White Rose Maths

Summer - Block 1

Fractions

Year 3

Overview

Small Steps

- Equivalent fractions (1)
- Equivalent fractions (2)
- Equivalent fractions (3)
- Compare fractions
- Order fractions
- Add fractions
- Subtract fractions

NC Objectives

Recognise and show, using diagrams, equivalent fractions with small denominators.

Compare and order unit fractions, and fractions with the same denominators.

Add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$]

Solve problems that involve all of the above.

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

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

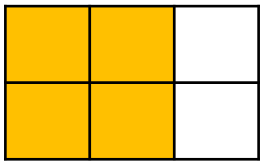
Start by drawing a bar 8 squares along. Label each square $\frac{1}{8}$

Underneath compare the same length bar split into four equal parts. What fraction is each part now?

Equivalent Fractions (1)

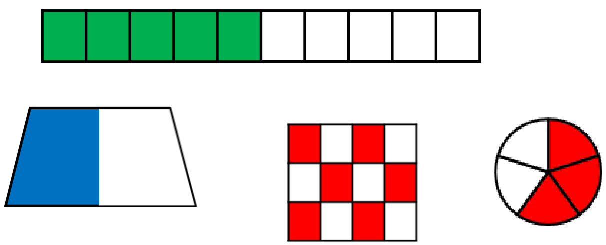
Reasoning and Problem Solving

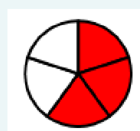
Explain how the diagram shows both $\frac{2}{3}$ and $\frac{4}{6}$



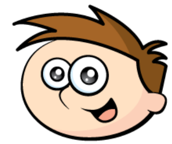
The diagram is divided in to six equal parts and four out of the six are yellow. You can also see three **columns** and two columns are yellow.

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.

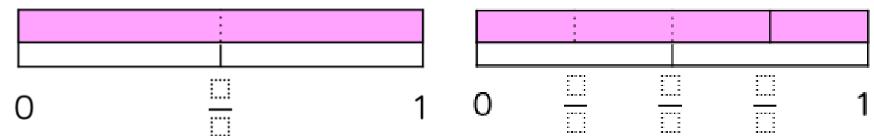
Mathematical Talk

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

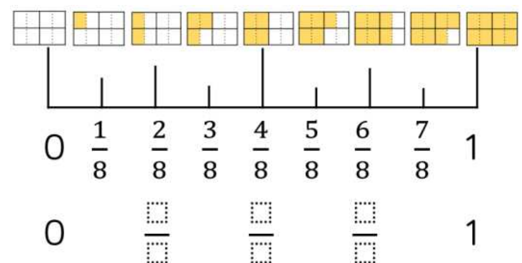
Look at the number line divided into twelfths. Which unit fractions can you place on the number line as equivalent fractions? e.g. $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ etc. Which unit fractions are not equivalent to twelfths?

Varied Fluency

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.

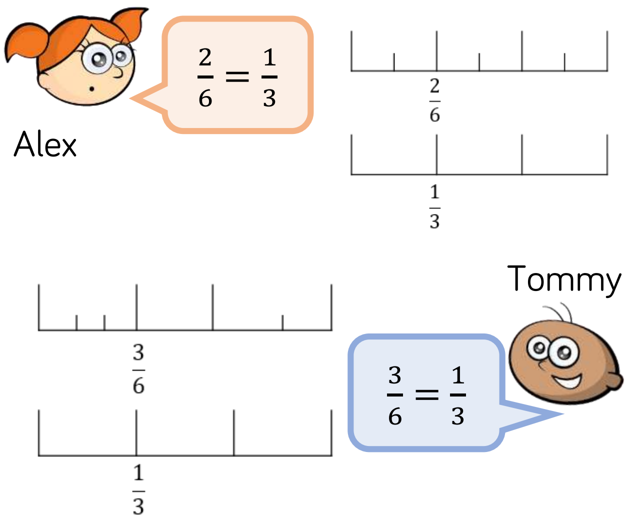
$\frac{1}{4}$ $\frac{3}{4}$ $\frac{1}{6}$ $\frac{1}{3}$ $\frac{2}{3}$

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

Equivalent Fractions (2)

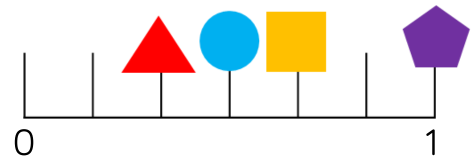
Reasoning and Problem Solving

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.

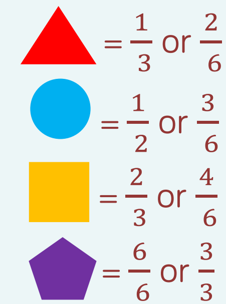


Use the clues to work out which fraction is being described for each shape.

- 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 (3)

Notes and Guidance

Children use proportional reasoning to link pictorial images with abstract methods to find equivalent fractions. They look at the links between equivalent fractions to find missing numerators and denominators.
Children look for patterns between the numerators and denominators to support their understanding of why fractions are equivalent e.g. fractions equivalent to a half have a numerator that is half the denominator.

Mathematical Talk

Why do our times tables help us find equivalent fractions?

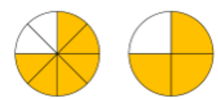
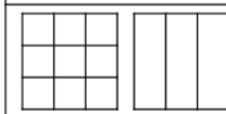
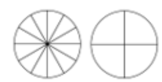
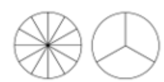
Can we see a pattern between the fractions?

Look at the relationship between the numerator and denominator, what do you notice? Does an equivalent fraction have the same relationship?

If we add the same number to the numerator and denominator, do we find an equivalent fraction? Why?

Varied Fluency

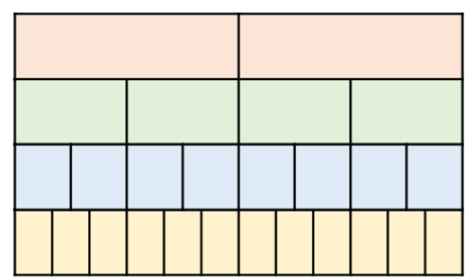
Complete the table. Can you spot any patterns?

Pictorial representation	Fraction	Words
	$\frac{6}{8} = \frac{3}{4}$	Six eighths is equivalent to three quarters
	$\frac{1}{3} = \frac{\square}{9}$	_______is equivalent to ______
	$\frac{\square}{4} = \frac{\square}{12}$	Three twelfths is equivalent to _____ quarters
	$\frac{4}{12} = \frac{\square}{\square}$	_______is equivalent to ______

Use the fraction wall to complete the equivalent fractions.

$\frac{1}{2} = \frac{\square}{4} = \frac{\square}{8} = \frac{6}{\square}$

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



Equivalent Fractions (3)

Reasoning and Problem Solving

Always, sometimes, never.

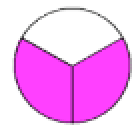
If a fraction is equivalent to one half, the denominator is double the numerator.

Prove it.

Can you find any relationships between the numerator and denominator for other equivalent fractions?

Always, children could also think of the numerator as being half of the denominator.

Dora has shaded a fraction.



She says,

I am thinking of an equivalent fraction to the shaded fraction where the numerator is 9

Is this possible?
Explain why.

This is impossible. Dora may have mistaken the numerator for the denominator and be thinking of $\frac{6}{9}$ which is equivalent to $\frac{2}{3}$

Compare Fractions

Notes and Guidance

Children compare unit fractions or fractions with the same denominator.

For unit fractions, children's natural tendency might be to say that $\frac{1}{2}$ is smaller than $\frac{1}{4}$, as 2 is smaller than 4. Discuss how dividing something into more equal parts makes each part smaller.

Mathematical Talk

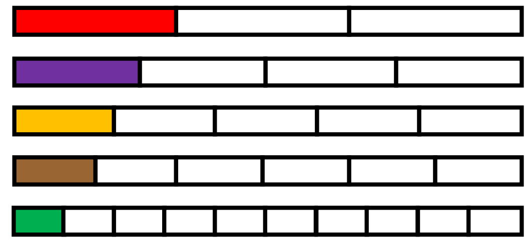
What fraction of the strip is shaded? What fraction of the strip is not shaded?

Why is it important that the strips are the same length and are lined up underneath each other?

Can you think of a unit fraction that is smaller than $\frac{1}{10}$? Can you think of a unit fraction that is larger than $\frac{1}{3}$?

Varied Fluency

- Use >, < or = to compare the fractions.



$\frac{1}{10} \bigcirc \frac{1}{4}$ $\frac{1}{3} \bigcirc \frac{1}{6}$ $\frac{1}{5} \bigcirc \frac{1}{4}$

When the numerators are the same, the _______ the denominator, the _______ the fraction.

- Use paper strips to compare the fractions using >, < or =

$\frac{3}{4} \bigcirc \frac{1}{4}$ $\frac{1}{6} \bigcirc \frac{5}{6}$ $\frac{3}{8} \bigcirc \frac{5}{8}$

When the denominators are the same, the _______ the numerator, the _______ the fraction.

Compare Fractions

Reasoning and Problem Solving

I know that $\frac{1}{3}$ is larger than $\frac{1}{2}$ because 3 is larger than 2

Do you agree with Dora?
Explain how you know.

$\frac{1}{3}$ is smaller because it is split into 3 equal parts, rather than 2 equal parts. Children could draw a bar model to show this.

Complete the missing denominator.
How many different options can you find?

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

Examples could include $\frac{1}{3}$, $\frac{1}{4}$ etc.

Here are three fractions.

$$\frac{3}{8} \quad \frac{3}{5} \quad \frac{1}{8}$$

Which fraction is the largest? How do you know?

Which fraction is the smallest? How do you know?

$\frac{3}{5}$ is the largest- when the numerators are the same, the smaller the denominator the larger the fraction. Children could also explain that $\frac{3}{5}$ is the only fraction larger than a half.
$\frac{1}{8}$ is the smallest- when the denominators are the same, the smaller the numerator, the smaller the fraction.

Order Fractions

Notes and Guidance

Children order unit fractions and fractions with the same denominator. They use bar models and number lines to order the fractions and write them in ascending and descending order.

Continue to encourage children to use stem sentences to explain why they can compare fractions when the numerators or the denominators are the same.

Mathematical Talk

How many equal parts has the whole been divided in to?

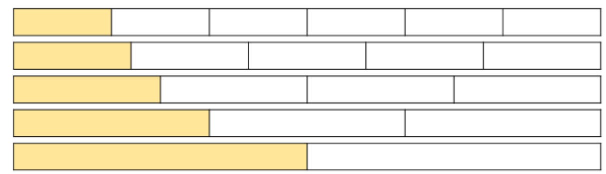
How many equal parts need shading?

Which is the largest fraction? Which is the smallest fraction?

Which fractions are the hardest to make as paper strips? Why do you think they are harder to make?

Varied Fluency

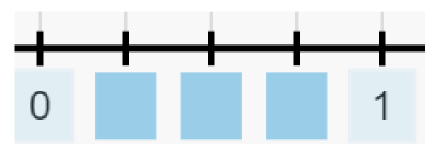
- Divide strips of paper into halves, thirds, quarters, fifths and sixths and colour in one part of each strip.
Now order the strips from the smallest to the largest fraction.



When the numerators are the same, the ______ the denominator, the _____ the fraction.

- Place the fractions on the number line.

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

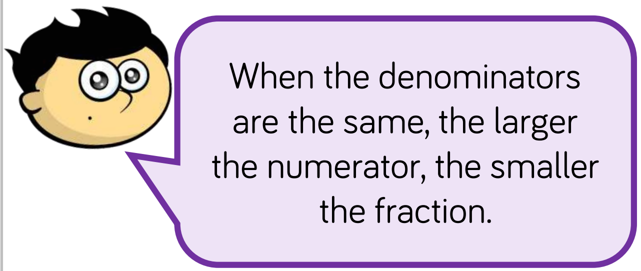


- Order the fractions in descending order.

$\frac{3}{8}$ $\frac{5}{8}$ $\frac{1}{8}$ $\frac{8}{8}$ $\frac{7}{8}$

Order Fractions

Reasoning and Problem Solving

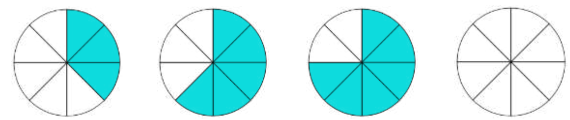


Is Jack correct?
Prove it.

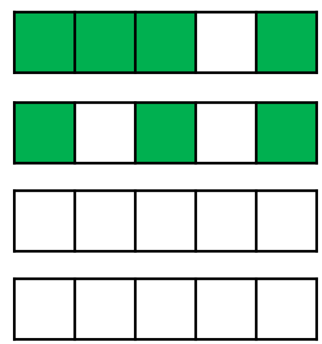
Jack is incorrect. When the denominators are the same, the larger the numerator the larger the fraction. Children could prove this using bar models or strips of paper etc.

Shade the blank diagrams so the fractions are ordered correctly.

Fractions in ascending order



Fractions in descending order



Either 7 or 8 parts shaded.

Either 2 and 1 parts shaded or 1 and 0 parts shaded.

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?

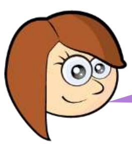
Add Fractions

Reasoning and Problem Solving

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)

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

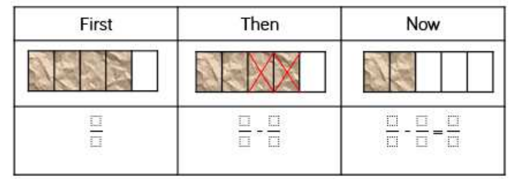
What fraction is shown first? Then what happens? Now what is left? Can we represent this in a number story?

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

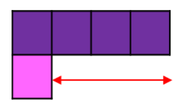
- Eva is eating a chocolate bar. Fill in the missing information.



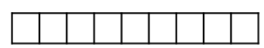
Can you write a number story using 'first', 'then' and 'now' to describe your calculation?

- Use the models to help you subtract the fractions.

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

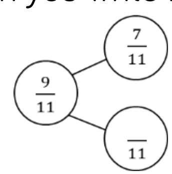


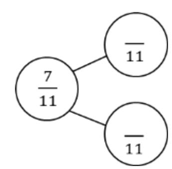
$\frac{4}{8} - \frac{\square}{8} = \frac{\square}{8}$

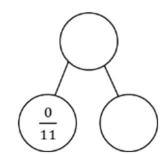


$\frac{\square}{9} - \frac{\square}{9} = \frac{4}{9}$

- 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:

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

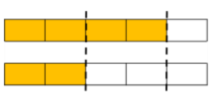
$\frac{\square}{9} - \frac{5}{9} = \frac{4}{9} - \frac{2}{9}$

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

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

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

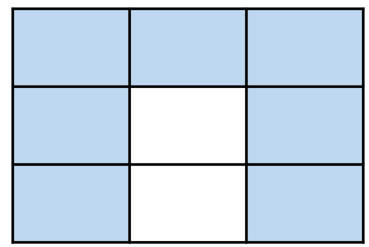
Jack's method: 

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.