Task: We All Scream for Ice Cream	**4th Grade**
Your teacher is ordering ice cream cones for her 22 students on the last day of school before summer break, and she takes a poll to decide how many of each flavor to order. One-fourth (1/4) of your classmates chose chocolate, 1/4 chose vanilla, and 1/2 chose strawberry. Two of your classmates are allergic to dairy and did not order ice cream. How many cones of each flavor should the teacher buy? Draw a picture to represent your thinking.	
Teacher Notes:	
The goal in this task is for students to multiply a fraction by a whole number. If your students are using other strategies, they should be rewarded but also encouraged to consider showing their work with multiplication equations so that the goal of the task is accomplished. Also, the picture required in this task should be a mathematical model (not simply pictures of ice cream cones, etc.)	
Common Core State Standards for Mathematical Content	**Common Core State Standards for Mathematical Practice**
4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. 4.NF.B.4c 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.	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Essential Understandings	
• The rational numbers allow us to solve problems that are not possible to solve with just whole numbers. • One interpretation of a rational number is as a part-whole relationship. • The interpretations of the operations on rational numbers are essentially the same as those on whole numbers, but some interpretations require adaptation, and the algorithms are different.	
Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
(1) May model the class as a rectangle/bar divided into 2 fourths and 1 half, indicating in some way that the entire rectangle would be 20 students, and label the fourths with “5” and the half with “10,” along with the flavors of ice cream. (2) Should come to the conclusion that 5 students chose chocolate, 5 chose vanilla, and 10 chose strawberry.	**Assessing Questions** • Tell me why you represented the class as a rectangle representing 20 students. • What was the process you used to find that ¼ of the rectangle (or class) would be 5 and ½ would be 10? **Advancing Questions** • Is there a way to represent the fractions ¼ and ½ in such a way

	that they are more easily compared?
(1) May model the class as 22 dots (or shapes of some kind) with 2 crossed out and the remaining 20 divided into two groups of 5 (chocolate and vanilla) and one group of 10 (strawberry). (2) Should arrive at same conclusion as above.	**Assessing Questions** • Tell me why you represented the class as separate dots. • What represents the whole in your diagram? • Explain the process you used to find the solution. **Advancing Questions** • Is there a way to represent the fractions ¼ and ½ in such a way that they are more easily compared?
Possible Student Misconceptions	
• May forget to leave out the 2 students who are not getting ice cream. • If using rectangle model, may think that ¼ is twice as big as ½, because 4 is double 2. • Rectangle model may confuse them because the arithmetic is not as clear as the dot model, in which the dots can be divided into four groups or two groups to solve the problem.	**Assessing Questions** • Can you read the problem aloud to me? Are you using all of the information given? • Can you draw a new rectangle and divide it into fourths? How much is ¼ of that rectangle? How much is ½? • Can you think of a different way to model a class of 20 students?
Entry/Extensions	**Assessing and Advancing Questions**
If students can't get started….	**Assessing Questions** • Draw me a picture that represents a class of 22 students, any way you would like. Can you use that to model this problem? **Advancing Questions** • Once we have disregarded the 2 students who won't get ice cream, can you represent the remaining 20 in fourths and halves? How many groups do you have if you are dividing people into fourths?
If students finish early….	**Assessing Questions** • Can you solve the problem if there are 26 students in the class and 2 are still allergic? How does your picture and solution change? **Advancing Questions** • Could you solve this problem if there were 18 students in the class? What is the solution?
Discuss/Analyze	
Whole Group Questions	
Write the key understandings that students should come to in the discussion of this task and questions you can ask in the whole group setting to support arrival at these key understandings.	

The Model

- How did you model the class?
- Did anyone do it differently?
- Are these solutions correct?
- Which model seems easier to use to you?

The Fractions

- What is ¼ of 20? What is ½ of 20?
- How did you decide that these were the answers?
- Did anyone decide differently?
- Do both of these processes work?

The Context

- What would happen if the class had 15 students in it?
- What is ¼ of 13? One-half of 13?
- Can we have fractions of people?

Multiplying a Whole Number Times a Fraction

- Can anyone see a relationship between the numbers ¼ and 20 that gives us a clue how to solve this without models?
- Do you think the relationship $a \times (b / c) = (a \times b) / c$ always works?
- Can you give me another example of this in the problem?