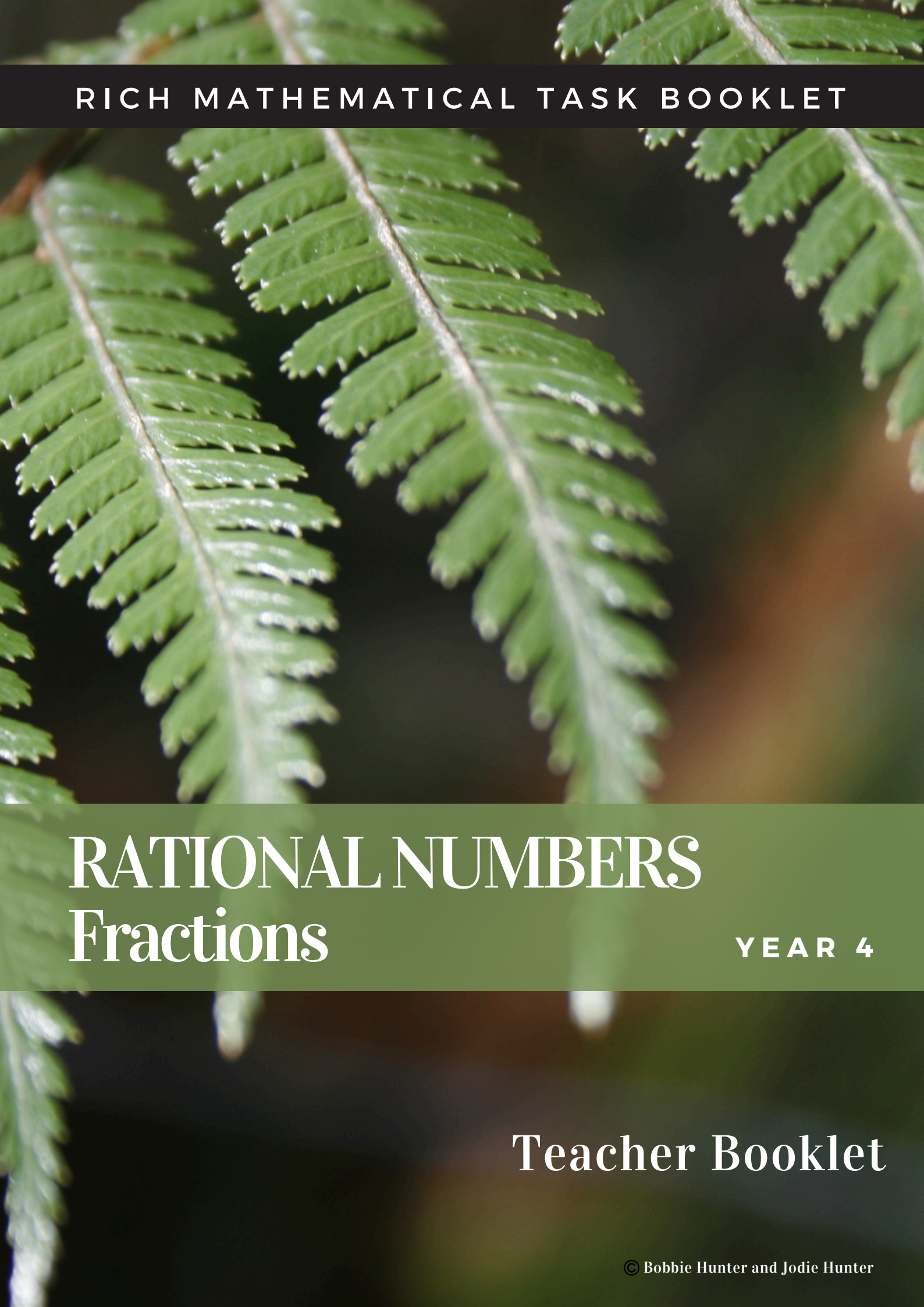


RICH MATHEMATICAL TASK BOOKLET

RATIONAL NUMBERS
Fractions

YEAR 4

Teacher Booklet

Task 1

What are all the different ways you can use the fraction tiles to equal one whole?
As you make these record them and be ready to explain and justify how they make one whole.

What are all the different ways you can use the fraction tiles to equal a fraction that is less than one whole?
As you make these record them and be ready to explain and justify why they are less than one whole.

What are all the different ways you can use the fraction tiles to equal a fraction that is more than one whole?
As you make these record them and be ready to explain and justify why they are more than one whole.

Teacher Notes

Have the fraction pieces for whole, halves, thirds, quarters, fifths, sixths, eighths, tenths.

Monitor for students using the words fractional numbers (not pieces or bits).

Notice students who make generalisations (e.g., the smaller the denominator the bigger the fraction when the numerator is one). Record these as class conjectures and have students explore and prove at a later date as a warm-up activity.

Expect students to represent materials and use appropriate notation and the equal sign ($\frac{2}{2} = 1$).

For the independent task, you will need fraction tile sets.

Shareback

Select students to share who made combinations of the whole or other fractions using the same size pieces (halves, thirds, quarters, fifths, sixths, eighths, tenths and recorded the combinations as numbers, equations, or words. Then, select students to share who made combinations of the whole using the unlike fraction pieces (e.g., $\frac{1}{2} + \frac{1}{4} + \frac{1}{4} = 1$) and recorded the combinations as numbers, equations or words. If no students did this, then introduce as an alternative solution that students previously shared.

Big Ideas

Numbers can be described in many different ways including as fractions.

The whole is important in naming fractions. A fraction is relative to the size of the whole or unit.

A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

Curriculum Links

During Year Four

Add and subtract fractions with the same denominators to make up to one whole

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Connect

What is $\frac{2}{2}$ the same as?
What is $\frac{6}{6}$ the same as?
What is $\frac{4}{4}$ the same as?
What is $\frac{8}{8}$ the same as?
What patterns and relationships do you notice?
What other fractional numbers are the same as one whole?
Encourage students to record using equals sign $\frac{2}{2}=\frac{5}{5}=\frac{100}{100}$

What is a rule for fractions that equal one whole?
Record conjectures and symbolise as $\frac{n}{n}$.

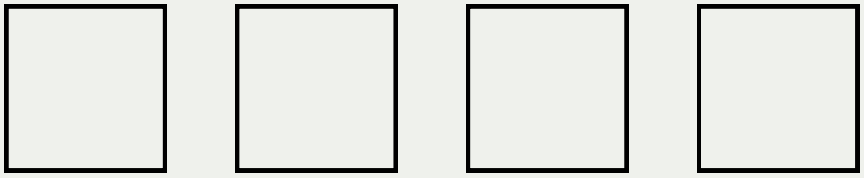
Suggested Learning Outcomes

Combine and recombine different units of fractions to make one whole.

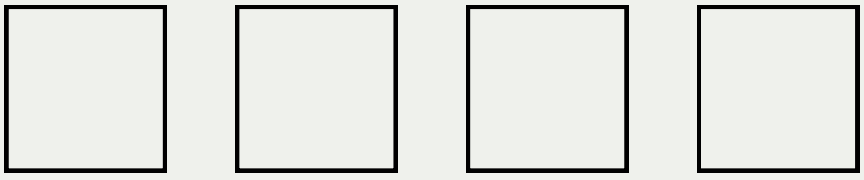
Identify and recognise equivalent fractions.

Independent Tasks

How many different ways can you split these squares into halves?



How many different ways can you split these squares into quarters?



Mathematical Language

Whole, half, halves, quarters, fourths, sixths, fraction, fractional number, whole number, eighths, equal, equivalent.

Anticipations

Solutions, Misconceptions

Task 2

What are all the different ways you can use the fraction tiles to equal a fraction that is less than one half?
As you make these record them and be ready to explain and justify why they are less than one half.

What are all the different ways you can use the fraction tiles to equal a fraction that is more than one half but less than one whole?
As you make these record them and be ready to explain and justify why they are more than one half and less than one whole.

What are all the different ways you can use the fraction tiles to equal a fraction that is more than one whole but less than two?
As you make these record them and be ready to explain and justify why they are more than one whole and less than two.

Teacher Notes

Have fraction pieces for the whole, halves, thirds, quarters, fifths, sixths, eighths, tenths.

Facilitate the students to notice that the numerator names the numbers of pieces of the whole and the denominator names the number of pieces the whole has been divided into.

Monitor for students using the words fractional numbers (not pieces or bits) and justifying their statements using both fraction pieces and notation.

For the independent activity, have fraction tiles for whole, halves, thirds, quarters, fifths, sixths, eighths, tenths avaliable.

Shareback

Select students to share who made combinations of fractions using the same size pieces (halves, thirds, quarters, fifths, sixths, eighths, tenths) and recorded the combinations as numbers, equations, or words. Then, select students to share who made combinations using the unlike fraction pieces (e.g., $\frac{1}{2}$ and $\frac{1}{3}$ is more than $\frac{1}{2}$ but less than one whole) and recorded the combinations as numbers, equations or words. If no students did this, then introduce as an alternative solution that students previously shared.

Big Ideas

Numbers can be described in many different ways including as fractions.

The whole is important in naming fractions. A fraction is relative to the size of the whole or unit

A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

Curriculum Links

During Year Four

Add and subtract fractions with the same denominators to make up to one whole

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Connect

Use your fraction tiles to find and record fractions that are the same as one half.
What other fractions do you know that are the same as one half?
What patterns and relationships do you notice?
What is a rule for fractions that are equivalent to one half?
[e.g., the numerator has to be half of the denominator]

Suggested Learning Outcomes

Combine and recombine different units of fractions to make one whole.

Independent Tasks

Use the fraction tiles to make different combinations that will equal less than one whole. Record these using fraction equations and drawings.

Use the fraction tiles to make different combinations that will equal less than one half. Record these using at least three different representations (drawings, equations).

Use the fraction tiles to make different combinations that are between one quarter and three quarters. Record these using fraction equations and drawings.

Use the fraction tiles to make different combinations that are between one whole and one and three quarters. Record these using fraction equations and drawings.

Use the fraction tiles to make different combinations that are smaller than three quarters. Record these using fraction equations and drawings.

Mathematical Language

Whole, half, halves, quarters, fourths, thirds, sixths, fraction, fractional number, whole number, eighths, equal, equivalent, numerator, denominator.

Anticipations

Solutions, Misconceptions

Task 3

What numbers are there between 0 and 1? Be ready to put a marker on the number-line and explain what fractional number is shown.

Draw your own number-line and record on it the number you are showing with the marker.

Can you show on your number-line four numbers between 1 and 2? Record alongside the mark what number they represent.

Teacher Notes

During the launch ask the students whether there are numbers between whole numbers? Lead into a discussion of situations where they have met a half (e.g., a baby before they are one, halfway between their own birthdays, half hour on a clock, half an apple). Extend discussion to other situations using other fractions.

Have an unmarked number line on the whiteboard to use during the lesson. Use this during the launch to estimate where the fraction is that they describe.

Have an unmarked length of paper tape across the floor and large marked fraction cards with whole number words and fraction words and symbols.

Facilitate the students to notice that earlier in the year, the number lines they have used only contained whole numbers (numbers that resulted from counting). The fractions they are talking about now (numbers resulting from equal splitting or partitioning) can be represented on the number line. This shows that fractions may also be thought of as numbers. In the connection, refer to the fractions (e.g., $3\frac{1}{2}$ as mixed numbers.

Monitor for students using vocabulary which emphasises dividing or splitting equally of portioning into equal parts.

Notice students who find the concept of fractions as numbers between numbers counter intuitive. Allow them to struggle and construct reasoning through mathematical talk and using agreeing mathematically and disagreeing mathematically (e.g., I agree because...)

For the independent task, have on A3 a series of number-lines marked with whole numbers from 0 to 10.

Big Ideas

Numbers can be described in many different ways including as fractions.

The whole is important in naming fractions. A fraction is relative to the size of the whole or unit

A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

A fraction describes division ($\frac{a}{b} = a \div b$, a & b are integers & b 0), and it can be interpreted on the number line in two ways. For example, $\frac{2}{3} = 2 \div 3$.

On the number line, $2 \div 3$ can be interpreted as 2 segments where each is $\frac{1}{3}$ of a unit ($2 \times \frac{1}{3}$) or $\frac{1}{3}$ of 2 whole units ($\frac{1}{3} \times 2$); each is associated with the same point on the number line.

Each fraction can be associated with a unique point on a number line.

There are an infinite number of fractions between any two fractions on the number line

Shareback

Select students to share who are able to show in multiple ways equal parts which represent a range of different fractional numbers on the large number-line and then students who can visualise and draw number-lines and mark the positions of fractions between 0 and 1 and 1 and 2.

Connect

What mathematical statements using mixed numbers can you make using the number-line for numbers between 3 and 4?
Use the equals sign (=) or greater than or less than (> and <) signs. I will give you an example to start: $3\frac{1}{2}$ is less than $3\frac{3}{4}$
[record as $3\frac{1}{2} < 3\frac{3}{4}$].

Suggested Learning Outcomes

Show fractions on a number-line.

Independent Tasks

Mark on the number line where you think the following mixed numbers would be.

$1\frac{1}{2}$	$1\frac{3}{4}$	$9\frac{1}{8}$
$5\frac{2}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$
$7\frac{2}{4}$	$8\frac{1}{2}$	$\frac{6}{8}$
$3\frac{4}{8}$	$9\frac{1}{2}$	$\frac{1}{4}$

Can you mark any other numbers on the number-line?

Curriculum Links

During Year Four

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Convert (using number lines) between mixed numbers and improper fractions with denominators of 2, 3, 4, 5, 6, 8, and 10

Mathematical Language

Whole, half, halves, quarters, fourths, thirds, sixths, eighths, counting numbers, mixed numbers. .

Anticipations

Solutions, Misconceptions

Task 4

At the local night market, you can buy rectangular plastic boxes of banana poke. All the trays of poke are the same size.

Nooroa's family has 3 children to share one tray.

John's family has 8 children to share one tray.

Tereapii's family has 6 children to share one tray.

Teokotai's family has 4 children to share one tray.

William's family has 5 children to share one tray.

Jillian's family has 10 children to share one tray

Which children would have more poke?

Prove your answer using at least three different representations (numbers, drawings, and a number-line)

Teacher Notes

During the launch, model the tray of poke as a rectangular representation.

Facilitate the students to notice that the denominator represents the number of pieces the whole has been divided into and the numerator shows the number of pieces that you have of the total.

Notice students who make the conjecture "the bigger the denominator the smaller the fractional piece if the numerator is one". Record and use for later discussion and examination in warm-ups.

Expect students to represent using number lines and identical rectangular representations

Shareback

Select students to share who have developed multiple representations including numbers, number-line, and drawings and use these to show comparisons between the different fractions.

Big Ideas

Numbers can be described in many different ways including as fractions.

The whole is important in naming fractions. A fraction is relative to the size of the whole or unit

A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

A fraction describes division ($\frac{a}{b} = a \div b$, a & b are integers & b 0), and it can be interpreted on the number line in two ways. For example, $\frac{2}{3} = 2 \div 3$.

On the number line, $2 \div 3$ can be interpreted as 2 segments where each is $\frac{1}{3}$ of a unit ($2 \times \frac{1}{3}$) or $\frac{1}{3}$ of 2 whole units ($\frac{1}{3} \times 2$); each is associated with the same point on the number line.

Each fraction can be associated with a unique point on a number line.

Connect

Record the solutions for the task:

$1 \div 3 = \frac{1}{3}$ $1 \div 8 = \frac{1}{8}$

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

What patterns and relationships do you notice?

What do you think would be the solution for?

$1 \div 6 =$ $1 \div 20 =$ $1 \div 73 =$ $1 \div A =$

Suggested Learning Outcomes

Divide wholes into equal parts.

Divide a whole number into fractions.

Compare and order unit fractions.

Independent Tasks

Put these fractions in order of size from smallest to largest.

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

2. $\frac{1}{10}$ $\frac{1}{5}$ $\frac{1}{2}$ $\frac{1}{20}$

3. $\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{2}$ $\frac{1}{16}$

4. $\frac{1}{4}$ $\frac{1}{10}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{1}{8}$ $\frac{1}{20}$

Use the fraction tiles and draw a representation and a number line to prove your ordering of the fractional numbers are correct.

Curriculum Links

During Year Four

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Convert (using number lines) between mixed numbers and improper fractions with denominators of 2, 3, 4, 5, 6, 8, and 10

Find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number

Identify, from a unit fraction part of a set, the whole set

Mathematical Language

Whole, half, halves, quarters, fourths, thirds, sixths, equal, equivalent, fair share, denominator, numerator.

Anticipations

Solutions, Misconceptions

Task 5

Atamai's Tinamatua has made pani popo and Atamai is wondering who would get more.

Eight tama sharing 10 pani popo equally.

Two tama sharing 3 pani popo equally.

Four tama sharing 9 pani popo equally.

Five tama sharing 4 pani popo equally.

Make sure that you represent and justify your answer in different ways.

Teacher Notes

During the launch, model the pani popo as a rectangular representation.

Facilitate the students to notice the need to coordinate partitioning of the shared item with the number of sharers. This is the basis of students developing understanding of the multiplicative relationship of the numerator and denominator in a fraction.

Expect students to represent with drawings and ensure that they use the same whole size for each pani popo when drawing.

Shareback

Select students to share who develop representations to justify their reasoning and either split all the pani popo into a fractional amount or share as a whole and fractional amount.

If the second solution is not used, then model as another way the teacher has seen used previously.

Big Ideas

Numbers can be described in many different ways including as fractions.

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A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

The real-world actions for addition and subtraction of whole numbers are the same for operations with fractions and decimals.

Connect

Use the student solutions to ask students to record these as equivalent fractions with mixed numbers and improper fractions. Ask the students to represent 10 eighths in a drawing and on a number line and then record as a fraction and a whole number and a fraction (e.g., $\frac{10}{8} = 1\frac{2}{8}$).

Repeat for the different fractional amounts.

Suggested Learning Outcomes

Share whole parts equally.

Solve problems that involve dividing a whole number into a fraction.

Convert improper fractions to mixed numbers.

Independent Tasks

At the Super Striker Soccer competition, these were the results of the goal shooting activity.

Ruby scored 5 out of the six goals that she kicked.
Daniel scored 2 out of three goals that he kicked.
Tasa scored 3 out of the four goals that he kicked.
Sesimani scored 7 out of the eight goals that she kicked.

Can you put them in order from who was the most accurate to least accurate in shooting the goals?

Curriculum Links

During Year Four

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Convert (using number lines) between mixed numbers and improper fractions with denominators of 2, 3, 4, 5, 6, 8, and 10

Find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number

Identify, from a unit fraction part of a set, the whole set

Mathematical Language

Whole, half, halves, quarters, fourths, thirds, fraction, fractional number, whole number, eighths, equal, equivalent, section, piece, fair share

Anticipations

Solutions, Misconceptions

Task 6

Mahini wants to share her red licorice twists with her five friends.
The six of them all have one fourth of a red licorice twist.
How many red licorice twists does Mahini have to share?

Mahini wants to share her red licorice twists with her eight friends.
The nine of them all have one third of a red licorice twist.
How many red licorice twists does Mahini have to share?

Mahini wants to share her red licorice twists with her 9 friends.
The nine of them all have two fifth of a red licorice twist.
How many red licorice twists does Mahini have to share?

Teacher Notes

Facilitate the students to notice that there are multiples of the fractional number which they can add or multiply.

Expect students to represent using drawings, number-line or fraction pieces to represent parts of the whole and to use the fractional parts to make wholes.

Shareback

Select students who add all the fourths and get six fourths; or add the fourths and get six fourths and see this as equivalent to one whole and two fourths; or solve the problem as $6 \times \frac{1}{4} = 1\frac{2}{4}$ or $1\frac{1}{2}$

If either solution is not used, then model as another way the teacher has seen used previously.

Big Ideas

Numbers can be described in many different ways including as fractions.

The whole is important in naming fractions. A fraction is relative to the size of the whole or unit

A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

A fraction describes division ($\frac{a}{b} = a \div b$, a & b are integers & b 0), and it can be interpreted on the number line in two ways. For example, $\frac{2}{3} = 2 \div 3$.

On the number line, $2 \div 3$ can be interpreted as 2 segments where each is $\frac{1}{3}$ of a unit ($2 \times \frac{1}{3}$) or $\frac{1}{3}$ of 2 whole units ($\frac{1}{3} \times 2$); each is associated with the same point on the number line.

Connect

Record the solution for each task as below and ask the students what they notice:

$\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}+\frac{1}{4}=6 \times \frac{1}{4}=\frac{6}{4}$

How would you record the following two situations:

Mahini is sharing with 3 friends. She gives each friend $\frac{1}{2}$ of her red licorice twist. How many licorice twists does she have?

Mahini is sharing with 6 friends. She gives each friend $\frac{1}{8}$ of her red licorice twist. How many licorice twists does she have?

What patterns do you notice?

Suggested Learning Outcomes

Add unit fractions.

Multiply a fraction by a whole number.

Independent Tasks

Which number is the smallest? Which number is the biggest?

$\frac{1}{2}$ or $\frac{1}{4}$	$\frac{1}{8}$ or $\frac{1}{4}$
$\frac{1}{3}$ or $\frac{1}{2}$	$\frac{1}{2}$ or $\frac{3}{4}$
$\frac{3}{4}$ or $\frac{2}{2}$	$\frac{4}{4}$ or $\frac{4}{3}$
$\frac{2}{4}$ or $\frac{3}{3}$	$\frac{3}{2}$ or $\frac{3}{4}$
$1\frac{1}{2}$ or $1\frac{1}{4}$	$2\frac{3}{4}$ or $2\frac{7}{8}$

Record representations of your reasoning to justify your ideas.

Curriculum Links

During Year Four

Add and subtract fractions with the same denominators to make up to one whole

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Convert (using number lines) between mixed numbers and improper fractions with denominators of 2, 3, 4, 5, 6, 8, and 10

Find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number

Identify, from a unit fraction part of a set, the whole set

Mathematical Language

Whole, quarters, fourths, thirds, equivalent, numerator, denominator.

Anticipations

Solutions, Misconceptions

Task 7

I have 2 slices of ham. It takes one quarter of a slice of ham to make a sandwich. How many sandwiches can I make?

I have 3 slices of ham. It takes one third of a slice of ham to make a sandwich. How many sandwiches can I make?

I have 5 slices of ham. It takes two thirds of a slice of ham to make a sandwich. How many sandwiches can I make?

Teacher Notes

Facilitate the students to notice that there are multiples of the fractional number which they can divide, add or multiply.

Notice students who use relationships to solve these word problems. For example, most students will repeatedly add or subtract but notice the students who see the relationship as groups of in multiplicative ways.

Expect students to represent using drawings and notation.

Shareback

Select students to who use measurement division (repeated subtraction as division, e.g., $2 - \frac{1}{4} - \frac{1}{4} - \frac{1}{4} - \frac{1}{4} - \frac{1}{4} - \frac{1}{4} - \frac{1}{4} - \frac{1}{4}$

or who use the inverse relationship of multiplication and division, e.g.,

$\frac{1}{4} \times ? = 2$ or $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 2$

If either solution is not used, then model as another way the teacher has seen used previously.

Connect

Record the solution for each task:
Ask students to describe how you would solve the following problems using division and subtraction or multiplication (addition):

I have 6 slices of ham. It takes one third of a slice of ham to make a snack. How many snacks can I make?

I have 8 slices of ham. It takes two quarters of a slice of ham to make a snack. How many snacks can I make?

Big Ideas

Numbers can be described in many different ways including as fractions.

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A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

The real-world actions for addition and subtraction of whole numbers are the same for operations with fractions and decimals.

Different real-world interpretations can be associated with division calculations involving fractions (decimals).

Suggested Learning Outcomes

Use repeated subtraction as division.

Solve problems that involve dividing a whole number by a fraction.

Independent Tasks

Miri wants to share her chocolate bars with her ten friends.
The eleven of them all have one half of a chocolate bar.
How many chocolate bars does Miri have to share?

Miri wants to share her chocolate bars with her five friends.
The six of them all have one quarter of a chocolate bar.
How many chocolate bars does Miri have to share?

Miri wants to share her chocolate bars with her 8 friends.
The nine of them all have one sixth of a chocolate bar.
How many chocolate bars does Miri have to share?

Curriculum Links

During Year Four

Add and subtract fractions with the same denominators to make up to one whole

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Convert (using number lines) between mixed numbers and improper fractions with denominators of 2, 3, 4, 5, 6, 8, and 10

Find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number

Identify, from a unit fraction part of a set, the whole set

Mathematical Language

Whole, half, halves, quarters, fourths, thirds, fraction, fractional number, whole number, eighths, equal, equivalent, section, piece, fair share, counting numbers, mixed numbers, splitting, partitioning

Anticipations

Solutions, Misconceptions

Task 8

Ayla and Jack were helping their Mum paint their garage wall. They each had a tin of orange paint that was the same size.
Tony used half a tin of his paint.
Jenny used three quarter of her tin of paint.
Mum wants to know how much of the tins of orange paint Ayla and Jack used altogether.

Ayla and Jack were helping their Mum paint their garage wall. They each had a tin of orange paint that was the same size.
Ayla used three eighths of a tin of paint.
Jack used three fourths of a tin of paint.
Mum wants to know how much of the tins of orange paint Ayla and Jack used altogether.

Ayla and Jack were helping their Mum paint their garage wall. They each had a tin of orange paint that was the same size.
Ayla used one half of a tin of paint.
Jack used three fifths of a tin of paint.
Mum wants to know how much of the tins of orange paint Ayla and Jack used altogether.

Teacher Notes

Have concrete material available if needed for students to select (e.g., fraction tiles).

Facilitate the students to notice that to add fractions the denominators need to be the same

Monitor for students using vocabulary of equivalence and relational thinking.

Notice students who show relational understanding: $\frac{3}{4}$ as $\frac{1}{2} + \frac{1}{4}$

Shareback

Select students to share who converted fractions to equivalent fractions using informal methods with representations before they added the fractions.

Big Ideas

Numbers can be described in many different ways including as fractions.

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A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

The real-world actions for addition and subtraction of whole numbers are the same for operations with fractions and decimals.

Different real-world interpretations can be associated with division calculations involving fractions (decimals).

Connect

What are all the fractions that would be the same as $\frac{1}{4}$?

What are all the fractions that would be the same as $\frac{3}{4}$?

What patterns and relationships can you use to find equivalent fractions? Can you come up with a rule to change fractions but keep them equivalent.

Suggested Learning Outcomes

Change fractions to equivalent fractions.

Solve problems that involve adding fractions.

Independent Tasks

Ayla and Jack were helping their Mum paint their garage wall. They each had a tin of orange paint that was the same size.
Ayla used one half of a tin of paint.
Jack used one fourth of a tin of paint.
Mum wants to know how much of the tins of orange paint Ayla and Jack used altogether.

Ayla and Jack were helping their Mum paint their garage wall. They each had a tin of orange paint that was the same size.
Ayla used one quarter of a tin of paint.
Jack used one eighth of a tin of paint.
Mum wants to know how much of the tins of orange paint Ayla and Jack used altogether.

Curriculum Links

During Year Four

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Convert (using number lines) between mixed numbers and improper fractions with denominators of 2, 3, 4, 5, 6, 8, and 10

Find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number

Identify, from a unit fraction part of a set, the whole set

Mathematical Language

Whole, half, halves, quarters, fourths, eighths, equal, equivalent.

Anticipations

Solutions, Misconceptions

Task 9

Leilani is decorating her birthday cake with jellybeans. She has 20 jellybeans. Her mum says she has to divide the cake into quarters and put the same number of jelly beans on each section.
How many jellybeans does she put on each section?

Leilani is decorating her birthday cake with jellybeans. She has 18 jellybeans. Her mum says she has to divide the cake into thirds and put the same number of jelly beans on each section.
How many jellybeans does she put on each section?

Leilani is decorating her birthday cake with jellybeans. She has 40 jellybeans. Her mum says she has to divide the cake into fifths and put the same number of jelly beans on each section.
How many jellybeans does she put on each section?

Teacher Notes

During the launch, ensure that you reinforce that the set of jellybeans are one whole as part of developing the context.

Have concrete material available if needed for students to select (e.g., fraction tiles, strips of paper) and counters to represent the jellybeans.

Facilitate the students to notice that they are finding a fraction of a whole even when there are a number of items in that set. Also, draw attention to the denominator as naming what the whole is divided into.

Shareback

Select students to share who have used a representation split into fraction parts and then have either used partitive division (e.g., 20 ÷ 4 = ?) or have used the inverse relationship and repeated addition or multiplication (e.g., 4 x ? = 20).

If either solution is not used, then model as another way the teacher has seen used previously.

Big Ideas

Numbers can be described in many different ways including as fractions.

The whole is important in naming fractions. A fraction is relative to the size of the whole or unit

A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

A fraction describes division ($\frac{a}{b} = a \div b$, a & b are integers & b 0), and it can be interpreted on the number line in two ways. For example, $\frac{2}{3} = 2 \div 3$.

On the number line, 2 ÷ 3 can be interpreted as 2 segments where each is $\frac{1}{3}$ of a unit ($2 \times \frac{1}{3}$) or $\frac{1}{3}$ of 2 whole units ($\frac{1}{3} \times 2$); each is associated with the same point on the number line.

Connect

Record the solution for each of the problems:

$\frac{1}{4}$ of 20 = 5 20 ÷ 4 = 5

$\frac{1}{3}$ of 18 = 6 18 ÷ 3 = 6

$\frac{1}{5}$ of 40 = 8 40 ÷ 5 = 8

What patterns and relationships do you notice?
What is a rule for finding a fraction of a set?

Suggested Learning Outcomes

Find fractions of a set

Independent Tasks

You have a bag of 12 lollies, and you share them equally with your friend.
What fraction do you each get?
How many lollies will you each get?

You have a bag of 24 lollies, and you share them equally with three friends.
What fraction do you each get?
How many lollies will you each get?

What is a quarter of 8?
What is a quarter of 80?

What are three quarters of 8?
What are three quarters of 80?

What is a half of 10?
What is a half of 100?

What is a third of 6?
What is a third of 60?

What are two thirds of 6?
What are two thirds of 60?
What are two thirds of 600?

Curriculum Links

During Year Four

Find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number

Identify, from a unit fraction part of a set, the whole set

Use doubling or halving to scale a quantity

Mathematical Language

Whole, quarters, fourths, thirds, fifths, sixths, section, piece, fair share, divide.

Anticipations

Solutions, Misconceptions

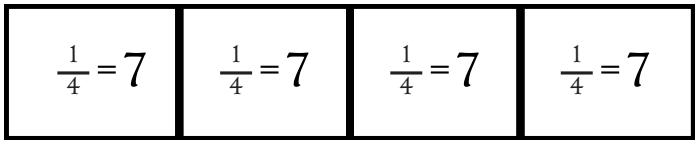
Task 10

Lyla scored $\frac{1}{10}$ of all the goals for her football team for the season. She scored 4 goals.
Sesimani scored $\frac{3}{10}$ of the goals for the team. How many goals did she score?
How many goals did the team score during the season?

Sima has a marble collection. He gives his sister Rosi 8 marbles which is $\frac{1}{6}$ of his collection.
He loses $\frac{3}{6}$ of the collection in a competition at school. How many marbles did he lose?
How many marbles did Sima have to start with in his collection?

Teacher Notes

During the launch, ensure that you reinforce that each fraction is part of one whole as part of developing the context of the task and that the problem is focused on finding the whole. Begin by asking the students to solve the following problem, one quarter of the class are sitting on the mat which is 7 children. How many children are in the class? After they have solved the problem, model representing this using a bar model:



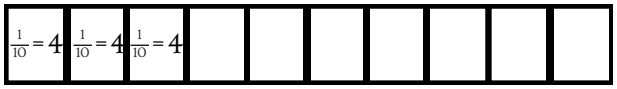
Have counters or beans available for the students to use to represent the task context or facilitate the students to draw these.

Facilitate the students to notice that they are finding the whole from the fraction given and the number in the set. Draw attention to the denominator as naming what the whole has been divided into (e.g., two groups, four groups).

Support the students to represent using a box model to show the problem context.

Shareback

Select students to share who develop representations to justify their reasoning and use this to show the whole.



Big Ideas

Numbers can be described in many different ways including as fractions.

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A comparison of a part to the whole can be represented using a fraction.

A fraction describes the division of a whole (region, set, segment) into equal parts.

The bottom number in a fraction tells how many equal parts the whole or unit is divided into. The top number tells how many equal parts are indicated.

A fraction describes division ($\frac{a}{b}$ = a ÷ b, a & b are integers & b 0), and it can be interpreted on the number line in two ways. For example, $\frac{2}{3}$ = 2 ÷ 3.

On the number line, 2 ÷ 3 can be interpreted as 2 segments where each is $\frac{1}{3}$ of a unit (2 x $\frac{1}{3}$) or $\frac{1}{3}$ of 2 whole units ($\frac{1}{3}$ x 2); each is associated with the same point on the number line.

The real-world actions for addition and subtraction of whole numbers are the same for operations with fractions and decimal

Connect

If 5 is $\frac{1}{4}$ of the set, what is $\frac{3}{4}$? What is the whole?
If 5 is $\frac{1}{6}$ of the set, what is $\frac{3}{6}$? What is the whole?
If 5 is $\frac{1}{3}$ of the set, what is $\frac{2}{3}$? What is the whole?
If 5 is $\frac{1}{10}$ of the set, what is $\frac{8}{10}$? What is the whole?

What patterns do you notice? What is a rule to work the whole?

Suggested Learning Outcomes

Identify the whole set when given a unit fraction.

Independent Tasks

$\frac{1}{2}$ of a number is 12. What is the number?

$\frac{1}{3}$ of a sheet of stickers is 12.
How many stickers on $\frac{2}{3}$ of a sheet?
How many stickers on the whole sheet?

$\frac{1}{6}$ of a bag of marbles is 4.
How many marbles in $\frac{4}{6}$ of a bag?
How many marbles in the whole bag?

$\frac{1}{8}$ of a packet of jellybeans is 5.
How many jellybeans in $\frac{5}{8}$ of a packet?
How many jellybeans in a whole packet?

Curriculum Links

During Year Four

Find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number

Identify, from a unit fraction part of a set, the whole set

For fractions with related denominators of 2, 4, and 8, 3 and 6, or 5 and 10:
– compare and order the fractions
– identify when two fractions are equivalent by directly comparing them, noticing the simplest form

Mathematical Language

Whole, half, halves, quarters, fourths, sixths, eighths, equal, equivalent.

Anticipations

Solutions, Misconceptions

Task 11

Gabriella is making a pattern using different coloured beads. She has 16 red beads, 40 blue beads and 24 gold beads.

She divides the pattern into 4 sections and uses the same number of each colour in each section.
How many of each coloured bead will she put on each section?

What about if she divides it into 8 sections?
How many of each coloured bead will she put on each section?

Teacher Notes

During the launch, ensure that you reinforce that the set of beads are one whole as part of developing the context.

Have concrete material available if needed for students to select (e.g., fraction tiles, strips of paper) and counters to represent the beads.

Facilitate the students to notice that they are finding a fraction of a whole even when there are a number of items in that set. Also, draw attention to the denominator as naming what the whole is divided into.

Monitor for students using vocabulary of the whole and parts of the set.

Shareback

Select students to share who have used a representation split into fraction parts and then have either used partitive division (e.g., 16 ÷ 4 = ?) or have used the inverse relationship and repeated addition or multiplication (e.g., 4 x ? = 16).

If either solution is not used, then model as another way the teacher has seen used previously.

Connect

Remember the rules for finding a fraction of a set that you developed (re-visit these). Describe how you would find the following:

$\frac{1}{4}$ of 48

$\frac{1}{3}$ of 99

$\frac{1}{n}$ of b

Big Ideas

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A fraction describes division ($\frac{a}{b}$ = a ÷ b, a & b are integers & b 0), and it can be interpreted on the number line in two ways. For example, $\frac{2}{3}$ = 2 ÷ 3.

On the number line, 2 ÷ 3 can be interpreted as 2 segments where each is $\frac{1}{3}$ of a unit (2 x $\frac{1}{3}$) or $\frac{1}{3}$ of 2 whole units ($\frac{1}{3}$ x 2); each is associated with the same point on the number line.

Suggested Learning Outcomes

Find fractions of a set

Independent Tasks

What is $\frac{1}{4}$ of 12?

What is $\frac{3}{4}$ of 12?

What is $\frac{1}{8}$ of 24?

What is $\frac{2}{8}$ of 24?

What is $\frac{1}{3}$ of 33?

What is $\frac{2}{3}$ of 33?

What is $\frac{1}{2}$ of 34?

What is $\frac{1}{5}$ of 45?

What is $\frac{4}{5}$ of 45?

Curriculum Links

During Year Four

Find a unit fraction of a whole number, using multiplication or division facts and where the answer is a whole number

Identify, from a unit fraction part of a set, the whole set

Use doubling or halving to scale a quantity

Mathematical Language

Whole, half, halves, quarters, fourths, equal, equivalent, section, piece, fair share.

Anticipations

Solutions, Misconceptions

Task 12

Hone and his two brothers Wiremu and Jo have 2 bottles of soft drink.
Hone drinks three quarters of one bottle.
Wiremu drinks five eighths of one bottle.
Jo drinks the rest.
How much does Jo drink?

Hone and his two brothers Wiremu and Jo have 2 bottles of soft drink.
Hone drinks three sixths of one bottle.
Wiremu drinks 2 thirds of one bottle.
Jo drinks the rest.
How much does Jo drink?

Hone and his two brothers Wiremu and Jo have 2 bottles of soft drink.
Hone drinks one fifth of one bottle.
Wiremu drinks four fifths of one bottle.
Jo drinks the rest.
How much does Jo drink?

Teacher Notes

Have concrete material available if needed for students to select (e.g., fraction tiles, strips of paper).

Facilitate the students to notice that to add or subtract fractions the denominators need to be the same.

For the independent task, you will need to complete the assessment tasks. For Task 1 encourage students to represent their thinking with diagrams, fractions and equations. Materials such as fraction tiles or paper strips may be used for students who need them.

For Task 2 have counting beans available for students to manipulate. Encourage students to make representations of drawings, numbers and equations to show their thinking. Transcribe where necessary.

Shareback

Select students to share who converted fractions to equivalent fractions using informal or more formalised methods (multiplication for example) before they solved the problem.

Big Ideas

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A fraction describes division ($\frac{a}{b} = a \div b$, a & b are integers & b 0), and it can be interpreted on the number line in two ways. For example, $\frac{2}{3} = 2 \div 3$.

On the number line, $2 \div 3$ can be interpreted as 2 segments where each is $\frac{1}{3}$ of a unit ($2 \times \frac{1}{3}$) or $\frac{1}{3}$ of 2 whole units ($\frac{1}{3} \times 2$); each is associated with the same point on the number line.

The real-world actions for addition and subtraction of whole numbers are the same for operations with fractions and decimals

Connect

How would you change these fractions to solve the equations?

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

$\frac{1}{3} + \frac{1}{6} + \frac{1}{3} =$

$\frac{1}{8} + \frac{1}{4} =$

Suggested Learning Outcomes

Change fractions to equivalent fractions.

Solve problems that involve subtracting fractions from whole numbers.

Independent Tasks

Complete one of the Assessment Tasks :

Task One: Fractions (region)

Task Two: Fractions (set)

Curriculum Links

During Year Four

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Mathematical Language

Whole, quarters, fourths, eighths, thirds, sixths, equal, equivalent.

Anticipations

Solutions, Misconceptions

Assessment Task 1 - Fractions - Year 4

Willow says she can prove $\frac{3}{5}$ is equal to $\frac{6}{10}$.

Do you agree or disagree with her? Explain why you agree or disagree.

What fractions do you know that are equal to each other? Explain how you know.

Assessment Task 2 - Fractions - Year 4

At school the classes are planting seeds. They have:

One quarter ($\frac{1}{4}$) of a bag of 32 seeds
One sixth ($\frac{1}{6}$) of a bag of 36 seeds
One fifth ($\frac{1}{5}$) of a bag of 35 seeds

Which bag has the most seeds?

Show your thinking.