<mark>Lesson Plan</mark>

Subject: Math	Name: Sam Park (104219647)
Grade: – Grade 5	Date/Time: December 3, 2022
Topic: Fractions in career contexts	Length of Period: 100 minutes (two math
	periods, 50 minutes each)

Curriculum Expectations

Overall Expectations

Ontario Math Curriculum

B. Number

B1. Number Sense: Demonstrate an understanding of numbers and make connections to the way numbers are used in everyday life

B2. Operations: Use knowledge of numbers and operations to solve mathematical problems encountered in everyday life

Specific Expectations

Fractions, Decimals and Percents

B1.3 Represent equivalent fractions from halves to twelfths, including improper fractions and mixed numbers, using appropriate tools, in various contexts

Addition and Subtraction

B2.5 Add and subtract fractions with like denominators, in various contexts

Purpose/Main Idea

- The purpose of this lesson is to reinforce fractions, and to apply fractions within various career contexts (e.g., basketball player, chef, and musician)
- Students will already have been exposed to equivalent fractions, improper fractions, mixed numbers, and adding fractions with like denominators in a previous lesson
- This lesson will be used to assess student knowledge and application of fractions
- Students will go through 3 stations, where each station is themed (e.g., sports, cooking, and music)

Prerequisites and Prior Learning

Students are expected to have met the following **grade 4 curriculum expectations**, prior to this lesson:

- **B1.4** Represent fractions from halves to tenths using drawings, tools, and standard fractional notation, and explain the meanings of the denominator and the numerator
- **B2.7** Represent the relationship between the repeated addition of a unit fraction and the multiplication of that unit fraction by a whole number, using tools, drawings, and standard fractional notation

Prior learning can be assessed (diagnostic assessment) at the start of the lesson with a **Fractions Knowledge Checklist** (attached to lesson plan).

Students will also have been given a **previous lesson on the content** in this lesson. This lesson is meant as a follow-up lesson to help **reinforce concepts** and allow students to **make connections** to their everyday life. Students are also expected to **work collaboratively** to ensure everyone is at the same level of understanding within the class.

Advanced Learning and Challenges

Based on the **grade 6 curriculum**, students will be advancing their knowledge to meet the following expectations:

- **B2.5** Add and subtract fractions with like and unlike denominators, using appropriate tools, in various contexts
- **B2.9** Multiply whole numbers by proper fractions, using appropriate tools and strategies

Students will be slowly challenged to consider multiplication of fractions, and addition of fractions with unlike denominators.

Learning Skills				
Based on page 11 of the Growing Success document				
1. Collaboration				
Students work collaboratively on math problems – expressing their thinking, listening				
to the thinking of others, and practicing inclusivity – and in that way foster healthy				
relationships				
• The student responds positively to the ideas, opinions, values, and traditions of				
others				
• The student builds healthy peer-to-peer relationships through personal				
interactions				

- The student works with others to resolve conflicts and build consensus to achieve group goals
- The student shares information, resources, and expertise and promotes critical thinking to solve problems and make decisions

2. Initiative

- The student looks for and acts on new ideas and opportunities for learning
- The student demonstrates curiosity and interest in learning
- The student approaches new tasks with a positive attitude

3. Self-Regulation

- The student seeks clarification or assistance when needed
- The student assesses and reflects critically on own strengths, needs, and interests
- The student identifies learning opportunities, choices, and strategies to meet personal needs and achieve goals
- The student perseveres and makes an effort when responding to challenges

Social Emotional Learning (SEL) Skills

Make connections among mathematical concepts, procedures, and representations, and relate mathematical ideas to other contexts (e.g., other curriculum areas, daily life, sports)

Materials

• Note: There are student worksheets attached to this lesson plan. Ensure that enough copies are **printed for all students** prior to the lesson.

Group 1: Basketball players

- Mini basketball net
- Mini basketball
- Masking tape
- Basketball and Fractions Student Worksheet (attached to lesson plan)

Group 2: Musicians

- Metronome
- Drum or another instrument
- *Music and Fractions Student Worksheet* (attached to lesson plan)

Group 3: Chefs

- Measuring cups
- Dried rice
- Bin for rice

- Food scale
- 2 large, clear drinking glasses (same size and shape)
- *Cooking and Fractions Student Worksheet* (attached to lesson plan)

Set-Up

There will be 3 stations. Station 1 will be basketball, station 2 will be cooking and station 3 will be music. The teacher will set-up the stations prior to the lesson.

Station 1: Basketball

Fix a mini basketball net to a wall or door. For example, see the image below. Put a piece of masking tape on the ground to indicate where shots should be taken from.



Station 2: Cooking

Put a food scale on a desk with some measuring cups and dried rice. Put the dried rice in a large bin so that it is easy to scoop. The dried rice could be replaced with water, or coffee beans. Flour is not a good idea because the weight can change a lot, depending on how packed it gets. Plus, the powdery flour can be very messy.



Station 3: Music

Put a metronome and a drum on a desk. The drum could be replaced with a recorder, or even clapping hands, or singing voices.



Assessment Strategies

Diagnostic Assessment

• Fractions Knowledge Checklist

- Before the lesson and activities, verbally go through the *Fractions Knowledge Checklist* and have students demonstrate with their bodies if they think they understand one of the concepts
- For example, "If you think you know the answer to the following question, or you know how to arrive at the answer, please jump up and down. If you are unsure of the answer, or how to get to the answer, please walk in a circle. The question is: How would I write 7/2 as a mixed number?"

Formative Assessment

- Making connections
 - e.g., listen for talk of using fractions in everyday life
- Working collaboratively
 - e.g., taking turns, listening to others, helping others, etc.
- Difficulty level
 - o e.g., listen for students expressing whether the work is "too hard" or "too easy"
- Appropriate mathematics terminology
 - e.g., listen for students using words like "numerator", "denominator", "greater than", "less than", "equal to", "simplify", "improper fraction", "mixed number", etc.
- Take notes on specific students.

Summative Assessment

- Have the students complete the 3 worksheets during the activities (unless a modification is required)
 - 1. Basketball and Fractions Student Worksheet
 - 2. Music and Fractions Student Worksheet
 - 3. Cooking and Fractions Student Worksheet

Daily Mindset and Quotes

This lesson is an application lesson in which students are encouraged to explore their own understanding of content.

Quote 1: **"Admitting your weaknesses does not diminish your strengths: it shows your courage."** - Erin Andrews

Allow students to be comfortable admitting what they do not understand. Learning and growth is enabled through the admission of uncertainty. We do not learn from what we already know.

Quote 2: "Knowledge is like paint; it does no good until it is applied." – Doe Zantamata

The purpose of this lesson is to have students connect fractions to their real world, and potential future careers. Fractions are in our everyday lives. Help students to realize that.

Le	Lesson Plan and Activities				
	A)	MINDSET, HOOK, AND DIAGNOSTIC ASSESSMENT			
	Tir	neframe: 15 min.			
	1.	Students stand and form a circle around the perimeter of the room			
	2.	Students are welcomed to math and the teacher reads the <i>Daily Mindset and Quotes</i>			
		(see above) for the lesson			
	3.	Hook: Questions to engage students			
		Teacher: "Do we have any aspiring basketball players in the room? Or anyone who			
		loves sports? Respond yes by pretending to shoot a basketball!"			
		Students: [pretend to shoot basketballs]			
		Teacher: "Good, this lesson is for you!"			
		Teacher: "What about future chefs? Does anyone here like to cook or bake? Respond			
		yes by pretending to mix cake batter!"			
		Students: [pretend to mix cake batter]			
		Teacher: "Wonderful, this lesson is for you!"			
		Teacher: "How about musicians? Does anyone here know how to play an instrument,			
		or want to learn one day? Respond yes by air drumming!"			
		Students: [pretend to drum]			
		Teacher: "Fabulous, this lesson is for you too. And for anyone who doesn't like any of			
		those things, this lesson is also for you because there are plenty of other ways that we			
		can use fractions. Now, can anyone tell me how the career of a basketball player, a			
		chef, or a musician might use fractions?"			
		Students: [given opportunity to answer]			
	4.	Diagnostic assessment: Perform the diagnostic activity (see attached Fractions			
		Knowledge Checklist)			

Transition: Tell students how many students are in the class in total that day. Ask students, *if* they were to divide themselves evenly into 3 groups, how many students would be in each group, and how many would be remaining. Write it on the board as a fraction.

Then, the teacher will divide the students using <u>dynamic groupings</u>. The students that need more assistance will start with the basketball activity because it is based on pre-requisite learning. The students that are excelling will start with the cooking activity because it is the most challenging mathematically of the three stations.

B) MAIN ACTIVITIES: 3 STATIONS

Timeframe: 75 min. (approximately 25 minutes per station)

Station 1: Basketball

Objective: Easy "refresher" on fractions and equivalent fractions.

- The station will already be set-up according to the set-up instructions (see above)
- Each student will be given a *Basketball and Fractions* worksheet
- Students will make their way through the worksheet, following written instructions
- The main activity in the worksheet involves each student shooting the basketball at the net 4 times and recording how many times they got it in the net

Station 2: Music

Objective: Application of adding fractions with common denominators, and an introduction to using equivalent fractions to add fractions with unlike denominators.

- The station will already be set-up according to the set-up instructions (see above)
- Each student will be given a *Music and Fractions* worksheet
- Students will make their way through the worksheet, following written instructions
- The main activity in the worksheet involves each student drumming 4 quarter note beats, 2 half note beats, and 1 whole note beat, to determine their time equivalence

Station 3: Cooking

Objective: Application of adding proper fractions, improper fractions, and mixed numbers. Recognizing that adding the same fractions together multiple times is the same as multiplying fractions.

- The station will already be set-up according to the set-up instructions (see above)
- Each student will be given a *Cooking and Fractions* worksheet
- Students will make their way through the worksheet, following written instructions
- One of the main activities in the worksheet involves qualitatively (visually) comparing and quantitatively comparing (measuring the masses) 1 cup of rice and 4 quarter cups of rice to determine their equivalence
- The other main activity involves doubling a recipe of banana bread, working with improper fraction and mixed numbers

C) CONCLUSION AND NEXT STEPS

Timeframe: 10 min.

- Students help to tidy up workstations
- The teacher tells students that **worksheets will be collected next class**. They may take them home if they are not finished.
- The teacher summarizes the main ideas of the lesson, and what to expect next lesson

Extra (if students are done early or need another activity):

- Finish worksheets
- Students watch the **supplementary videos** (8 min, 57 sec)

• Write in **math journal**, following prompts (see attached)

Differentiation of Learning

Accommodations

- Level of support: The student may work with a partner to complete the worksheet (put two names on one worksheet).
- **Input:** Student may be given a digital copy of the worksheet to type on.
- **Output**: Student may be assessed verbally, without a written component.

Modifications

- **Amount**: If a student needs a modification related to the size of the lesson, the student may be excused from completing some of the activities. For example, the student may do the basketball activity *only*. Or they could do the basketball activity and then watch the supplementary videos.
- **Time**: Allow the student to have more time to complete the activities. For example, the student may be given 30 minutes per station, instead of 20 minutes per station, and then only do 2 of the stations.
- Level of support: The student may be given a peer tutor or educational assistant to assist them in completing the worksheets.
- **Output**: The assessment component may be changed completely. For example, students may write in their math journal, following the *Student Journal Prompts* (attached).

<mark>Extensions</mark>

- Determine the rules for adding fractions with *unlike* denominators, based on the activities done (hint: consider the use of equivalent fractions)
- Determine the rules for multiplying whole numbers by proper fractions, based on the activities done (hint: adding the same fractions together multiple times will yield the same result as multiplying fractions)
- Watch the **supplementary videos** (below)
- Write in math journal, following the *Student Journal Prompts* (attached)

Gardner's Multiple Intelligences

Visual / Spatial Intelligence

- Students are given pie charts to colour in and visually see the fractions represented
- Verbal / Linguistic Intelligence
- Students are encouraged to talk to each other and talk out loud while solving problems Logical / Mathematical Intelligence
 - Students will perform calculations involving fractions on the worksheets. For example, students will have to add fractions with like denominators.

Bodily / Kinesthetic Intelligence

• Students will move around the room, using their bodies to perform the activities at each station. For example, shooting basketballs is an active activity that requires arm and leg movement.

Musical / Rhythmic Intelligence

• Time signatures and note values in music are considered using fractions. Students are given the opportunity to make music during this activity.

Interpersonal Intelligence

• Students are given the opportunity to collaborate and work together with their peers to complete the worksheets.

Intrapersonal Intelligence

• Students can write in their math journal to reflect on their own personal experiences during the activity

Philosophical Connections

John Dewey believed in learning through active experiences that engage the body and mind (Dewey, 1916). These stations are meant to have students apply fractions to common life scenarios, such as baking, music, and sports.

Reference: Dewey, J. (1916). The democratic conception in education. In *Democracy and education: An introduction to the philosophy of education* (pp. 124–139). The Free Press, Collier-Macmillan Limited.

Supplementary Videos

- 1. Music notes and fractions (5:10): https://www.youtube.com/watch?v=nDlEymx6D80
- 2. Using fractions in baking (3:47): https://www.youtube.com/watch?v=HVQngj8Tkpo

Next lessons

- Collect student worksheets
- Learn about decimals
- Apply decimals to the job of banking, or cashier

Reflection and Comments for Improvement

This lesson involves three different stations. Students will all be up and moving around. There are many materials involved.

- It may be helpful to demonstrate each station to the whole class first, before students break into groups. The teacher can have a PowerPoint presentation, or a video prepared, to show how each station will work. The teacher may choose to do the worksheets together, as a class.
- It may be helpful to have extra assistance in the classroom when performing this lesson. Having student teachers, educational assistants, or other support to help answer questions and manage behaviour may be beneficial.
- This lesson may not be good if all students are at different levels of understanding. Some students may need easier or harder worksheets. Another option is to only do one station at a time and complete the other stations on different days.

Fractions Knowledge Checklist

Below grade level expectations

□ **Fractions and Whole Numbers** Is the number 2 a fraction or a whole number? (Whole number) Is 5/2 a fraction? (YES)

At grade level expectations

- $\Box \quad Equivalent Fractions \\ Does <math>2/8 = 1/4?$ (YES) Does 4/6 = 1/3? (NO)
- □ Mixed numbers and improper fractions How would you write 7/2 as a mixed number? $(3\frac{1}{2})$ How would you write $2\frac{1}{3}$ as an improper fraction? (7/3)
- □ Adding fractions with like denominators $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = ?(3/4)$ $3/2 + \frac{1}{2} = ?(4/2 = 2)$

Above grade level expectations

- □ Adding fractions with unlike denominators, and LCD $2/3 + \frac{1}{2} = ?(4/6 + 3/6 = 7/6)$
- □ Multiplying fractions $3/2 \times 5/4 = ?(15/8 = 1\frac{7}{8})$

Basketball and Fractions

Student Worksheet

Name:	 		

Date: _____

Step 1: Determine who in the group is going to shoot first. That person will stand behind the white line and prepare to throw the basketball into the net.

Make 4 total throws and record how many throws went into the net in question 1 below.

Question 1: How many basketballs went in the net; out of the 4 shots you took?



Draw what that would look like on the pie graph below. Colour in the number of sections based on the number of shots scored. For example, if 3 out of 4 shots went in the net, colour in 3 sections of the pie graph.



Lesson: In fractions, the **denominator** (bottom number) is the total number. In this case, the denominator represents the total number of shots taken. It could also represent the total number of cookies in a box, or the total number of students in a class, etc. The **numerator** (top number) indicates how much of the total we have. For example, if I scored 7 out of 12 baskets, then my fraction is 7/12.

Question 2: Imagine that John got the ball in the net 4 times, after throwing it 8 times total (4/8). Sally threw the ball 4 times total and got it in 2 times (2/8). Colour in the pie graphs below.



What do you notice about these graphs?

How would you write this as a simplified fraction?

Lesson: **Equivalent fractions** are fractions that represent the same value, even though they are divided a different number of times. It is important that we **simplify fractions** into their least number of divisions.

Music and Fractions

Student Worksheet

Name:		
Date:		

In music, common (4/4) time signature means that a quarter note gets one beat and there are 4 beats in a measure.



In other words, 4 quarter notes is equal to 1 whole.



Mathematically, we can write it like this:

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

Lesson: When **adding fractions with common denominators**, we can simply add the numerators, and keep the denominator the same.

Question 1:

Are 2 half notes equal to four quarter notes?



Circle Yes or No.

YES NO

Activity: Try drumming using the metronome

- a) 4 quarter note beats
- b) 2 half note beats
- c) 1 whole note beat

Did it take the same amount of time for each? Circle Yes or No.

YES

NO

Question 2: How many half notes can go in a measure with 2 quarter notes, if the time signature is common?

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





How can you write $\frac{1}{2}$ with a denominator of 4?

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

Lesson: When **adding fractions with different denominators**, we can try to make the denominators the same using **equivalent fractions**.

Question: How many sixteenth notes make up a three-quarter (dotted half) note?

First, fill in $\frac{3}{4}$ on the pie chart for a $\frac{3}{4}$ note. Then match the amount of shaded space for the 1/16 note. Count the number of shaded sections.



 $\frac{3}{4} = \frac{1}{16}$

What is 12 divided by 4? _____ What is 16 divided by 4? _____ 4 × 4 = _____

3 × 4 = _____

Question: How could I simplify the fraction 12/16 to get ³/₄? What would I have to do to the top number and the bottom number?

Cooking and Fractions

Student Worksheet

Name:	
Date:	

Step 1: Put a large, clear drinking glass on the food scale. "Zero" the scale by pressing the clear button. This will ignore the mass of the glass.

Step 2: Using a 1 cup measuring cup, scoop 1 cup of dried rice from the bin, into the glass.

Record the mass of 1 cup of rice here: _____ [grams]

Step 3: Take the first glass with the rice in it off the food scale. Set it aside, but do <u>not</u> dump it out yet. Put the other drinking glass on the food scale. The scale should read zero grams. If not, "zero" the scale again by pressing clear with the glass on it.

Step 4: Take a ¹/₄ cup measuring cup and scoop 4 scoops of dried rice from the bin, into the glass.

Record the mass of $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$ cups of rice here: _____ [grams]

The mass of 1 cup of rice should be about the same as $4 \times \frac{1}{4}$ cups of rice.

Put the glasses of rice side-by-side to visually compare them. Do they look the same?

How would we write this mathematically?

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{1}{4} = 1 \text{ cup}$$
$$4 \times \frac{1}{4} = 1$$
$$\frac{4}{1} \times \frac{1}{4} = 1$$

Now, let's say that we want to double $(\times 2)$ a recipe. We can do this with multiplication of fractions, or addition of fractions.

Take a look at the banana bread recipe below:



Question 1: How many bananas would I need to make <u>double</u> the banana bread?

$3 \text{ bananas} \times ___= 6 \text{ bananas}$

$3 \text{ bananas} + 3 \text{ bananas} = _$

Therefore, I would need _____ bananas for double the batch.

Question 2: How much butter would I need for double the batch?

$$\frac{\frac{1}{3} + \frac{1}{3} = -}{2 \times \frac{1}{3} = \frac{2}{1} \times \frac{1}{3} = \frac{2}{3}}$$

Therefore, I would need _____ cups butter for double the batch.

Lesson: Adding the same fractions together multiple times, is the same as multiplying fractions. Try to determine the rules for multiplying fractions!

Question 3: How much sugar would I need for double the batch?

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

$$2 \times \frac{2}{3} = \frac{2}{1} \times \frac{2}{3} = \frac{2}{3}$$

Therefore, I would need _____ cups sugar for double the batch.

Lesson: An **improper fraction** is a fraction in which the numerator is larger than the denominator. For example: 4/3 is an improper fraction. A **mixed number** is a whole number and a fraction combined.

Question 4: If you only had a 1/3 cup measuring cup, a $\frac{1}{2}$ measuring cup, and a 1 cup, how would you scoop the sugar?



Therefore, you could use the _____ measuring cup and scoop the sugar _____ times.



Or, you could use the ____ and ____ cup to scoop the sugar.

Question 5: How would you write 4/3 as a mixed number?

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

Question 6: How much flour would you need for double the batch?

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

 $1 \operatorname{cup} + 1 \operatorname{cup} + \frac{1}{2} \operatorname{cup} + \frac{1}{2} \operatorname{cup} = _$

Therefore, you would need _____ cups of flour.

Lesson: When adding mixed numbers, add the whole numbers first, and then add the fractions together.

Question 7: How would you write $1\frac{1}{2}$ as an improper fraction? $2 \times 1 = \underline{\qquad}$ + 1 = 3 $\overline{_2} = 1\frac{1}{2}$

Lesson: When **converting from a mixed number to an improper fraction**, multiply the denominator of the proper fraction by the whole number, and then add the numerator of the proper fraction. This value will be the numerator of the improper fraction. The denominator of the improper fraction will be the same as the denominator of the proper fraction.

Student Journal Prompts

This is an optional activity and may be used as an extension for students who are done early, or as a modification for students that are not submitting worksheets for assessment.

Feedback:

- 1. What *did* you like about the activities today?
- 2. What would you want to change, or what *didn't* you like about the activities today?
- 3. Which activity was your favourite? Why was that activity your favourite?
- 4. How would you rate the activities in terms of difficulty? Were they easy, hard, or inbetween?

Connecting and Reflecting:

- 5. What do you want to do as a job/career one day? Can you think of how you might use fractions in your future job?
- 6. Can you think of any other careers that might use fractions?
- 7. Could you add fractions when using a measuring tape as a woodworker? Explain.

Math Remembering and Understanding:

- 8. Name some words related to fractions that you remember.
- 9. Explain or show how you add fractions with the same denominator (bottom number).

Math analyzing and Creating:

10. Were you able to develop a rule for multiplying fractions? How does this compare to adding fractions?