Jessica Smith & Emily Shorthouse
February 24th, 2020
EDCI-405

Mini Lesson: Fraction Concepts
Grade 3

Learning Objective:

This lesson is an introduction to fraction concepts based on the Grade 3 B.C. math curriculum. We will provide two activities that offer concrete, pictorial and symbolic forms to develop understanding of how fractions are a type of number that can represent quantities. After the lesson, students will be able to:

- Demonstrate how a whole can be divided into equal parts
- Recognize the fraction symbol as a type of number that can represent parts of a whole

Introduction:

Fractions are used in our everyday lives. They can be used in stories we share, the ways we represent our physical, mental, spiritual and emotional self, and how we talk about the seasons of the year. They are represented in our currencies, and can be found in so many aspects of our daily lives. Based on fraction concepts as they are introduced in the Grade 3 B.C. math curriculum, we hope to offer strategies that will help students grasp the concept of fractions representing parts of a whole.

Through an interactive story, students will have a chance to conceptualize what happens when a whole banana loaf is split up between four friends. The story will set the stage for a number talk where students will be asked to represent what is happening when the loaf is divided into four equal parts. The second half of the lesson will introduce students to the linear model of fractions with a fraction strips activity that will provide students an opportunity to use concrete manipulatives to explore parts of a whole.

Terms to be introduced

Fraction: Used to describe one or more parts of a whole that is divided into equal parts.

Denominator: The number below the fraction bar that represents how many pieces/parts the whole is divided into.

Numerator: The number above the fraction bar that represents how many parts of the whole are being considered.

Prior Knowledge:

• To have a basic understanding of equal versus not equal

• To know what one half of a whole is

• To understand concepts of division (eg. sharing, grouping repeated subtraction)

Connections to Mathematics 3

Big Idea: Fractions are a type of number that can represent quantities.

Curricular Competencies:
- Develop, demonstrate, and apply mathematical understanding through play, inquiry, and problem solving
- Visualize to explore mathematical concepts
- Engage in problem-solving experiences that are connected to place, story, cultural practices, and perspectives relevant to local First Peoples communities, the local community, and other cultures
- Use mathematical vocabulary and language to contribute to mathematical discussions
- Represent mathematical ideas in concrete, pictorial, and symbolic forms
- Reflect on mathematical thinking
- Incorporate First Peoples worldviews and perspectives to make connections to mathematical concepts

Content:
- Fractions are numbers that represent an amount or quantity
- Fraction parts are equal shares or equal-sized portions of a whole or unit
- Provide opportunities to explore and create fractions with concrete material
- Recording pictorial representations of fractions models and connecting to symbolic notation
- Equal partitioning
- Equal sharing, medicine wheel, seasons

First Peoples Principles of Learning:
- Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).
- Learning is embedded in memory, history, and story.

Opportunities to Differentiate:

- Have a variety of manipulatives available for play and discovery (ie. lego, blocks, cuisiniarie rods, playdough)
- Experiential play using everyday items like granola bars, pizza, pie, or other food
- Use a variety of different shapes to represent fractions
- Students create their own stories around fractions
- Number talks / open-ended questions

Assessment:

- Use of paper strips to help with formative assessment on students comprehension
- Number talk and discussion and use of Thumbs up, sideways or down
- Observation as students are playing "Cover up" game
- Exit slips/Ticket out the door

Description of activities:

"Clover Bakes Banana Loaf" story
(to take place over 45 minute lesson)**:**

Each student should have one strip of paper to demonstrate how they would divide up the banana loaf. The teacher will read the story and prompt students by asking them how they would fold the paper to represent the whole loaf as it is divided up equally between two friends, and then between two more friends. This hands-on activity is a great way to conceptualize what is happening as a whole is split into equal parts and moves towards the linear model of fractions. After the number talk, the concepts of how to write a fraction and the terms denominator and numerator can be introduced.

Guiding questions during story:
- Ask: "How can Clover and Ollie cut this loaf so they can each have equal amounts?" As the loaf is a rectangle, there may be a few different ways to do this. For this lesson the teacher will consider cutting the loaf in half like we do with fraction strips, making sure that the students know that other ways of cutting the loaf are also okay. Refer to the diagram in the appendix for a sample.

- Ask students to fold the paper to show how they would divide the loaf up equally between four friends.

- Ask students if they think whether or not all the animals have equal amounts of loaf. Does Little Grey Duck have the same amount of loaf as everyone else?

Guiding questions at end of the story:
- Does anyone know what a fraction is?
- How would you write it?
- Ask students what fractions they see in the Clover Bakes Banana Loaf story.
- What does the number on the bottom represent?
- What does the number on the top represent?

Refer to the loaf diagram in the appendix to ask the following questions:
- How would you write a fraction to represent 1 loaf that is cut into 4 pieces?
- How would you write a fraction to represent you have 3 of the 4 pieces of loaf left? *[Encourage different ways to express number: ie. three pieces out of four, or three fourths or 3/4]*
- How would you write a fraction to represent you have 2 of the 4 pieces of loaf left? *[two pieces out of four, or two fourths or 2/4]*
- How would you write a fraction to represent you have 1 of the 4 pieces of loaf left? *[one piece out of four, or one fourth or 1/4]*
- How would you write a fraction to represent you have 0 of the 4 pieces of loaf left?
- Can you write 4/0? *[Answer = Undefined. You can't have 4 pieces of nothing.]*

Fraction Strips (can be used for various activities related to fraction concepts):

Fraction strips are a useful manipulative for students to grasp early concepts of fractions and to conceptualize the linear model. Teachers can find resources to make their own fraction strips. It is recommended that students prepare their own fraction strips by folding and cutting out the individual shapes (1, ½, ¼, ⅛, 1/16) and writing out the different fractions on each shape themselves. Experienced teachers have explained that this process helps students to better understand the concept of this manipulative. To add to the understanding of fraction strips, we have included a granola bar image made into fraction strips for introducing fraction concepts and group discussions. We recommend printing fraction strips on heavier, coloured card stock for durability. Be sure to keep each shape of each fraction strip a different colour and the same size. See appendix for examples.

Fraction Strips Game "Cover Up" (15-20 minute game)
Preparation:
Prepared fraction strips in 1, ½, ¼, & ⅛.
Dice with numbers ½, ¼, & ⅛.
Work in partners or groups of three.

To Play:
1. Each member lays out their fraction strips the table in order with the "1" or whole number fraction strip on the top and the 1/8th strips on the bottom.
2. To see who goes first, there is an option to roll the dice and player who rolls largest fraction goes first.
3. Your turn begins by rolling the fraction dice.
4. Whatever fraction you role tells you what size fraction strip size you can use to cover up the whole number strip.
5. Check with your group members to see if they agree with your move.
6. After you are finished, say "Done" and pass the dice to the next player.
7. The player that covers up their whole strip first wins the game.
8. For each turn, you must use exactly the fraction that you roll. If you have a smaller space on your whole number fraction strip that what is on your fraction die, you cannot go and your turn is over. For example if you have a space for 1/8, and you roll ¼, you cannot go and your turn is over.

Reference:
Burns, M. (2003). *The Fraction Kit Guide Grades 4 - 6*. Math Solutions.

Possible open questions:
- Can you find a fraction strip that is smaller than ½?
- Can you find a fraction strip that is bigger than ¼?
- Find 2 fraction strips that add up to 1 (ie. ½ + ½ or ¼ + ¼ + ¼ + ¼)
- Find 3 fractions that add up to 1 (ie. ½ + ¼ + ¼)

Story: Clover Bakes Banana Loaf

Once upon a time, in a forest not too far from here, a little rabbit named Clover decided it was time for a snack.

"Hmmm," said Clover, "I think I will make some of my delicious banana loaf."

Clover carefully went through their cupboards and found all the ingredients needed, except for one thing.

 "Oh dear, what am I going to do? I have no bananas!" thought Clover, "Hmmm, I must go to Ollie's house. They'll have bananas."

Clover happily went to visit Ollie, the snowy owl. Ollie lived only a few trees away, so in a hop, skip and a jump Clover was at the owl's front door.

Clover gently knocked on the front door. A very sleepy Ollie answered yawning, "Why, hello, Clover! What brings you over to my house so early this morning?"

"Well, I have a craving for banana loaf, but I need bananas. You wouldn't happen to have any do you?" asked Clover.

"Why, yes I do! You can have as many as you need," said Ollie.

"Oh thank you so much!" said Clover. "Please join me. I would love to share my banana loaf with you!"

"Sure," said Ollie. Ollie's tummy was a bit empty and they thought that some of Clover's banana loaf would be just the right thing.

The two friends walked back to Clover's house and began to mix the ingredients. After adding a little extra sugar and chocolate chips, the banana loaf was ready for the oven.

As Clover and Ollie sat with a cup of tea waiting for the banana loaf to bake in the hot oven, Clover thought, "This banana loaf is going to be delicious. I must make sure to share it evenly with my friend. How must I cut this loaf so that we both have equal parts?"
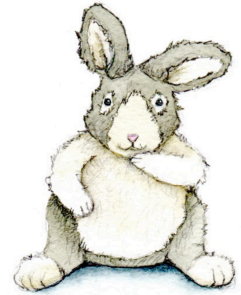
Ask students how Clover can cut the loaf so that there are two equal pieces for the two friends. Please refer to the lesson plan for more detail.

Clover decided to cut the loaf in half, making sure that both sides of the loaf were exactly the same. This way Clover was sure that they would all get the same amount.

As the beautiful banana loaf baked in the oven there was a knock at the door.

Clover opened the door to find their friends Frog Frog and Little Grey Duck.

 "Why, hello Frog Frog and Little Grey Duck. Do come in!" said Clover.

"We would love to," said Frog Frog, "We were just on our way to the pond when we thought we would come for a visit."

"Would you like to have some tea and banana loaf?" said Clover, "The loaf is just about ready!"

"Of course!" said Frog Frog and Little Grey Duck together.

In a small voice Little Grey Duck said, "You make the best banana loaf in the entire forest!"

As the four friends sat drinking their tea and visiting and smelling the wonderful loaf cooking in the oven, Clover thought, "I must make sure that everyone gets an equal amount. How am I going to cut the loaf now that I have two more friends to share with?"

Ask students how they would cut the loaf up in equal parts to share with four friends. Please refer to the lesson plan for more detail.

Clover thought, "I must cut the loaf in half, and then cut both those pieces in half so that the loaf can be divided into four equal pieces, one for me and one for each of my friends."

Finally the banana loaf was ready. Everyone watched as Clover very carefully cut the loaf in half. When Clover was done, they cut the two half pieces in half so that there were four equal pieces all together.

Little Grey Duck thought their piece of loaf looked rather big to eat all at once and asked, "Clover, could you please cut my piece into two pieces, so that it would be easier to eat?"

Without thinking, Clover said, "Sure," and cut Little Grey Duck's piece in half.

Suddenly Clover was worried because Little Grey Duck had two pieces and everyone else had only one. Clover thought, "What am I going to do now that Little Grey Duck has two pieces and we all have one? Does everyone still have equal amounts?"

Ask students if they think all the animals have equal amounts of loaf. Does Little Grey Duck have the same amount of loaf as everyone else? Encourage the students to use manipulatives or draw out their solution to figure out their answers. Please refer to the lesson plan for more detail.

After some thought, Clover decided that Little Grey Duck did indeed have the same amount as everyone else because their piece, which was the same as everyone else's, was just cut in half. It only looked like it more because it was two pieces instead of one.

All the animals decided that this was the best banana loaf they had ever tasted. They sat chatting and enjoying the warmth of the kitchen while talking about their adventures and patting their full bellies. Clover enjoyed the banana loaf, but sharing the loaf and spending time with friends was Clover's favourite part.

Visual for how the loaf is cut during the story
as a precusor for fraction strips.
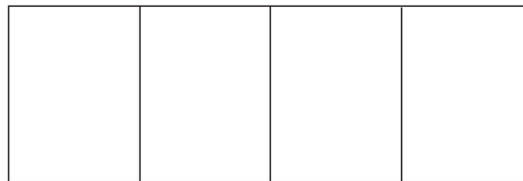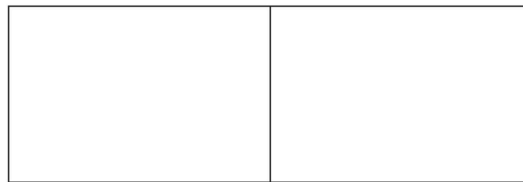
Fraction Strips
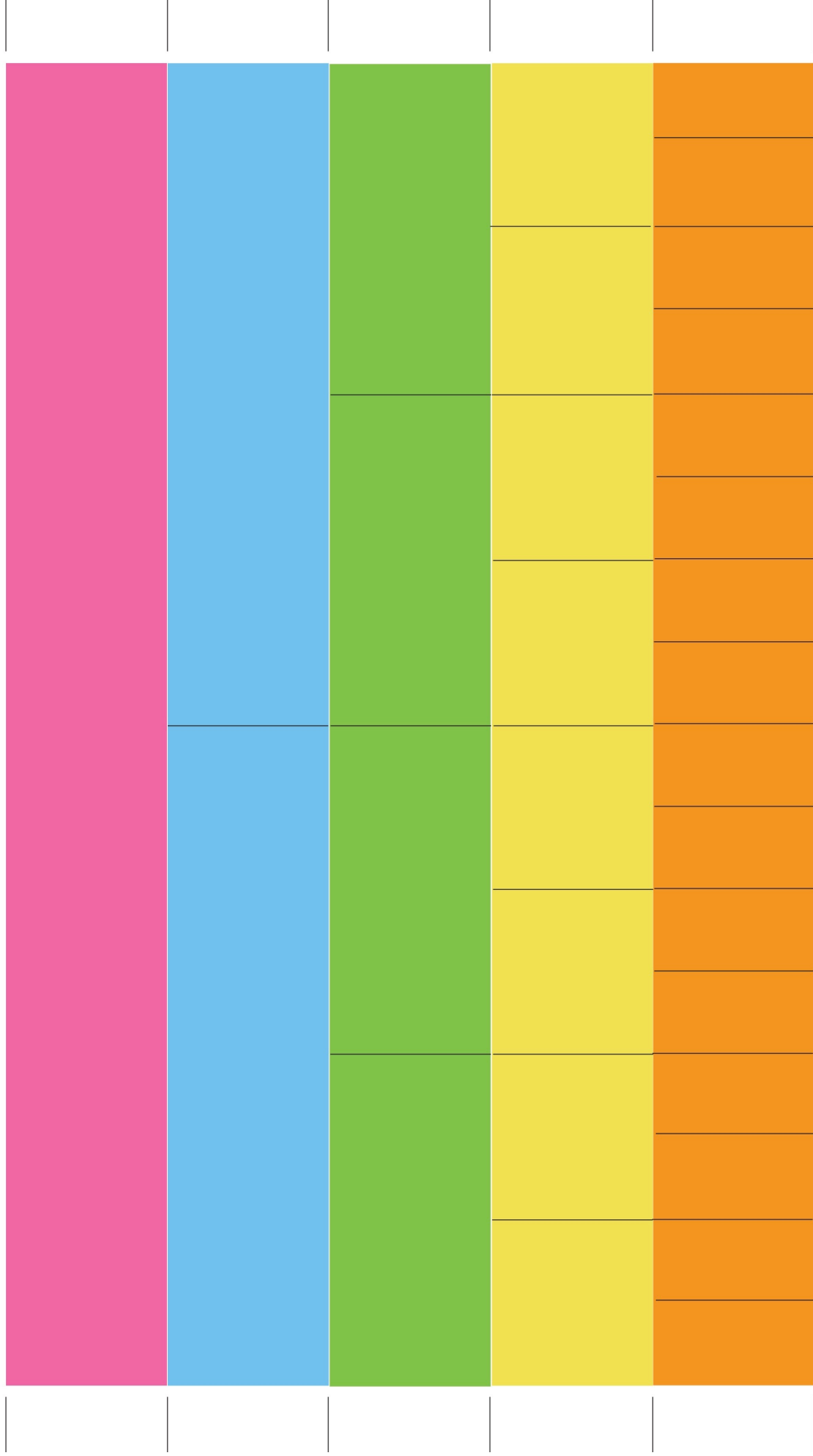
Cut out strips using crop lines. Let the students cut out each shape in each colour and write the size in each shape. Pink = 1, Blue = $\frac{1}{2}$ Green = $\frac{1}{4}$ Yellow = $\frac{1}{8}$ Orange = $\frac{1}{16}$

Learning to Write Fractions

1

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

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

$$\frac{3}{4}$$

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

$$\frac{3}{4}$$

$$\frac{0}{4}$$

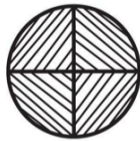Name: Fraction Strips

Write on each coloured shape what fraction the coloured shape represents of the whole shape.

What fraction could you use to describe
what is left of this shape?

Name: Matching Fractions

$$\frac{3}{4}$$

$$\frac{0}{4}$$

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

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

$$\frac{1}{4}$$

Draw a line to connect a picture that matches that fraction. White means there is nothing left.

Name:

$$\frac{0}{4}$$

$$\frac{3}{4}$$

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

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

1

$$\frac{3}{4}$$

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

Use a line to match the fraction to the shape. White means there is nothing left.

Granola Bar Fraction Strips