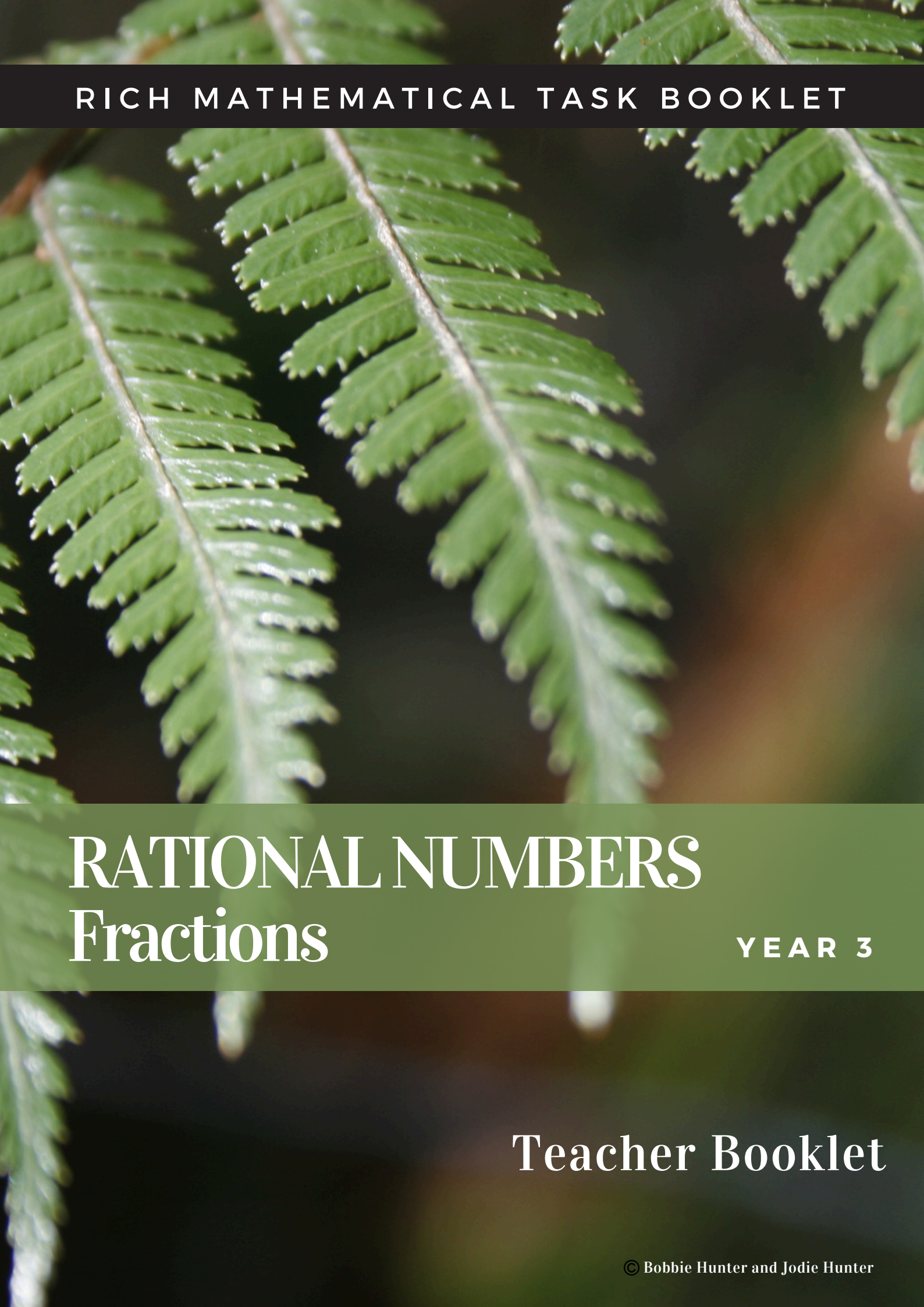


RICH MATHEMATICAL TASK BOOKLET

# RATIONAL NUMBERS
# Fractions

YEAR 3

## 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 fraction pieces for the whole, quarters, eighths, halves and introduce thirds, fifths, sixths at the second task.

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) 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 the third year***

*Identify, read, write, and represent halves, thirds, quarters, fifths, sixths, and eighths as fractions of sets and regions, using equal parts of the whole and by positioning on a number line.*

*Compare and order fractions involving halves, quarters, and eighths and identify when two fractions are equivalent*

## 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

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

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

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

## 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, thirds, quarters, halves, fifths, sixths, and eighths.

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, quarters, and thirds available.

## 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 the third year***

*Identify, read, write, and represent halves, thirds, quarters, fifths, sixths, and eighths as fractions of sets and regions, using equal parts of the whole and by positioning on a number line.*

*Compare and order fractions involving halves, quarters, and eighths and identify when two fractions are equivalent*

## Shareback

Select students to share who made combinations of fractions using the same size pieces (halves, thirds, quarters, fifths, sixths, eighths) 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.

## 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

Identify which number sentences are true or false.

$20 + 20 + 70 = 40 + 70$

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

$18 + 6 = 17 + 7$

$2+2 = \frac{4}{4} + \frac{2}{2} + \frac{3}{3}$

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

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

Explain and prove why you think the number sentences are true or false

## 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 numberline.*

*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.

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

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

## Curriculum Links

***During the third year***
*Identify, read, write, and represent halves, thirds, quarters, fifths, sixths, and eighths as fractions of sets and regions, using equal parts of the whole and by positioning on a number line.*

*Compare and order fractions involving halves, quarters, and eighths and identify when two fractions are equivalent*

## Mathematical Language

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

# Anticipations

Solutions, Misconceptions

## Task 4

The bakery is selling banana cakes to families. All the cakes are the same size.

Jamie's family has 3 children to share one cake.

Tarani's family has 6 children to share one cake.

Daniella's family has 8 children to share one cake.

Tiare's family has 2 children to share one cake.

Timo's family has 4 children to share one cake.

Which children would have more cake? Prove your answer using at least three different representations (numbers, drawings, a number-line).

## Teacher Notes

During the launch, model the cake as a rectangular representation to ensure that the students use this as the 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.

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?

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

## Suggested Learning Outcomes

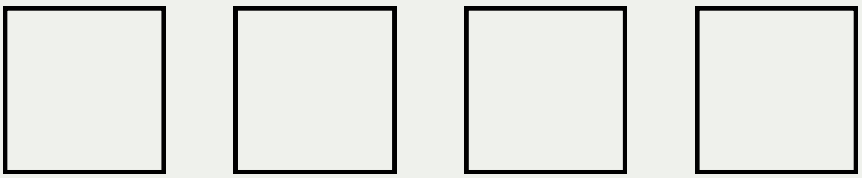
Divide wholes into equal parts.

Divide a whole numbr into fractions.

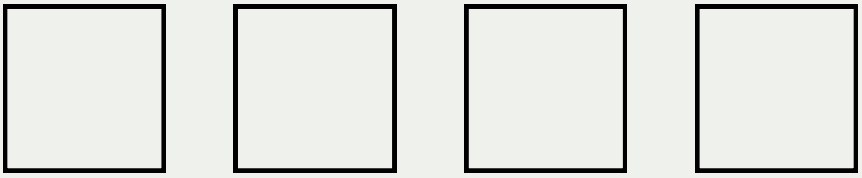
Compare and order unit fractions.

## Independent Tasks

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



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



How many different designs can you make that are $\frac{3}{4}$ red and $\frac{1}{4}$ blue?

## Curriculum Links

***During the third year***

*Identify, read, write, and represent halves, thirds, quarters, fifths, sixths, and eighths as fractions of sets and regions, using equal parts of the whole and by positioning on a number line.*

*Compare and order fractions involving halves, quarters, and eighths and identify when two fractions are equivalent*

*Add and subtract unit fractions with the same denominator*

## Mathematical Language

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

# Anticipations

Solutions, Misconceptions

## Task 5

Tama, Lelei and Lily want to share five keke pua'a so that each person gets the same amount. The keke pua'a are all the same size.
How much do they each get?

Tama, Lelei and Lily want to share seven keke pua'a so that each person gets the same amount. The keke pua'a are all the same size.
How much do they each get?

Tama, Lelei and Lily want to share four keke pua'a so that each person gets the same amount. The keke pua'a are all the same size.
How much do they each get?

## Teacher Notes

Have a picture of a plate of keke pua'a (steamed and fried meat filled buns) for students to see or discuss similar food your students eat.

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.

Monitor for students using vocabulary which relates to equal sharing and thirds.

Notice students who use multiplicative thinking and see the link between five thirds and why.

## Shareback

Select students to share who develop representations to justify their reasoning and either split all the keke pua'a in thirds 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.*

*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.*

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

## Curriculum Links

***During the third year***

*Identify, read, write, and represent halves, thirds, quarters, fifths, sixths, and eighths as fractions of sets and regions, using equal parts of the whole and by positioning on a number line.*

*Compare and order fractions involving halves, quarters, and eighths and identify when two fractions are equivalent*

*Add and subtract unit fractions with the same denominator*

## Connect

Record the matching equations and solutions for each problem.
$4 \div 3 = 1\frac{1}{3}$

$5 \div 3 = 1\frac{2}{3}$

$7 \div 3 = 2\frac{1}{3}$

Ask students to discuss the pattern that they notice. Ask them to use the pattern to solve:
$8 \div 3 =$
$10 \div 3 =$

## Suggested Learning Outcomes

Share whole parts equally.

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

## Independent Tasks

Tama, Sima, Lelei and Lily want to share five keke pua'a so that each person gets the same amount. The keke pua'a are all the same size. How much do they each get?

Tama, Sima, Lelei and Lily want to share seven keke pua'a so that each person gets the same amount. The keke pua'a are all the same size. How much do they each get?

Tama, Sima, Lelei and Lily want to share nine keke pua'a so that each person gets the same amount. The keke pua'a are all the same size. How much do they each get?

## Mathematical Language

*Whole, thirds, equal, equivalent.*

# Anticipations

Solutions, Misconceptions

## Task 6

Mireka's Nana has made panikeke and Mireka is wondering who would get more.

Two tama sharing 3 panikeke equally.

Four tama sharing 9 panikeke equally.

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

## Teacher Notes

During the launch, model the panikeke 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 panikeke when drawing.

## Shareback

Select students to share who develop representations to justify their reasoning and either split all the panikeke 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.

## 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 then record as a fraction and a whole number and a fraction (e.g., $\frac{10}{8} = 1\frac{2}{8}$) and represent on a number line.

Repeat for the different fractional amounts.

## 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.*

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

## Suggested Learning Outcomes

Share whole parts equally.

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

## Independent Tasks

Papa has baked a banana bread loaf. Who gets to eat more?

Six tamariki sharing 10 slices equally.

Eight tamariki sharing 12 slices equally.

Four tamariki sharing 6 slices equally.

Five tamariki sharing 7 slices equally.

Make sure you represent and justify your reasoning.

## Curriculum Links

***During the third year***

*Identify, read, write, and represent halves, thirds, quarters, fifths, sixths, and eighths as fractions of sets and regions, using equal parts of the whole and by positioning on a number line.*

*Compare and order fractions involving halves, quarters, and eighths and identify when two fractions are equivalent*

*Add and subtract unit fractions with the same denominator*

## Mathematical Language

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

# Anticipations

Solutions, Misconceptions

## Task 7

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

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

## Connect

Record the solution for each task:

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

$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 9 \times \frac{1}{3} = \frac{9}{3}$

How would you record the following two situations:

Miri is sharing with 3 friends. She gives each friend

Miri is sharing with 6 friends. She gives each friend

## 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.*

## Suggested Learning Outcomes

Add unit fractions (quarters and thirds).

Multiply a fraction by a whole number.

## 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 the third year***

*Identify, read, write, and represent halves, thirds, quarters, fifths, sixths, and eighths as fractions of sets and regions, using equal parts of the whole and by positioning on a number line.*

*Compare and order fractions involving halves, quarters, and eighths and identify when two fractions are equivalent*

*Add and subtract unit fractions with the same denominator*

## Mathematical Language

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

# Anticipations

Solutions, Misconceptions

## Task 8

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, $2 \div 3$ 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

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

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

## Curriculum Links

***During the third year***

*Identify, read, write (using symbols and words), and represent halves, quarters, and eighths as fractions of sets and regions, using equal parts of the whole.*

*Directly compare two fractions involving halves, quarters, and eighths*

*Find a half and quarter of a set by identifying groups and patterns (rather than sharing by ones), and identify the whole set or shape when given a half or quarter*

*Find a unit fraction of a whole number (e.g., $\frac{1}{3}$ of 15), and identify the whole set or amount when given a unit fraction (e.g., "$\frac{1}{4}$ of the set is 3, what is the whole set?")*

## Mathematical Language

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

# Anticipations

Solutions, Misconceptions

## Task 9

Tino and his 3 friends are playing with acorns. They have gathered 28 acorns. They share the acorns equally between the 4 of them. How many acorns do they each get? What fraction of the acorns do they each get?

Tino and his 5 friends are playing with acorns. They have gathered 60 acorns. They share the acorns equally between the 6 of them. How many acorns do they each get? What fraction of the acorns do they each get?

Tino and his 7 friends are playing with acorns. They have gathered 40 acorns. They share the acorns equally between the 8 of them. How many acorns do they each get? What fraction of the acorns do they each get?

## Teacher Notes

During the launch, ensure that you reinforce that the set of acorns 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 acorns.

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.*

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

## Connect

Record the solution for each of the problems:

$\frac{1}{4}$ of 28 = 7 so 28 ÷ ? = 7

$\frac{1}{6}$ of 60 = 10 so 60 ÷ ? = 10

? of 40 = 8 so 40 ÷ 5 = 8

? of 10 = 2 so ? ÷ ? = ?

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

What is a quarter of 4?
What is a quarter of 40?
What is a quarter of 400?

What is a half of 20?
What is a half of 200?
What is a half of 220?

What is a third of 9?
What is a third of 90?
What is a third of 99?

What is a quarter of 8?
What is a quarter of 40?
What is a quarter of 48?

What is a sixth of 6?
What is a sixth of 30?
What is a sixth of 36?

What is a third of 9?
What is a third of 30?
What is a third of 39?

## Curriculum Links

***During the third year***

*Identify, read, write (using symbols and words), and represent halves, quarters, and eighths as fractions of sets and regions, using equal parts of the whole.*

*Directly compare two fractions involving halves, quarters, and eighths*

*Find a half and quarter of a set by identifying groups and patterns (rather than sharing by ones), and identify the whole set or shape when given a half or quarter*

*Find a unit fraction of a whole number (e.g., $\frac{1}{3}$ of 15), and identify the whole set or amount when given a unit fraction (e.g., "$\frac{1}{4}$ of the set is 3, what is the whole set?")*

*Add and subtract unit fractions with the same denominator*

### Mathematical Language

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

# Anticipations

Solutions, Misconceptions

# Task 10

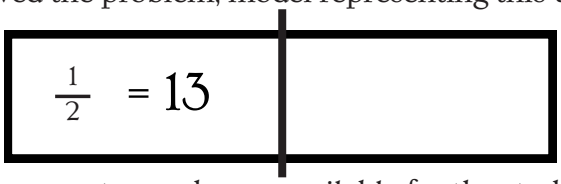
Te Irirangi has read $\frac{1}{5}$ of her book and is at page 22. How many pages in her book?

Lila has collected shells on the beach and gives her brother 9 shells. This is $\frac{1}{5}$ of the shells that she collected, how many shells did she collect?

Hemi scored $\frac{1}{6}$ of all the goals for his football team for the season. He scored 6 goals. How many goals did his team score during the season?

## 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 half of the class are sitting on the mat which is 13 children. How many children are in the class? After they have solved the problem, model representing this using a bar model:

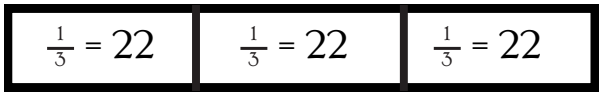



Have counters or beans available for the students to use to represent the task context or facilitate the students to draw these.
Facilitate the students to notice that they are finding the whole from the fraction given and the number in the set. Draw attention to the denominator as naming what the whole 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

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*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

If 5 is $\frac{1}{3}$ of the set, what is the whole?

If 5 is $\frac{1}{4}$ of the set, what is the whole?

If 5 is $\frac{1}{5}$ of the set, what is the whole?

If 5 is $\frac{1}{6}$ of the set, what is the whole?

What patterns do you notice?

## Suggested Learning Outcomes

Identify the whole set when given a unit fraction.

## Independent Tasks

Tayla has spent $\frac{1}{2}$ her pocket money and has $8 left. How much money did she start with?

Mareko has $\frac{1}{4}$ of a bag of lollies left and now has 15 lollies. How many lollies did he have to start with?

Ahmed has given away $\frac{1}{6}$ of his sticker collection which is 11 stickers. How many stickers did he start with?

Priti has read 14 pages which is $\frac{1}{5}$ of her book. How many pages does the book have in total?

## Curriculum Links

***During the third year***

*Identify, read, write (using symbols and words), and represent halves, quarters, and eighths as fractions of sets and regions, using equal parts of the whole.*

*Directly compare two fractions involving halves, quarters, and eighths*

*Find a half and quarter of a set by identifying groups and patterns (rather than sharing by ones), and identify the whole set or shape when given a half or quarter*

*Find a unit fraction of a whole number (e.g., $\frac{1}{3}$ of 15), and identify the whole set or amount when given a unit fraction (e.g., "$\frac{1}{4}$ of the set is 3, what is the whole set?")*

*Add and subtract unit fractions with the same denominator*

## Mathematical Language

*Whole, half, halves, quarters, fourths, thirds, fractional number, eighths, equal, equivalent, numerator, denominator.*

# Anticipations

Solutions, Misconceptions

# Task 11

Prove and justify your answer using at least 3 different representations:

Is $\frac{2}{4}$ of a chocolate bar the same as $\frac{1}{2}$ of a chocolate bar?

Is $\frac{1}{8}$ of a chocolate bar the same as $\frac{1}{2}$ of a chocolate bar?

Is $\frac{1}{4}$ of a chocolate bar the same as $\frac{2}{8}$ of a chocolate bar?

Is $\frac{1}{2}$ of a chocolate bar the same as $\frac{2}{4}$ or $\frac{3}{6}$ or $\frac{4}{8}$ of a chocolate bar?

Is 1 chocolate bar bigger than $\frac{1}{2} + \frac{1}{2}$ chocolate bars?

Are 2 chocolate bars bigger than 2 x $\frac{1}{2}$ chocolate bars?

Is $\frac{1}{2}$ of a chocolate bar bigger than $\frac{3}{8} + \frac{3}{8}$ of a chocolate bar?

## Teacher Notes

Have students work through these together in their groups or pairs, one by one, discuss and explain and then complete the next one.

Facilitate the students to notice that they do not always need to use materials or drawings if they can use the notation to explain and justify their reasoning.

Notice students who use relational reasoning.

## Shareback

Select students to share who have used two different representations to justify their reasoning.

## Connect

Write your own true or false sentences involving fractions.

## Big Ideas

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*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.*

## Suggested Learning Outcomes

Change fractions to equivalent fractions.

Compare fractions with different denominators.

Solve problems that involve adding or subtraction fractions.

## Independent Tasks

Put these numbers in order from smallest to biggest:

1. $\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{8}$ $\frac{1}{6}$

2. $\frac{4}{8}$ $\frac{2}{4}$ $\frac{3}{6}$ $\frac{1}{2}$

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

4. $\frac{4}{4}$ $\frac{1}{2}$ $\frac{6}{8}$ $\frac{1}{4}$ $\frac{2}{8}$

5. $\frac{1}{2}$ $\frac{2}{3}$ $\frac{1}{6}$ $\frac{1}{3}$ $\frac{3}{6}$ $\frac{5}{6}$

## Curriculum Links

***During the third year***

*Identify, read, write (using symbols and words), and represent halves, quarters, and eighths as fractions of sets and regions, using equal parts of the whole.*

*Directly compare two fractions involving halves, quarters, and eighths*

*Find a half and quarter of a set by identifying groups and patterns (rather than sharing by ones), and identify the whole set or shape when given a half or quarter*

*Find a unit fraction of a whole number (e.g., $\frac{1}{3}$ of 15), and identify the whole set or amount when given a unit fraction (e.g., "$\frac{1}{4}$ of the set is 3, what is the whole set?")*

*Add and subtract unit fractions with the same denominator*

## Mathematical Language

*Whole, half, halves, quarters, fourths, thirds, fractional number, eighths, equal, equivalent, numerator, denominator.*

# Anticipations

Solutions, Misconceptions

## Task 12

Susie is making an elastics to play with. She needs 3 metres of thin elastic, but her mum only has smaller pieces for her to use.

First her Mum gives her $1\frac{1}{2}$ metres.
Then she finds 3 more pieces all $\frac{1}{2}$ a metre long?

How much elastic does she have altogether? Does she have enough elastic to make an elastics, to play with?

Susie is making an elastics to play with. She needs 3 metres of thin elastic, but her mum only has smaller pieces for her to use.

First her Mum gives her $2\frac{1}{4}$ metres. Then she finds 3 more pieces which are both a $\frac{1}{4}$ metre long?

How much elastic does she have altogether? Does she have enough elastic to make an elastics to play with?

## 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.

## Shareback

Select students to share who have recognised the need to add like fractions using informal methods with representations.

## Connect

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

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

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

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

What patterns do you notice?
Can you describe a rule for adding fractions with the same denominators?

## Big Ideas

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

*The whole is important in naming fractions.*

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*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.*

## Suggested Learning Outcomes

Change fractions to equivalent fractions.

Solve problems that involve adding fractions.

## Independent Tasks

Complete one of the Assessment Tasks :

Task 1: Fractions (region)

Task 2: Fractions (set)

## Curriculum Links

***During the third year***

*Identify, read, write (using symbols and words), and represent halves, quarters, and eighths as fractions of sets and regions, using equal parts of the whole.*

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*Add and subtract unit fractions with the same denominator*

## Mathematical Language

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

# Anticipations

Solutions, Misconceptions

# Assessment Task 1 - Fractions - Year 3

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 3

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.