Released January 2018

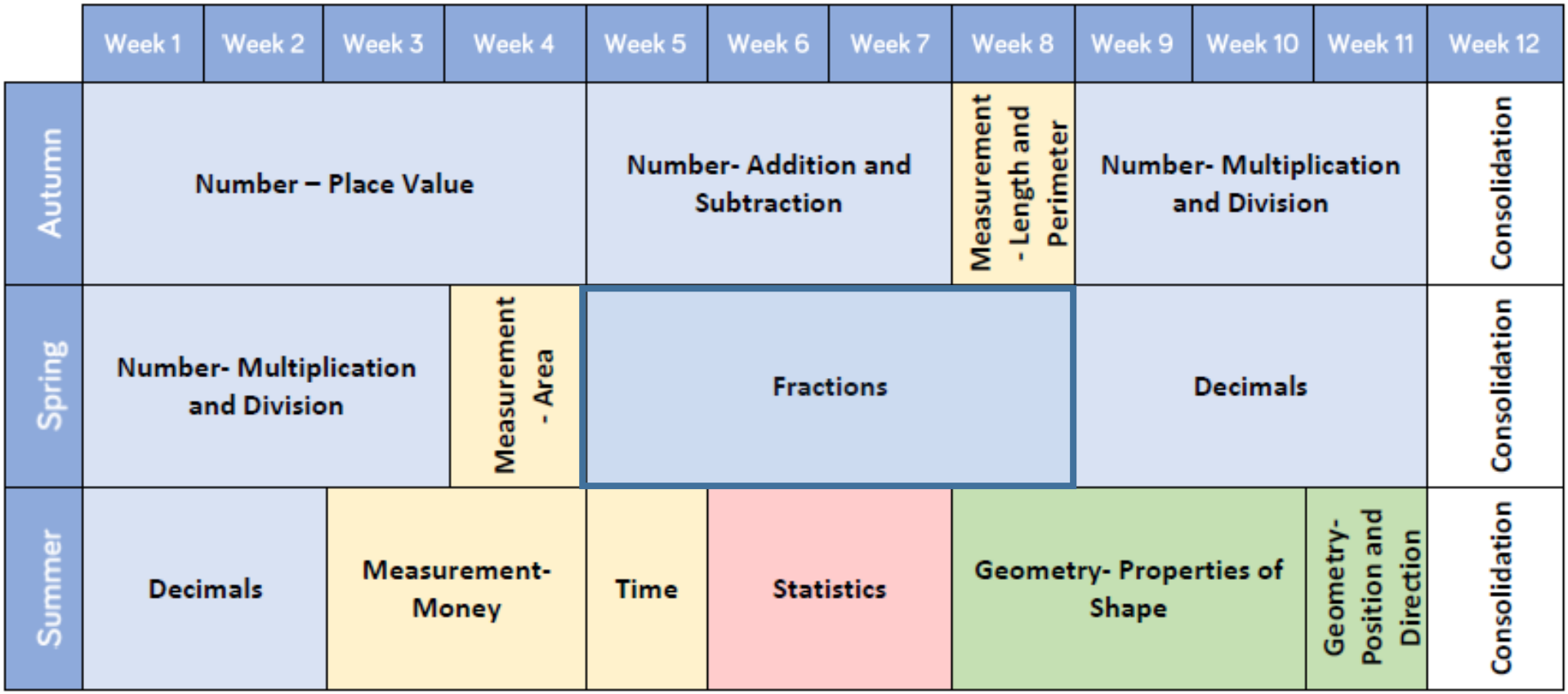
Year 4

Small Steps Guidance and Examples

Block 3 – Number: Fractions

White Rose Maths

Year 4 – Yearly Overview



Week 5 to 8 – Number: Fractions

Overview

Small Steps

- What is a fraction?
- Equivalent fractions (1)
- Equivalent fractions (2)
- Fractions greater than 1
- Count in fractions
- Add 2 or more fractions
- Subtract 2 fractions
- Subtract from whole amounts
- Calculate fractions of a quantity
- Problem solving – calculate quantities

NC Objectives

Recognise and show, using diagrams, families of common equivalent fractions.

Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.

Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number.

Add and subtract fractions with the same denominator.

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 on the meaning of numerator and denominator, non unit and unit fractions.

Mathematical Talk

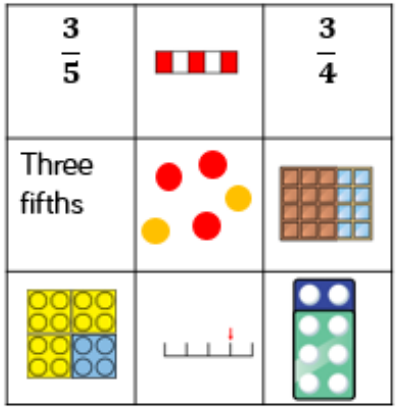
How can we sort the fraction cards? What does each one represent?

How can we represent $\frac{a}{b}$ in different ways?

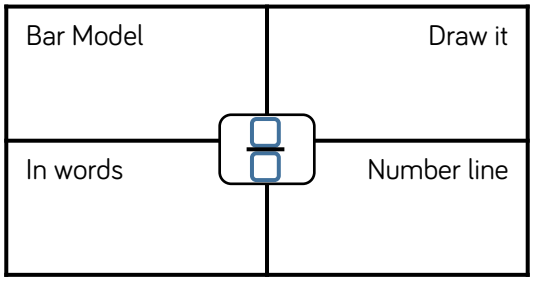
Is it a unit or non unit fraction?
Explain how you know.

Varied Fluency

1 Sort the cards into different groups.
Can you explain how you made your decision?
Can you sort the cards a different way?



2 Represent the fraction you have been given in as many different ways as possible.

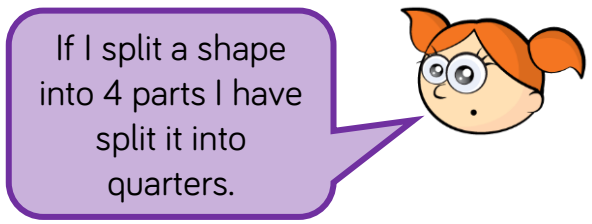


3 Using counters or cubes, explore finding $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ of different amounts. What do you notice? Can you use any amount? Why?
Repeat with other unit and non-unit fractions.

What is a Fraction?

Reasoning and Problem Solving

Always, Sometimes, Never

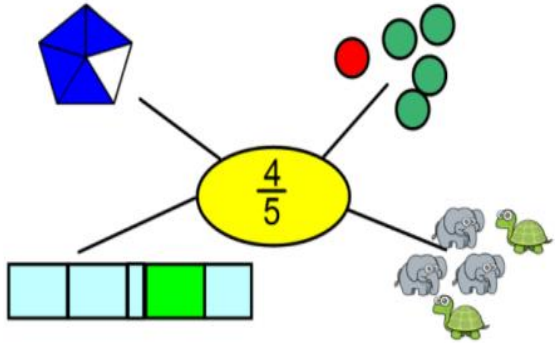


Explain your answer.

Sometimes

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

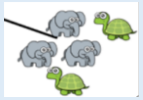
Which representations of $\frac{4}{5}$ are incorrect?



Explain how you know.

Has not been split into equal parts.

Shows either $\frac{3}{5}$ or $\frac{2}{5}$



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 finding more than one equivalent fraction on a fraction wall.

Mathematical Talk

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?

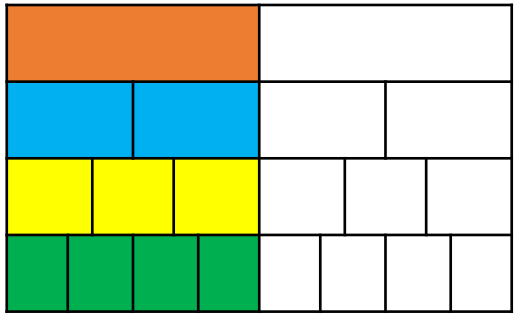
Can a fraction have more than one equivalent fraction?

Varied Fluency

1 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?

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

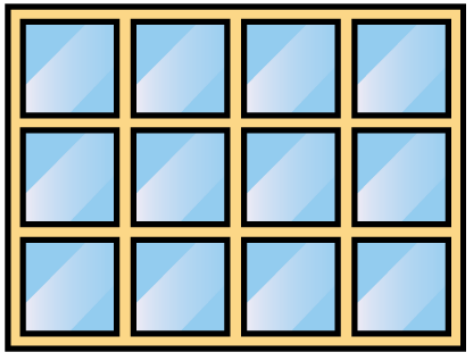
3 How many fractions that are equivalent to one half can you see on the fraction wall? Can you draw any extra rows to show other equivalent fractions?



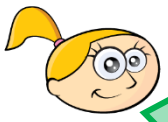
Equivalent Fractions (1)

Reasoning and Problem Solving

How many equivalent fractions can you see in this picture?



Laura says:



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

Is Laura correct? Explain why.

Children can give a variety of possibilities.
Examples:

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

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

Laura is not correct. They can use bar models/strip diagrams to explain.

Liam 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.

What fractions could he have folded his strips into?

Liam 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 equivalences 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

Do you notice anything about the denominators? Does this apply to the numerators? Would this pattern continue?

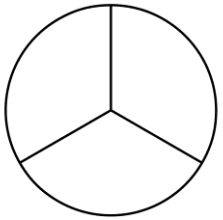
If I multiply the numerator by a number, what do I have to do to the denominator to keep it equivalent? Is this always true?

What relationships can you see between the numerator and denominator?

Varied Fluency

1 Using the diagram, complete the fractions.

$\frac{1}{4} = \frac{\square}{12}$ $\frac{1}{\square} = \frac{3}{6}$ $\frac{3}{4} = \frac{\square}{8}$ $\frac{5}{12} = \frac{\square}{24}$

2 

Using the pie chart, complete the equivalent fractions.

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

3 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

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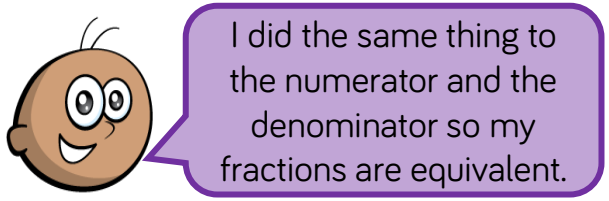
$$\frac{3}{4} = \frac{5}{6} = \frac{7}{9} = \frac{9}{11}$$

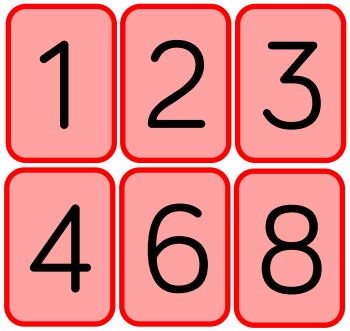


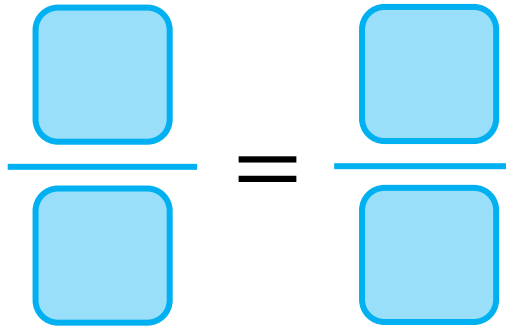
Shabaz

Do you agree with Shabaz? Explain your answer.

Shabaz is wrong. He has added two to the numerator and denominator. When you find equivalent fractions you either need to multiply or divide.

Use the digits cards below to fill in the boxes.





How many different ways can you find?

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

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

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

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?

Can you draw it? Can you build it using cubes?

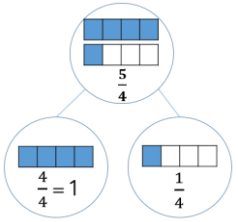
What do you notice about the numerator and denominator when a fraction is equivalent to a whole?

Varied Fluency

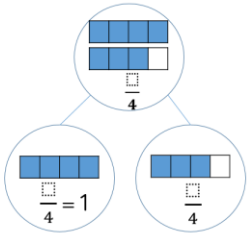
1 Complete the part whole models and sentences.

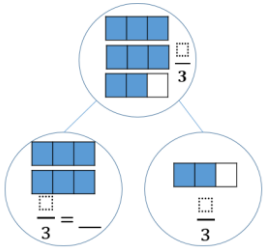
There are ☐ quarters altogether.

☐ quarters = ☐ whole and ☐ quarter.

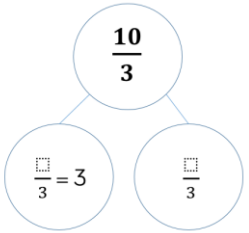


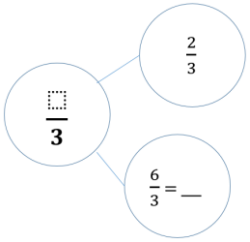
Write sentences to describe these part whole models.

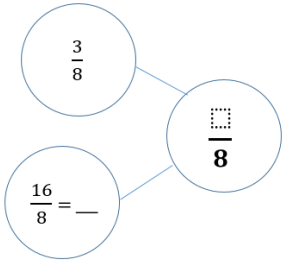




2 Complete the part whole models.







Fractions Greater than 1

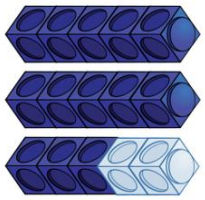
Reasoning and Problem Solving

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.

There will be one slice left over.

Spot the mistake:



$\frac{13}{5}$ = 10 wholes and 3 fifths.

There are 2 wholes not 10.
$\frac{10}{5}$ = 2 wholes

Do you agree?

$\frac{16}{4}$ is bigger than $\frac{8}{2}$ because 16 is bigger than 8

Explain why.

Disagree because they are both the same as 4.

Children may choose to build both fractions using cubes, or draw strip diagrams.

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

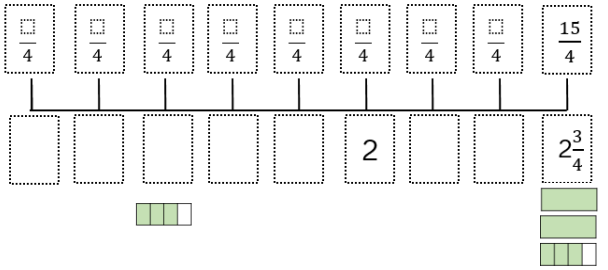
How many ____ make a whole?

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

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

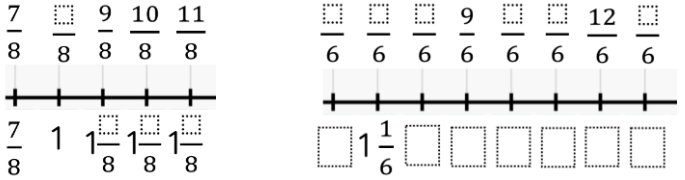
Varied Fluency

1 Complete the number line.



Can you complete bar models to represent each fraction?

2 Fill in the blanks using cubes or strip diagrams to help you.



3 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

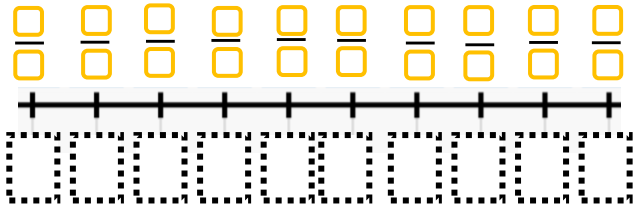
Here is a number sequence.

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

Which fraction would come next?

The fractions are increasing by one more twelfth each time. The next fraction would be $\frac{19}{12}$

Create an improper fraction and mixed number number line for your partner to complete.



Multiple possible answers.

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

Children also explore using a number line to add fractions where they can add on from a given fraction. They could also explore adding fractions more efficiently by using known facts or number bonds to help them e.g. $\frac{5}{9}+\frac{7}{9}+\frac{5}{9}=\frac{10}{9}+\frac{7}{9}=\frac{17}{9}$

Mathematical Talk

If I have two strips folded into quarters, show me what $\frac{\square}{4}+\frac{\square}{4}=$

How many quarters do I have in total?

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

Where is $\frac{\square}{\square}$ on the number line? How can I use the number line to add $\frac{\square}{\square}$ to my first fraction?

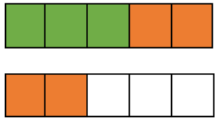
Varied Fluency

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

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

what other fractions can you make and add?

2 Use the models to add the fractions:

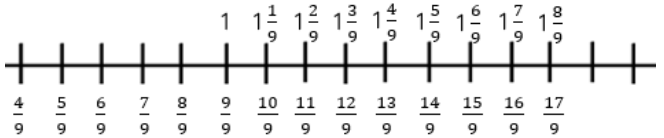


$\frac{3}{5}+\frac{4}{5}$

Choose your preferred model to add:

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

3 Use the number line to add the fractions.



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

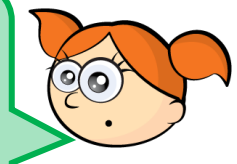
$\frac{3}{7}+\frac{5}{7}+\frac{2}{7}$ $\frac{5}{8}+\frac{7}{8}+\frac{1}{8}$ $\frac{\square}{9}+\frac{5}{9}+\frac{7}{9}=\frac{17}{9}$

Add 2 or More Fractions

Reasoning and Problem Solving

Zoe thinks she has got the correct answer for this calculation.

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



Is she correct? Explain why.

Zoe is incorrect. Zoe has added the denominator as well as the numerator.

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.

Lennox and Brandon are solving:

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

Lennox

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

Brandon

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

Who do you agree with? Explain why.

They are both correct. Lennox has added $\frac{6}{13}+\frac{7}{13}$ to make a whole and then added $\frac{5}{13}$

Subtract 2 Fractions

Notes and Guidance

Children use practical equipment and pictorial representations to subtract fractions.

Children explore using a number line to subtract fractions. They could also explore partitioning fractions to help subtract more efficiently by using known facts or number bonds to help them e.g. $\frac{12}{9} - \frac{7}{9} = \frac{12}{9} - \frac{2}{9} - \frac{5}{9} = \frac{5}{9}$

Mathematical Talk

If I have two strips folded into eighths, show me what $\frac{\square}{8} - \frac{\square}{8} =$

Can you use a bar model to show the difference between two fractions?

Where is $\frac{\square}{\square}$ on the number line? How can I use the number line to subtract $\frac{\square}{\square}$? Can I partition my fraction to help subtract?

What is staying the same? What is changing?

Varied Fluency

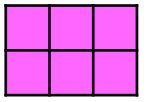
1 Use identical strips of paper and fold in to eighths. Use this to solve the calculations.

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

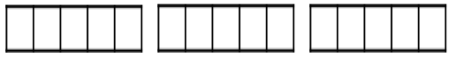
Can you use the strips to show take away and then to show the difference? What's the same? What's different?

2 Use the bar models to subtract the fractions.

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

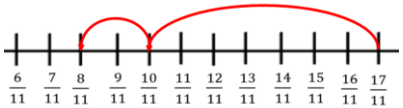


$\frac{11}{6} - \frac{\square}{6} = \frac{\square}{6}$



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

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



Use a number line to solve:

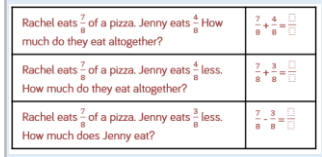
$\frac{16}{13} - \frac{9}{13}$ $\frac{16}{9} - \frac{9}{9}$ $\frac{16}{7} - \frac{9}{7}$ $\frac{16}{16} - \frac{9}{16}$

Subtract 2 Fractions

Reasoning and Problem Solving

Match the number stories to the correct calculations.

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



How many different ways can you complete the calculations?

$$\square/7 - 3/7 = \square/7 + \square/7$$

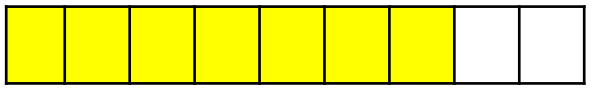
$$\square/7 - 3/7 = \square/7 - \square/7$$

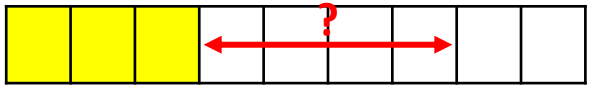
Children may give a range of answers as long as the calculation for the numerators is correct.

Sally and Jade are working out the answer to this problem.

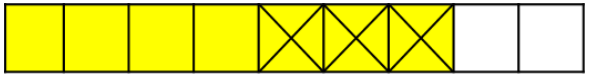
$$7/9 - 3/9$$

Sally uses this model.





Jade 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 number stories show take away (where something is removed) or the difference (comparing two quantities)

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 the relationship between the whole number and the denominator. For example, $\frac{9}{9} = 1$, $\frac{18}{9} = 2$ etc.

Mathematical Talk

How can we represent our calculation? What is $\frac{9}{9}$ the same as?
Can we record our fraction as a whole number? Why? Why not?
Where can we see the whole number?
How can we use a number line to find the difference between a fraction and a whole number?

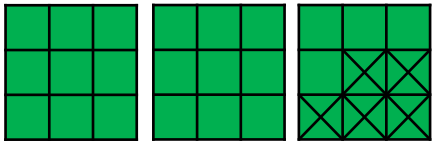
Varied Fluency

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

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

What's the same? What's different?

Use cubes to build a model to show $3 - \frac{5}{9} = 2\frac{4}{9}$

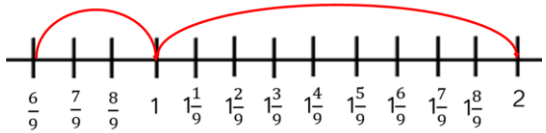


Could you build the cubes in a tower to subtract?

2 Use cubes to calculate:

$2 - \frac{3}{4}$ $3 - \frac{3}{7}$ $3 - \frac{\square}{8} = 1\frac{3}{8}$ $\frac{\square}{\square} - \frac{4}{5} = 1\frac{3}{5}$

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



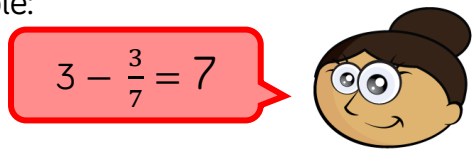
Use a number line to find the difference between:

2 and $\frac{2}{3}$ 2 and $\frac{2}{11}$ 2 and $\frac{2}{7}$

Subtract from Whole Amounts

Reasoning and Problem Solving

Callie is subtracting a fraction from a whole:



Can you spot her mistake?

What should the answer be?

Callie has not recognised the whole number as an improper fraction. The answer is $2\frac{4}{7}$

How many ways can you make the statement correct?

$$4 - \frac{\square}{9} > 2\frac{1}{9} + \frac{\square}{9}$$

Lots of possible Reponses. Check numerators make the statement correct.

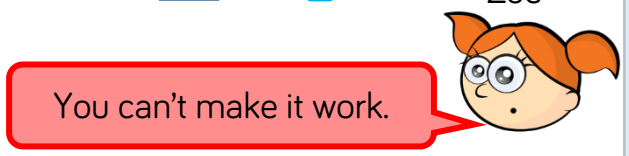
Zoe and Billy have these digits:

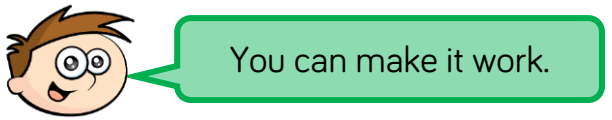
1	2	3	4	5

They are trying to use them to solve:

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

Zoe





Billy

Who do you agree with? Explain why

Zoe is correct. You can not place the digits to make the calculation correct. Children could explore which digit they could change to make it correct.

Fractions of a Quantity

Notes and Guidance

Children build on their understanding from Year 3 that the denominator tells us how many equal parts a whole has been split into and the numerator tells us how many equal parts of the whole there are.

Children use concrete and pictorial representations to find fractions of a quantity. They 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 split the whole into?

If we change the numerator by 1, what do you notice? Can we spot a pattern?

How can we represent this fraction of an amount using a bar model? What does this part of the model represent?

Varied Fluency

1 Tim has 24 apples. Use counters to represent his apples and find:

$\frac{1}{2}$ of 24 $\frac{1}{4}$ of 24 $\frac{1}{3}$ of 24 $\frac{1}{6}$ of 24

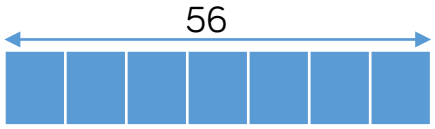
Now calculate:

$\frac{2}{2}$ of 24 $\frac{3}{4}$ of 24 $\frac{2}{3}$ of 24 $\frac{5}{6}$ of 24

What do you notice?

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

$\frac{1}{7}$ of 56 = 56 ÷ ☐



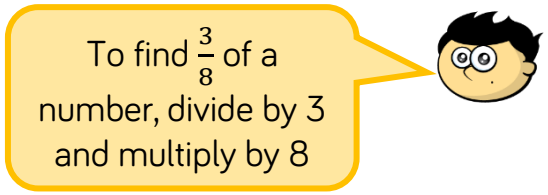
a. $\frac{2}{7}$ of 56 b. $\frac{3}{7}$ of 56 c. $\frac{4}{7}$ of 56 d. $\frac{4}{7}$ of 28

3 Jenny eats $\frac{3}{8}$ of 240 *g* bar of chocolate.
How many grams does she have left?

Fractions of a Quantity

Reasoning and Problem Solving

True or False?



Convince me

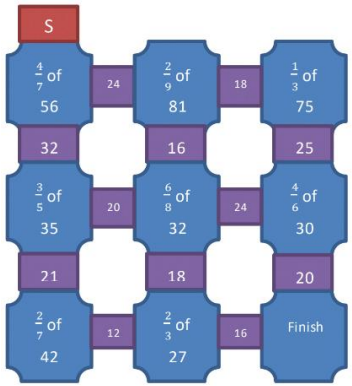
False. Divide the whole by 8 to find one part and then multiply your answer by three because we want to find three parts.

How many ways can you make the statement correct?

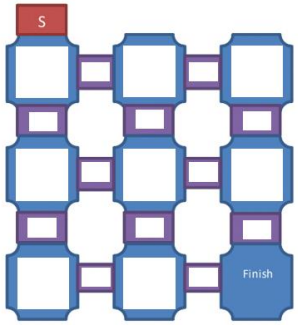
$\frac{2}{9}$ of 81 > $\frac{3}{4}$ of $\square$

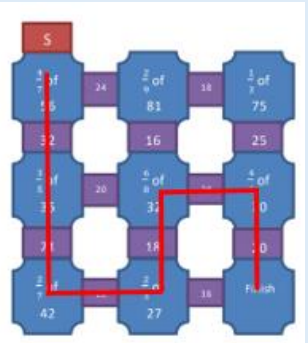
20
16
12
8
4

Work out the answer to each question to make it through the maze.



Can you create your own version?





Calculate Quantities

Notes and Guidance

Children solve more complex problems for fractions of an amount. They continue to use practical equipment and pictorial representations to help them work out what the whole is when a fraction is given.

Children continue to only use proper fractions within this step.

Mathematical Talk

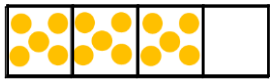
If I know one quarter of a number, how can I find three quarters of a number?

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

How can a bar model support my working?

Varied Fluency

1 Use the counters and bar models to calculate the whole:



There are ____ counters in one part.

$\frac{1}{4}$ = ____ counters $\frac{2}{4}$ = ____ counters

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

There are 7 counters in one part.

$\frac{1}{4}$ = ____ counters $\frac{2}{4}$ = ____ counters

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

2

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 ____ = ____
The whole is 4.5 *l*	$\frac{1}{10}$ of ____ = ____	$\frac{7}{10}$ of ____ = ____

3 Gino and Holly have ordered lemonade. Gino has a small lemonade which is 250 *ml*. Holly has a large lemonade which is $\frac{4}{10}$ more than a small. How many millilitres does Holly have?

Calculate Quantities

Reasoning and Problem Solving

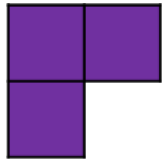
The school kitchen needs to buy carrots for lunch. A large bag has 200 carrots and a medium bag has $\frac{3}{5}$ of a large bag. The school cook says,

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

Is he correct? Explain your reasoning.

Yes. $\frac{3}{5}$ of 200 = 120 so he will need a large bag.

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



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

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

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

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

A = 96
B = 80
C = 360