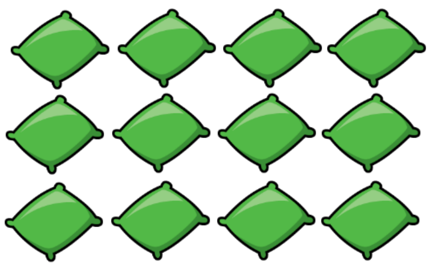
  Use Amir's method to find:

  $\frac{2}{3}$ of 36 $\quad$ $\frac{2}{3}$ of 45 $\quad$ $\frac{3}{5}$ of 65

Fraction of an Amount (2)

Reasoning and Problem Solving

R

This is $\frac{3}{4}$ of a set of beanbags.  How many were in the whole set?	16
Ron has £28 On Friday, he spent $\frac{1}{4}$ of his money. On Saturday, he spent $\frac{2}{3}$ of his remaining money and gave £2 to his sister. On Sunday, he spent $\frac{1}{5}$ of his remaining money. How much money does Ron have left? What fraction of his original amount is this?	Ron has £4 left. This is $\frac{1}{7}$ of his original amount.

Fractions of a Quantity

Notes and Guidance

Children use their knowledge of finding unit fractions of a quantity, to find non-unit fractions of a quantity.

They use concrete and pictorial representations to support their understanding. Children link bar modelling to the abstract method in order to understand why the method works.

Mathematical Talk

What is the whole? What fraction of the whole are we finding? How many equal parts will I divide the whole into?

What's the same and what's different about the calculations? Can you notice a pattern?

What fraction of her chocolate bar does Whitney have left? How many grams does she have left? Can you represent this on a bar model?

Varied Fluency

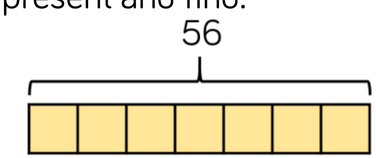
- Mo has 12 apples.
  Use counters to represent his apples and find:
  $\frac{1}{2}$ of 12 $\frac{1}{4}$ of 12 $\frac{1}{3}$ of 12 $\frac{1}{6}$ of 12

  Now calculate:
  $\frac{2}{2}$ of 12 $\frac{3}{4}$ of 12 $\frac{2}{3}$ of 12 $\frac{5}{6}$ of 12

  What do you notice? What's the same and what's different?

- Use a bar model to help you represent and find:

  $\frac{1}{7}$ of 56 = 56 ÷ $\boxed{}$



  $\frac{2}{7}$ of 56 $\frac{3}{7}$ of 56 $\frac{4}{7}$ of 56 $\frac{4}{7}$ of 28 $\frac{7}{7}$ of 28

- Whitney eats $\frac{3}{8}$ of 240 g bar of chocolate.
  How many grams of chocolate has she eaten?

Fractions of a Quantity

Reasoning and Problem Solving

True or False?

To find $\frac{3}{8}$ of a number, divide by 3 and multiply by 8

Convince me.

False.
Divide the whole by 8 to find one eighth and then multiply by three to find three eighths of a number.

Ron gives $\frac{2}{9}$ of a bag of 54 marbles to Alex.

Teddy gives $\frac{3}{4}$ of a bag of marbles to Alex.

Ron gives Alex more marbles than Teddy.

How many marbles could Teddy have to begin with?

$$\frac{2}{9} \text{ of } 54 > \frac{3}{4} \text{ of } \boxed{}$$

Teddy could have 16, 12, 8 or 4 marbles to begin with.

Calculate Quantities

Notes and Guidance

Children solve more complex problems for fractions of a quantity. They continue to use practical equipment and pictorial representations to help them see the relationships between the fraction and the whole.

Encourage children to use the bar model to solve word problems and represent the formal method.

Mathematical Talk

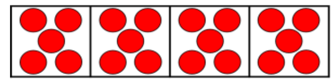
If I know one quarter of a number, how can I find three quarters of a number?

If I know one of the equal parts, how can I find the whole?

How can a bar model support my working?

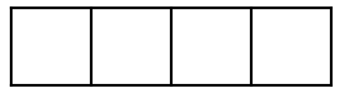
Varied Fluency

Use the counters and bar models to calculate the whole:



There are ____ counters in one part.

$\frac{1}{4}$ = ____ $\frac{2}{4}$ = ____ $\frac{3}{4}$ = ____ $\frac{4}{4}$ or 1 whole = ____



There are 7 counters in one part.

$\frac{1}{4}$ = ____ $\frac{2}{4}$ = ____ $\frac{3}{4}$ = ____ $\frac{4}{4}$ or 1 whole = ____

Complete.

Whole	Unit Fraction	Non-unit Fraction
The whole is 24	$\frac{1}{6}$ of 24 = ____	$\frac{5}{6}$ of 24 = ____
The whole is ____	$\frac{1}{3}$ of ____ = 30	$\frac{2}{3}$ of ____ = ____
The whole is ____	$\frac{1}{5}$ of ____ = 30	$\frac{3}{5}$ of ____ = ____

Jack has a bottle of lemonade.
He has one-fifth left in the bottle.
There are 150 ml left.
How much lemonade was in the bottle when it was full?

Calculate Quantities

Reasoning and Problem Solving

The school kitchen needs to buy carrots for lunch.

A large bag has 200 carrots and a medium bag has $\frac{3}{5}$ of a large bag.

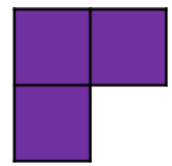
Mrs Rose says,

I need 150 carrots so I will have to buy a large bag.

Is Mrs Rose correct?
Explain your reasoning.

Mrs Rose is correct.
$\frac{3}{5}$ of 200 = 120
Mrs Rose will need a large bag.

These three squares are $\frac{1}{4}$ of a whole shape.



How many different shapes can you draw that could be the complete shape?

Lots of different possibilities. The shape should have 12 squares in total.

If $\frac{1}{8}$ of A = 12, find the value of A, B and C.

$$\frac{5}{8} \text{ of A} = \frac{3}{4} \text{ of B} = \frac{1}{6} \text{ of C}$$

A = 96
B = 80
C = 360