DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES

Number: Fractions

Level 1 (Year 1-2)

Teacher Booklet

Level 1: Year One and Two teacher booklet: Number: Fractions

Task 1	What are all the different ways you and your buddy could halve your piece of paper? Make sure you can explain how you know each pair of halves is equal.
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Share a whole into equal parts. • Put two equal parts (units) together to make one whole. • Count or add fractional parts to make one whole.
Mathematical language	Whole, half, halves, fraction, share, fair, divide, same as, equal, more than, less than.
Sharing back/Connect	Select students to share who have shown different ways of showing halves and can explain and show how each pair of halves is equal. **Connect:** Provide students with the different size pieces of paper and ask them to show different ways of showing halves. Discuss and explore what is a half.
Teacher Notes	• Have A4 pieces of paper, pens, other different size pieces of paper including postage stamp size and larger than A4 paper. • Facilitate the students to notice that two halves of one whole have to be equal. • Monitor for students using two bits of pieces and revoice as two halves of one whole. • Notice students who use many different representations to explain all the different ways a whole can be shown as two halves equally. • For the independent task, you will need different sized and shaped containers and water.

Independent Tasks	Choose a container and fill it with water. Pour out half of the water. How much water is left? Do the same with a different sized container. What do you notice? Draw a picture to record your actions. Show where half is on each container.
Anticipations	

Task 2	Can you fold your paper strip into two equal parts? Draw a representation to show what you did. Be ready to explain how many folds you needed to make and how you made sure it was equal. Can you fold your paper strip into three equal parts? Draw a representation to show what you did. Be ready to explain how many folds you needed to make and how you made sure that each part was equal.
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Share a whole into equal parts. • Put equal parts (units) together to make one whole. • Count or add fractional parts to make one whole.
Mathematical language	Whole, half, halves, thirds, fraction, share, fair, divide, same as, equal, more than, less than.
Sharing back/Connect	Select students to share who have represented halves and thirds accurately and can explain and show how each section in the fold is equal to the others. **Connect:** Ask students to draw two long thin rectangles to represent their paper strips. Ask them to represent halves on the first strip and thirds on the second strip. Record the symbol for half and third.
Teacher Notes	• During the launch, ask students to discuss how you would share a chocolate bar fairly. Make links to the ways they used a number-line to show their mass/capacity scales and in number. • Have available strips of 2cm wide paper and concrete material to use to measure pieces (not rulers).

	• Facilitate the students to notice the way in which different students have used measures to ensure equal parts including using concrete materials and their fingers. • During the activity, support students to recognise that folding a strip of paper into equal parts is using partitioning as they did in number. Here, instead of dividing a group of objects into equal groups as they did in number activities using folding, they are illustrating dividing a length into equal parts. Link to the use of the number line as divided into equal parts (usually as whole parts but this lays foundations for them to see fractions between whole numbers). • Model notating for students in both words and numbers what they show with their representations. Emphasise the whole and that the bottom number represents how many parts the whole has been divided into and the top number represents how many parts of the whole they have. • Monitor and affirm students using vocabulary which emphasises fair and equal and halves and thirds and sharing or dividing into equal parts • Notice students who use different ways to ensure equal parts including using concrete materials and their fingers and use the language of fractions • Expect students to represent using the folds and strips of paper but re-represent as drawings and equal sections or parts • For the independent task, you will need containers that are the same size and shape and water.
Independent Tasks	Choose one container and fill it with water. Pour out one third of the water into the second container. How much water is left in the first container? How much water is in the second container? What do you notice? Draw a picture to record your actions and to show where one third and two thirds are on each container.
Anticipations	

Task 3	Use the fraction tiles to find as many different ways as you can to make one whole. Record what you show using words or numbers. Be ready to explain and justify how they make one whole.
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use. NA2-6: Communicate and interpret simple additive strategies, using words, diagrams (pictures), and symbols.
Learning Outcomes: Students will be able to:	• Share a whole into different parts. • Combine and recombine different units of fractions to make one whole. • Identify and recognise equivalent fractions.
Mathematical language	Whole, half, halves, thirds, quarters, fraction, share, fair, divide, same as, equal.
Sharing back/Connect	Select students to share who made combinations of the whole using the same size pieces (halves, thirds, quarters) and recorded the combinations as numbers or words. **Connect:** Select students who were able to represent and explain using the fraction tiles and different combinations which make one whole. (e.g., one half and two quarters). If no students did this, then introduce as an alternative solution. Ask students to discuss why these make one whole and any patterns or relationships that they notice.
Teacher Notes	• During the launch, provide all students with a paper strip (the same length as they used in the previous lesson) and ask them to fold it into four equal parts. Link back and make comparisons to their paper strips from the previous lesson and the need for equal parts of the one whole. Name and record these as quarters.

	• Provide students with fraction tiles for one whole, halves, quarters, and thirds. • Teachers notate for students in both words and numbers what they show with their representations. Emphasise the whole and that the bottom number represents how many parts the whole has been divided into and the top number represents how many parts of the whole they have. • Facilitate the students to notice the connection between the concrete representation and their recording in words and numbers. • Notice students who notice equivalence in the fractional parts. Record these as number sentences using the equal sign. • For the independent task, have available fraction tiles for whole, halves, thirds, and quarters. Have the words: halves, half, thirds, quarters, fourths, whole and their equivalent in numbers available as cards for students to use as they record their combinations to make one whole.
Independent Tasks	Use the fraction tiles to make different combinations of one whole. Draw your representations as bars and record in words and fractions how you made one whole.
Anticipations	

Task 4	Use the fraction tiles to find as many different ways as you can to make less than one whole. Record what you show using words or numbers. Be ready to explain and justify how they make less than one whole. Use the fraction tiles to find as many different ways as you can to make more than one whole. Record what you show using words or numbers. Be ready to explain and justify how they make more than one whole.
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Share a whole into different parts. • Count or add fractional units. • Identify and recognise equivalent fractions.
Mathematical language	Whole, half, halves, thirds, fourths, quarters, fraction, share, fair, divide, same as, equal, more than, less than.
Sharing back/Connect	Select students to share who represented and explained using fraction tiles and other representations. Begin with those students who made combinations of less than the whole and more than a whole using the same size pieces (halves, thirds, quarters). **Connect:** Select students who were able to represent and explain using unlike fractions and different combinations to make less than or more than a whole. Record the solutions as addition for the students. Ask the students whether they notice any patterns or relationships (focus on equivalence).
Teacher Notes	• During the launch, revisit all the combinations they made for one whole in the previous lesson and independent task. • Provide fraction tiles for one whole, halves, quarters, and thirds.

	• Teachers notate for students and/or support students to record in both words and numbers what they show with their representations. Re-emphasise the whole and that the bottom number represents how many parts the whole has been divided into and the top number represents how many parts of the whole they have. • Facilitate the students to connect to the concept of fractional numbers as less than one whole and more than one whole and record as using greater than, less than symbols and as addition equations with the equals sign.
Independent Tasks	Which number sentences are true or false? 30 = 30 $\frac{1}{2} + \frac{1}{2} = 1$ 9+5 =12 + 3 6 = 3 + 3 $1 = \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3}$ $\frac{1}{2} = \frac{1}{4} + \frac{1}{3}$ Explain why you think the number sentences are true or false
Anticipations	

Task 5	Jayden and Martha's nana has baked a banana bread loaf. She tells them they can have three slices of the banana bread to share but they are to make sure that they both have the same amount. How many slices of banana bread does each one get to eat? What about if Jayden and Martha had to share one slice of banana bread equally? How many slices of banana bread does each one get to eat? What about if Jayden and Martha had to share five slices of banana bread equally? How many slices of banana bread does each one get to eat?
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Share whole parts equally. • Solve problems that involve dividing a whole number into a fraction.
Mathematical language	Whole, half, halves, fraction, share, fair, divide, same as, equal.
Sharing back/Connect	Select students to share who develop representations to justify their reasoning and either split all the banana bread slices in halves 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:** Record the matching equations and solutions for each problem. $1 \div 2 = \frac{1}{2}$

	$3 \div 2 = 1\frac{1}{2}$ $5 \div 2 = 2\frac{1}{2}$ Ask students to discuss the pattern that they notice. Ask them to use the pattern to solve: $7 \div 2 =$ $9 \div 2 =$
Teacher Notes	• During the launch, discuss the context of the problem, make links to banana bread and its equivalent form other students know (e.g., date loaf) and times when students have had to share food in a fair way. Emphasise the need for fair sharing as each getting an equal portion. Model the representation as a rectangular shape. • Have concrete material available if needed for students to select (e.g., fraction tiles, strips of paper). • Facilitate the students to notice that fair sharing of a whole into halves means equal size pieces. • Monitor for students using vocabulary of fractions (e.g., one whole piece and one-half piece). • For the independent task have fraction tiles for the whole, quarters, thirds, halves and paper and pen
Independent Tasks	Use the fraction tiles to make as many different combinations as you can of: Less than one whole. Less than one half. The same as one half. More than one half but less than a whole. Draw your representations as bars and record in words, numbers (fractions) and equations.
Anticipations	

Task 6	Rebekah has helped her Mum make some panipopo for their family. Mum ate one and then she said that Rebekah could share the five left with her three sisters, but they all had to have the same amount. How many panipopo did they each get to eat? What about if Rebekah had to share one panipopo with her sisters? How much panipopo would they get to eat? What about if Rebekah had to share three panipopo with her sisters? How much panipopo would they get to eat?
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Share whole parts equally. • Solve problems that involve dividing a whole number into a fraction.
Mathematical language	Whole, half, fourths, quarters, fraction, share, fair, divide.
Sharing back/Connect	Select students to share who develop representations to justify their reasoning and either split all the panipopo in quarters 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:** Record the matching equations and solutions for each problem. $1 \div 4 = \frac{1}{4}$ $3 \div 4 = \frac{3}{4}$

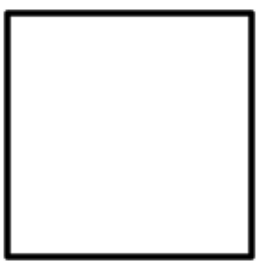
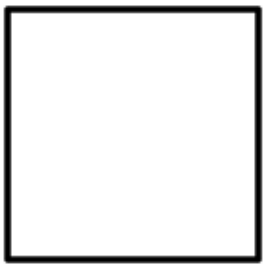
	$5 \div 4 = 1\frac{1}{4}$ or $\frac{5}{4}$ Ask students to discuss the pattern that they notice. Ask them to use the pattern to solve: Rebekah had to share 7 panipopo with her four sisters. Rebekah had to share 9 panipopo with her four sisters.
Teacher Notes	• Have concrete material available if needed for students to select (e.g., fraction tiles, playdough). • Facilitate the students to notice that fair sharing of a whole into quarters means four equal size pieces of the one whole. • Monitor for students using vocabulary of fractions (e.g., one whole panipopo and quarters of one panipopo). • Expect students to represent using drawings and as needed re-represent using materials. Notate for the students the solutions as addition using either numbers or words, • Notice students who draw on multiplicative thinking (i.e., means they immediately see $1 \div 4 = \frac{1}{4}$ so each person gets either $1\frac{1}{4}$ or five quarters). • For the independent task have fraction tiles for the whole, quarters, thirds, halves and add in eighths and sixths and paper and pen
Independent Tasks	Dad has made some banana muffins. How much would you get if you had to share: Two banana muffins with four people. Two banana muffins with eight people. Four banana muffins with eight people. Six banana muffins with four people. Six banana muffins with eight people. Draw and write how you solved the problems.
Anticipations	

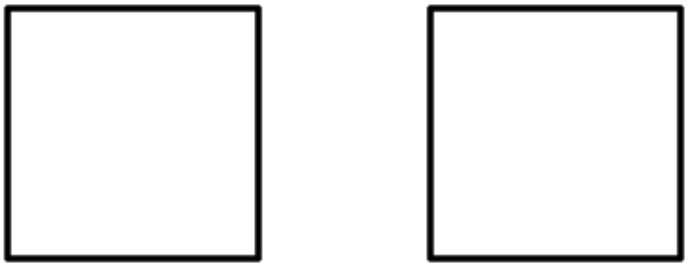
Task 7	What comes between 0 and 1? Put your marker on the tape on the floor where you think half is. Be ready to explain and justify how you can prove the accuracy of where your marker is. Now divide the tape into three equal parts and put the markers where you think they should be. Be ready to explain and justify how you can prove the accuracy of where your marker is. Look at our number line which goes from 0 to 10. What number would go between 1 and 2? What number would go between 2 and 3? Can you put in any other numbers which would go halfway between the whole numbers?
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 ÷ 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 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. Each fraction can be associated with a unique point on a numberline. There is no least or greatest fraction on the number line.
Curriculum links	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Show fractions on a number-line.

Mathematical language	Whole, half, halves, thirds, fraction, divide, mixed numbers.
Sharing back/Connect	Select students to share who can mark the fractions onto the number-lines with some accuracy and justification. **Connect:** Put as many numbers that would come between other numbers onto the number-line.
Teacher Notes	• Have an unmarked number-line on the whiteboard to use during the lesson and two lengths of paper tape to lay on the floor and large marked fraction cards with words and notation and a number-line marked 0-10. • Facilitate the students to notice that previously 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 a mixed number. • 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 20. Have available fraction cards which students can use to select the fractional number
Independent Taks	Mark on the number-line where you think the following mixed numbers would be: $3\frac{1}{2}$, $19\frac{1}{2}$, $\frac{1}{2}$, $10\frac{1}{2}$, $15\frac{1}{2}$, $5\frac{1}{2}$) Draw your own number-line from 0 to 10. Mark on it all the whole numbers from 0 to 10. Now mark on it as many mixed numbers with half as you can.
Anticipations	

Task 8	Divide the tape into four equal parts and put the arrows where you think they should be and then put your fraction name card. Be ready to explain and justify how you can prove the accuracy of where your arrow is. Draw a picture of the number-line from 0 to 1. Mark $\frac{1}{4}$ on the number-line. Mark $\frac{2}{4}$ on the number-line. Mark $\frac{4}{4}$ on the number-line. Draw a number-line from 0 to 10. Mark $2\frac{1}{2}$ on the number-line. Mark $5\frac{1}{3}$ on the number-line. Mark $3\frac{1}{4}$ on the number-line. Mark any other mixed numbers that you can on the number-line.
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 ÷ 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 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. Each fraction can be associated with a unique point on a numberline. There is no least or greatest fraction on the number line.
Curriculum links	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.

Level 1: Year One and Two teacher booklet: Number: Fractions

Learning Outcomes: Students will be able to:	• Show fractions on a number-line.
Mathematical language	Whole, half, halves, thirds, fourths, quarters, mixed numbers.
Sharing back/Connect	Select students to share who can visualise and draw the number-lines and mark the positions of the fractions. **Connect:** Looking at our number-line can you make some mathematical statements that are true. I will start you off by saying 5 is greater than $4\frac{1}{2}$.
Teacher Notes	• During the launch revisit the patterns with choral counting in halves, quarters, thirds from 0 to 5. • Have an unmarked length of paper tape to lay on the floor, large fraction cards with words and a number-line marked 0-10. For the connect, draw a number-line from 0 to 5 and mark on whole numbers and mixed numbers for halves, quarters and thirds. • Facilitate the students to notice that there are numbers between whole numbers and that there is a pattern to these numbers. Also, facilitate students to count the sections inside the number-line and not the markers. • In this activity, most students will draw a number line from 0-10, mark all the whole numbers and then find the positions of the mixed numbers by partitioning. Some students may estimate the positions of the mixed numbers on the empty number line. Both strategies are acceptable as long as the students can justify what they have done.
Independent Tasks	Draw some shapes. If the shape is cut into two halves, what might it look like? Draw different ways that it could be cut into two halves. How many different ways can you cut these squares into quarters?  

	
Anticipations	

Task 9	Hone and Rangi both have a chocolate bar. Hone has eaten $\frac{3}{4}$ of his bar and Rangi has eaten $\frac{1}{2}$ of her bar. Who has eaten the most? Hone and Rangi both have a chocolate bar. Hone has eaten $\frac{1}{4}$ of his bar and Rangi has eaten $\frac{1}{3}$ of her bar. Who has eaten the most? Hone and Rangi both have a chocolate bar. Hone has eaten $\frac{3}{4}$ of his bar and Rangi has eaten $\frac{2}{3}$ of her bar. Who has eaten the most?
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 ÷ 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 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. Each fraction can be associated with a unique point on a numberline. There is no least or greatest fraction on the number line.
Curriculum links	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Identify and compare different unit fractions. • Recognise equivalent fractions.
Mathematical language	Whole, half, halves, thirds, fourths, quarters, fraction, same as, equal, more than, less than.
Sharing back/Connect	Select students to share who are able to develop representations (drawings of two identical length chocolate bars marked as

	fractions, or two identical number lines with the fractional markings) to explain how and why each fractional number is bigger or smaller than another fractional number. **Connect:** Bigger, smaller or the same? $\frac{3}{4}$ or $\frac{2}{2}$ $\frac{4}{4}$ or $\frac{5}{4}$ $\frac{3}{3}$ or $\frac{2}{2}$ $\frac{1}{3}$ or $\frac{1}{2}$ $1\frac{1}{2}$ or $1\frac{3}{4}$
Teacher Notes	• Facilitate the students to notice that the denominator represents the number of pieces the whole has been divided into and the smaller the denominator the greater the piece. Reinforce that the chocolate bars should be the same size and need to be identical lengths if they draw it.
Independent Tasks	Look at the fractions below and draw a representation for each one. Now use the symbols > (greater than), < (less than), = (equal) to make the number sentences true. ½ and $\frac{2}{3}$ $\frac{5}{4}$ and $\frac{2}{2}$ $1\frac{1}{2}$ and $1\frac{2}{3}$ $\frac{4}{4}$ and $\frac{3}{3}$ $\frac{3}{3}$ or $\frac{3}{2}$ $\frac{3}{2}$ or $1\frac{2}{4}$
Anticipations	

Task 10	Monica and her seven friends are given one cake to share. They all have exactly the same amount. How much do they each have? Monica and her seven friends are given nine muffins to share. They all have exactly the same amount. How much do they each have? Monica and her seven friends are given 10 muffins to share. They all have exactly the same amount. How much do they each have?
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 ÷ 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 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. Each fraction can be associated with a unique point on a numberline. There is no least or greatest fraction on the number line.
Curriculum links	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Share whole parts equally. • Solve problems that involve dividing a whole number into a fraction.
Mathematical language	Whole, eighths, share, fair, divide, same as, equal.
Sharing back/Connect	Select students to share who develop representations to justify their reasoning and for the second and third problem either split

	all the muffins into eighths or share as a whole and fractional amount. **Connect:** Record the student solutions as an equation: $1 \div 8 = \frac{1}{8}$ $9 \div 8 = 1\frac{1}{8}$ $10 \div 8 = 1\frac{2}{8}$ What patterns and relationships do you notice? What about if Monica and her friends had 11 muffins to share?
Teacher Notes	• Before the launch, use a warm up with fraction cards for halves, thirds, quarters and corresponding mixed numbers to five. Ask students to work in pairs and randomly pick a card and have their buddy represent where it would be on an empty number line. • During the launch, model the cake and muffins as a rectangular representation. • Facilitate the students to notice that the cakes can be divided into eight equal pieces and that would mean that for the second problem each person gets $\frac{9}{8}$ or the last cake can be split into eight equal pieces and that they each get 1 and $\frac{1}{8}$. Have them notice that $\frac{9}{8}$ is the same as $1\frac{1}{8}$ • Expect students to represent using drawings and use fraction pieces as proof • For the independent task, you will need playdough.
Independent Tasks	Make three playdough loaves. Share the loaves equally between 5 friends. What do you notice? Record your thinking and show how you worked out how much of each loaf each friend got. Make four playdough loaves. Share the loaves equally between 5 friends. What do you notice? Record your thinking and show how you worked out how much of each loaf each friend got. Make six playdough loaves. Share the loaves equally between 5 friends. What do you notice? Record your thinking and show how you worked out how much of each loaf each friend got.

Anticipations	

Level 1: Year One and Two teacher booklet: Number: Fractions

Task 11	Look at the pairs of fractions and identify which is the biggest number and which is the smallest number. Make sure you justify your thinking in at least two different ways (e.g., drawing, number-line) $\frac{1}{2}$ or $\frac{1}{4}$ $\quad\quad$ $\frac{1}{8}$ or $\frac{1}{4}$ $\frac{1}{3}$ or $\frac{1}{2}$ $\quad\quad$ $\frac{1}{2}$ or $\frac{3}{4}$ $\frac{3}{4}$ or $\frac{2}{2}$ $\quad\quad$ $\frac{4}{4}$ or $\frac{4}{3}$ $\frac{2}{4}$ or $\frac{3}{3}$ $\quad\quad$ $\frac{3}{2}$ or $\frac{3}{4}$ $1\frac{1}{2}$ or $1\frac{1}{4}$ $\quad\quad$ $2\frac{3}{4}$ or $2\frac{7}{8}$
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. Each fraction can be associated with a unique point on a number line.
Curriculum links	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use.
Learning Outcomes: Students will be able to:	• Recognise unit fractions. • Compare unit fractions. • Identify equivalent fractions.
Mathematical language	Whole, half, halves, thirds, fourths, quarters, eighths, fraction, same as, equal, more than, less than, numerator, denominator.
Sharing back/Connect	Select students to share who have used two different representations to justify their reasoning. **Connect:** Put these numbers in order from smallest to biggest $\frac{1}{2}, \frac{3}{3}, \frac{1}{3}, \frac{1}{4}, \frac{2}{3}, \frac{3}{4}$
Teacher Notes	• Facilitate the students to notice the relationship between the numerator and denominator.

	• Notice students who use the language of justification and draw on equal lengths as representations of the whole as justification • Expect students to represent using concrete means including both drawings and a number-line.
Independent Tasks	Sepi ate one quarter of a liquorice strap; Mara ate two eighths of a liquorice strap. Who ate the most? Why? Josie ate one half of a liquorice strap; Lee ate three eighths of a liquorice strap. Who ate the most? Why? Moana ate one half of a liquorice strap; Eli ate four eighths of a liquorice strap. Who ate the most? Why? Now write your own fraction problems and ask a classmate to solve them.
Anticipations	

Task 12	There are two children in Teremoana's family. Their mother gives them half a banana each. How many bananas does she use? There are four children in Teremoana's family. Their mother gives them half a banana each. How many bananas does she use? There are six children in Teremoana's family. Their mother gives them half a banana each. How many bananas does she use? There are seven children in Teremoana's family. Their mother gives them half a banana each. How many bananas does she use?
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use. NA2-6: Communicate and interpret simple additive strategies, using words, diagrams (pictures), and symbols.
Learning Outcomes: Students will be able to:	• Identify how many halves make one whole. • Add or count fractional parts. • Multiply a fraction by a whole number.
Mathematical language	Whole, half, halves, equal.
Sharing back/Connect	Select students to share who either add all the halves and get four halves and change this to two whole bananas ($\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{4}{2} = 2$) or add the halves to one whole ($\frac{1}{2} + \frac{1}{2} = 1$, $\frac{1}{2} + \frac{1}{2} = 1$, $1 + 1 = 2$) or multiply ($4 \times \frac{1}{2} = 2$). If either of the addition solutions is not used, then model as another way the teacher has seen used previously.

	Connect: What if Monica's mother had given the two children $1\frac{1}{2}$ bananas each? What if Monica's mother had given the two children $\frac{2}{4}$ bananas each?
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 or fraction pieces to represent parts of the whole. • For the independent task, you will need different sized containers and water.
Independent Tasks	There are four children in Teremoana's family. Their mother gives them $\frac{1}{4}$ of a banana each. How many bananas does she use? There are eight children in Teremoana's family. Their mother gives them $\frac{1}{4}$ of a banana each. How many bananas does she use? There are 10 children in Teremoana's family. Their mother gives them $\frac{1}{4}$ of a banana each. How many bananas does she use?
Anticipations	

Task 13	Jakob and his two brothers Noa and Hemi share 2 chocolate bars. Jakob eats a quarter of one. Noa eats three thirds of one. Hemi eats one half of one. How much of the two chocolate bars do they eat? Prove your reasoning using at least two different representations.
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use. NA2-6: Communicate and interpret simple additive strategies, using words, diagrams (pictures), and symbols.
Learning Outcomes: Students will be able to:	• Represent fractions using drawings and symbols. • Add or subtract simple fractions from a whole number. • Find equivalent fractions to solve an addition or subtraction problem.
Mathematical language	Whole, half, halves, thirds, fourths, quarters, equal.
Sharing back/Connect	Select students to share who solve the problem by either representing each chocolate bar and subtracting a fractional amount or use equivalent fractions to convert half into quarters and recognise $\frac{3}{3}$ is a whole. If either of the solutions is not used, then model as another way the teacher has seen used previously. **Connect:** $\frac{1}{2} + \frac{1}{2}$ =? $\frac{1}{4} + \frac{1}{4}$ = ? $\frac{2}{4} + \frac{2}{4}$ = ? $\frac{3}{4}$ + ? = 1 $\frac{1}{2}$ + ? = 1

Teacher Notes	• Monitor for students using vocabulary which emphasise the one whole.
Independent Tasks	Luna and her parents shared a bottle of milk. Luna drank one eighth of the bottle, Mum drank three eighths of the bottle. Dad drank the rest. How much did Dad drink? Who drank the most? Prove your reasoning using at least two different representations.
Anticipations	

Task 14	For your birthday, you have a cake to decorate with 16 M & Ms. You cut the cake in two and shared the M & Ms equally. What fraction of the M & Ms would there be on each side? How many M & Ms would be on each side? For your birthday, you have a cake to decorate with 16 M & Ms. You cut the cake in four and shared the M & Ms equally. What fraction of the M & Ms would there be on each side? How many M & Ms would be on each side? For your birthday, you have cake to decorate with 16 M & Ms. You cut the cake in eight and shared the M & Ms equally. What fraction of the M & Ms would there be on each side? How many M & Ms would be on each side?
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use. NA2-6: Communicate and interpret simple additive strategies, using words, diagrams (pictures), and symbols.
Learning Outcomes: Students will be able to:	• Find fractions of a set.
Mathematical language	Whole, half, halves, fourths, quarters, eighths, fraction, share, fair, divide.
Sharing back/Connect	Select students who develop a representation and: Year One: Share the M & Ms equally either by ones or in chunks. If no students are using chunks, then model as another way the teacher has seen used previously. Year Twos: Share the M & Ms equally in chunks or by using division. If no students use division, then model as another way the teacher has seen used previously.

	Connect: You have a bag of lollies, and you share them equally with your friend. If you have 8 lollies in the bag how many do you each get? Record as: $\frac{1}{2}$ of 8 = 4 8 ÷ 2 = 4 You have a bag of lollies, and you share them equally with your friend. If you have 20 lollies in the bag how many do you each get? Record as: $\frac{1}{2}$ of 20 = 10 20 ÷ 2 = 10 What do you notice?
Teacher Notes	• During the launch, ensure that you reinforce that the set of M and Ms are one whole as part of developing the context. Model the representation of the cake as a rectangle. • Have counters available to represent the M & Ms or facilitate the students to draw these. • 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.
Independent Tasks	There are 10 marbles in a bag. One half of the marbles are blue. How many marbles are blue? There are 24 marbles in a bag. One half of the marbles are blue. How many marbles are blue? There are 30 marbles in a bag. One half of the marbles are blue. How many marbles are blue? There are 12 marbles in a bag. One quarter of the marbles are red. How many marbles are red? There are 20 marbles in a bag. One quarter of the marbles are red. How many marbles are red? There are 28 marbles in a bag. One quarter of the marbles are red. How many marbles are red?
Anticipations	

Task 15	Mere and Harmony are playing with their toy cars, and they decide to use boxes for garages. They have 12 little cars. They share them equally between 3 garages. What fraction of the cars would be in each garage? How many cars would be in each garage? Mere and Harmony are playing with their toy cars, and they decide to use boxes for garages. They have 16 little cars. They share them equally between 4 garages. What fraction of the cars would be in each garage? How many cars would be in each garage? Mere and Harmony are playing with their toy cars, and they decide to use boxes for garages. They have 30 little cars. They share them equally between 3 garages. What fraction of the cars would be in each garage? How many cars would be in each garage?
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	NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures. NA2-1: Use simple additive strategies with whole numbers and fractions. NA2-5: Know simple fractions in everyday use. NA2-6: Communicate and interpret simple additive strategies, using words, diagrams (pictures), and symbols.
Learning Outcomes: Students will be able to:	• Find fractions of a set. • Make links between finding a fraction of a set and division.
Mathematical language	Whole, thirds, fourths, quarters, divide.
Sharing back/Connect	Select students who develop a representation and: Year One: Share the cars equally either by ones or in chunks. If no students are using chunks, then model as another way the teacher has seen used previously.

	Year Twos: Share the cars equally in chunks or by using division. If no students use division, then model as another way the teacher has seen used previously. **Connect:** What is a third of 9? Record as: $\frac{1}{3}$ of 9 = 3 9 ÷ 3 = 3 What is a third of 90? Record as: $\frac{1}{3}$ of 90 = 30 90 ÷ 3 = 30 What is a quarter of 20? Record as: $\frac{1}{4}$ of 20 = 5 20 ÷ 4 = 5 What is a quarter of 200? Record as: $\frac{1}{4}$ of 200 = 50 200 ÷ 4 = 50 What patterns and relationships do you notice?
Teacher Notes	• During the launch, ensure that you reinforce that the set of cars are one whole as part of developing the context. • Have counters available to represent the cars. • 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.
Independent Tasks	Select one or more of the following assessment tasks (attached at the end of the document) as the independent activity: NR1: Fractions: Halves and quarters NR2: Finding fractions of a set.
Anticipations	

DMIC
DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES
ASSESSMENT TASK

NUMBER – FRACTIONS (region): LEVEL 1 Task NR1

Write and draw everything you know about halves and quarters.

Are there any other fractions you know that you can write and draw about?

DMIC

DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES
ASSESSMENT TASK

NUMBER – FRACTIONS (set): LEVEL 1 Task NR2

At school the classes are planting seeds. They have:

One half ($\frac{1}{2}$) of a bag of 12 seeds One quarter ($\frac{1}{4}$) of a bag of 24 seeds

One third ($\frac{1}{3}$) of a bag of 21 seeds

How many seeds are in each bag? Which bag has the most seeds?

Show your thinking.