Fraction multiplication lesson
Domain: Number and Operations

Grade: 4 **Time/Lesson Duration:** 60 min

CCS Standards Addressed and/or Assessed:

4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

a. Understand a fraction a/b as a multiple of 1/b.

b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number.

c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.

Objectives:

Content Objective: Students will be able to multiply fraction parts by whole numbers using models and visual representations to represent real-world problems, and will understand how to use number sentences to represent this work.

Language Objective: The students will create visual models that accurately represent fraction-multiplication word problems, and will be able to verbally describe their reasoning for constructing the model the way they did. They will create equations to represent the problems and their models, and be able to describe the reasoning they used to create the equations.

Lesson Overview: Students will work individually to solve real-world fraction multiplication problems involving fraction parts multiplied by a whole number; they will use models and graphical representations, then represent the problems and solutions in number sentences. Students will be given the option to continue individual practice in the same manner, or apply knowledge with a partner to begin one of two poster projects of varying cognitive complexity. Prior knowledge: students will understand whole-number multiplication, and basic fraction concepts. Students will be familiar with use of the available manipulatives.

Supplementary Materials: Overhead or digital projector, fraction bars, dot grid paper, poster supplies.

LESSON IMPLEMENTATION

Time	Opening Experience:	
10 min	A portion of a poem found online (uncredited) at http://wcsmath.blogspot.com/2011/04/fraction-poem.html At lunchtime I bought a huge orange- The size of it made us all laugh. I peeled it and shared it with Robert and Dave-- they got quarters, and I had a half. Read the poem and display it on the projector. Connect to students' own experience of sharing/dividing items with friends or family, then use poem as the basis for a review of students' knowledge of fractions: How would they write "one quarter?" How would they write "one half"? Write the numbers on the board according to their directions. Prompt them to tell you what each portion of the fractions represents (bottom number, top number, etc). If necessary, add a more in-depth review of these concepts before proceeding with the rest of the lesson.	Oral questioning

	Stated Objectives to Students: We remember that a fraction represents pieces of a whole; we know that the bottom number tells us how many equal pieces of that size would go into the whole orange, and the top number tells us how many of those pieces we are talking about. Today, we're going to play with situations where we will need to count these pieces back up and group them together: multiplying fractions with whole numbers! Get out the fraction bars at your table, and get ready to play with the first situation. You will have a chance to share your thinking out loud once everyone is done, but I need your voices off right now so that everyone can have thinking time.	
Time	**Description of Learning Experience:**	**Checks for Understanding**
	Read problem one aloud and display on the projector with graphical support (to provide context for the problem, but not to represent its values). See attached problem reference sheet.	Circulating
20 min	Prompt students to use manipulatives and concrete materials such as fraction bars to try to solve the problem. Circulate to provide support to struggling students.	Student models Oral questioning
	Invite a few successful students to share their thinking with the rest of the class (modeling their groupings using the projector). Take hands to see how many students figured it out the same way, and whether anyone else figured it out differently (and would like to share). Have students represent their thinking and calculations graphically (on dot grid paper). Repeat this procedure with a second problem (models, grid paper, sharing). Then, a third problem in which the numerator is not one.	Written work
5 min	Ask students to return to each of the previous problems and represent it as a number sentence (including a solution). Model this first using the projector. Offer the students a stretch break, and the opportunity to take ten steps and find a partner to complete the number sentences.	
20-25 min	Students will then choose one of three options: 1) continue practicing with models, paper, and instructor-provided problems; or 2) work with a partner to write a new story problem involving fraction and whole number multiplication, and represent the problem and calculations visually on a poster; or 3) work with a partner to create a poster using their existing representations to describe a rule for fraction and whole number multiplication (students choosing this option may wish to create a table of their number sentences and results first, and analyze the table to see what patterns they notice). *Differentiation: use of visual, kinesthetic, and oral inputs will provide access for students of various learning styles and strengths. Partner work will aid struggling students. Three options for continued practice*	

5-10 min	*allow for success at varying levels of cognitive challenge.* **Closure:** Students will have opportunity to share-out their completed or partially completed posters, as well as the patterns or rules found for fraction multiplication.	
	Evidence from Students that Content and Language Objectives were Met: Informal: circulating, observing students' use of fraction bars and other models, oral responses. Formal: Students' visual representations of fraction problems and calculations, students' written equations to represent the problems, student-created fraction calculation posters.	

PROBLEMS:

John gave ¼ of an orange to Robert and ¼ of an orange to Dave. How much orange did he give away?

Teresa uses 1/8 of a bottle of chocolate syrup to make an ice cream sundae. If she makes five sundaes, how much of the bottle will she use? (extension question: how many more sundaes could she make?)

Gilberto earns ⅔ of an hour of tv time for each night that he washes the dishes. If he washes the dishes two nights, how much time will he earn? What if he washed the dishes three nights?