SESSION 4A.9

Dividing a Fraction by a Whole Number

Math Focus Points

- Using representations to solve problems involving dividing a unit fraction by a whole number
- Using reasoning, and the relationship between division and multiplication, to divide a unit fraction by a whole number

Today's Plan		Materials
1 ACTIVITY **Dividing a Fraction by a Whole Number**	45 MIN, CLASS, INDIVIDUALS	• *Student Activity Book*, p. 95 or **C46, Dividing a Fraction by a Whole Number** Make copies. (as needed)
2 DISCUSSION **Dividing Fractions**	15 MIN, CLASS	• *Student Activity Book*, p. 95 or C46 (completed)
3 SESSION FOLLOW-UP **Daily Practice**		• *Student Activity Book*, p. 96 or **C47, Divide It All Up** Make copies. (as needed) • *Student Activity Book*, p. 97 or **C48, Biking to the Park** Make copies. (as needed)

Ten-Minute Math

Estimation and Number Sense: Closest Estimate Write each of the following problems on the board, one at a time:

1. $628 \times 9\frac{6}{18} \approx$ 6,000 8,000 10,000
2. $84 \times \frac{11}{15} \approx$ 40 60 80

Give students approximately 30 seconds to look at the three possible estimates and determine which is the closest to the actual answer. Ask several students to explain how they chose an estimate, including how they thought about each of the numbers.

45 MIN CLASS INDIVIDUALS

ACTIVITY

1 Dividing a Fraction by a Whole Number

Write $\frac{1}{3} \div 2 =$ on the board.

We worked on dividing a whole number by a fraction, today we're going to do the opposite—dividing a fraction by a whole number. Think about what we know about division. Do you think the answer to this problem is going to be more or less than $\frac{1}{3}$? Why?

Students might say:

"I think bigger, because when we divided a whole number by a fraction, our answers were bigger!"

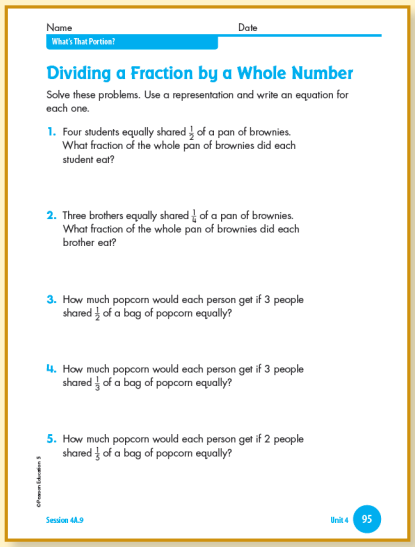
"I think it's probably going to be less than $\frac{1}{3}$, because you have $\frac{1}{3}$ of something, and you're going to divide it into 2 equal things. So it should be smaller, I think."

We talked about how we could also think about a missing factor problem when we solved division problems. It doesn't make a lot of sense to ask "How many 2s are there in $\frac{1}{3}$?" But we could still think about "What times 2 equals $\frac{1}{3}$?" How would we write $\frac{1}{3} \div 2$ as a multiplication problem?

Write ___ $\times 2 = \frac{1}{3}$ on the board.

Let's use a story context. *Alex's dad made a pan of brownies, and there was $\frac{1}{3}$ of the brownies left. After school, Alex and his friend equally shared what was left. What fraction of the whole pan of brownies did each person eat?* I'm going to draw a rectangle on the board to show the pan of brownies.

Ask students to tell you how to divide the rectangle into thirds, and then how to show how much each person ate.



Name Date

What's That Portion?

Dividing a Fraction by a Whole Number

Solve these problems. Use a representation and write an equation for each one.

1. Four students equally shared $\frac{1}{2}$ of a pan of brownies. What fraction of the whole pan of brownies did each student eat?

2. Three brothers equally shared $\frac{1}{4}$ of a pan of brownies. What fraction of the whole pan of brownies did each brother eat?

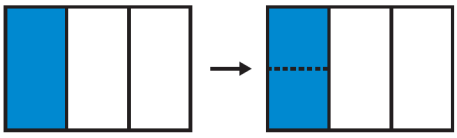
3. How much popcorn would each person get if 3 people shared $\frac{1}{2}$ of a bag of popcorn equally?

4. How much popcorn would each person get if 3 people shared $\frac{1}{3}$ of a bag of popcorn equally?

5. How much popcorn would each person get if 2 people shared $\frac{1}{3}$ of a bag of popcorn equally?

Session 4A.9 Unit 4 95

▲ **Student Activity Book, Unit 4, p. 95; Resource Masters, C46**



How do we figure out what fraction of the pan of brownies each person ate?

Students should recognize the answer is $\frac{1}{6}$ of a pan. It might be necessary to extend the horizontal dotted line to show the rectangle is now divided equally into sixths. Write $\frac{1}{3} \div 2 = \frac{1}{6}$ on the board.

Where do we see these numbers in the representation? Where is the $\frac{1}{3}$? The 2? The $\frac{1}{6}$? Can we see the multiplication problem $\frac{1}{6} \times 2 = \frac{1}{3}$ in the drawing?

Look at *Student Activity Book* page 95 or C46. Let's do the first problem together as we keep trying to make sense of these problems.

Repeat the process as described above, asking students to explain each step. Pay particular attention to determining the answer, and connecting the numbers in the equation (e.g., $\frac{1}{2} \div 4 = \frac{1}{8}$) back to the drawing.

ONGOING ASSESSMENT: Observing Students at Work

Students solve division problems involving dividing a unit fraction by a whole number.

- **How are students solving the problems?** What kind of representations are they using? How are they keeping track of the parts, and how do they know what the answer is?
- **Are students able to write an equation to represent the problem?** Do they write a division equation or a multiplication equation? Do they write the division equation correctly? (e.g., For Problem 2, do they write $\frac{1}{4} \div 3 = \frac{1}{12}$ and not $3 \div \frac{1}{4} = \frac{1}{12}$?)

DIFFERENTIATION: Supporting the Range of Learners

Intervention Most students are able to draw a representation of the initial problem, but then start to lose track of what the drawing shows and what the problem is asking. As these students are working, keep making connections between their drawing and the problem by asking questions such as these:

What does the [square] represent? Why did you divide each one into 3 parts? What does each part represent? How does that help you answer the question?

Extension Students who quickly solve these problems can be challenged to solve similar problems, using non-unit fractions.

15 MIN CLASS

2 DISCUSSION

Dividing Fractions

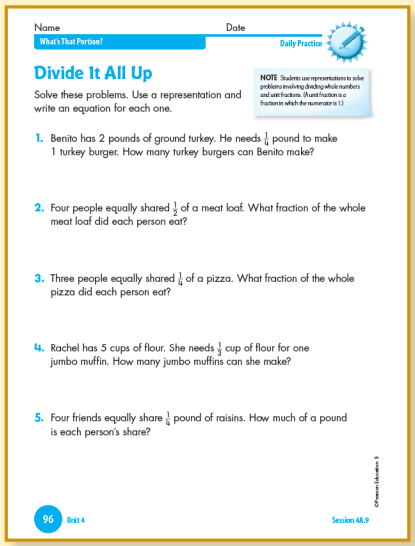
Math Focus Points for Discussion

- Using representations to solve problems involving dividing a unit fraction by a whole number

Ask students to explain their solution for Problem 3 on *Student Activity Book* page 95 or C46. As each student talks, ask the class to look at the representation and to connect each of the numbers in the equation back to the drawing. Also, encourage students to think about what the related multiplication problem would be. One possible solution might be as follows:

Students might say:

"I drew a square to show a bag of popcorn, and then I divided it in half, to show there was $\frac{1}{2}$ of a bag. Then I divided half into 3 parts. One part shows how much popcorn 1 person would get, and that's $\frac{1}{6}$ of the whole bag."



Name Date

What's That Portion? Daily Practice

Divide It All Up

Solve these problems. Use a representation and write an equation for each one.

NOTE Students use representations to solve problems involving dividing whole numbers and unit fractions. (A unit fraction is a fraction in which the numerator is 1.)

1. Benito has 2 pounds of ground turkey. He needs $\frac{1}{4}$ pound to make 1 turkey burger. How many turkey burgers can Benito make?

2. Four people equally shared $\frac{1}{2}$ of a meat loaf. What fraction of the whole meat loaf did each person eat?

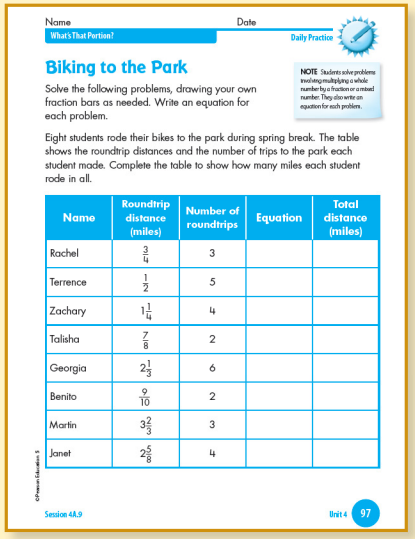
3. Three people equally shared $\frac{1}{4}$ of a pizza. What fraction of the whole pizza did each person eat?

4. Rachel has 5 cups of flour. She needs $\frac{1}{3}$ cup of flour for one jumbo muffin. How many jumbo muffins can she make?

5. Four friends equally share $\frac{1}{8}$ pound of raisins. How much of a pound is each person's share?

96 Unit 4 Session 4A.9

▲ **Student Activity Book, Unit 4, p. 96; Resource Masters, C47**



Name Date

What's That Portion? Daily Practice

Biking to the Park

Solve the following problems, drawing your own fraction bars as needed. Write an equation for each problem.

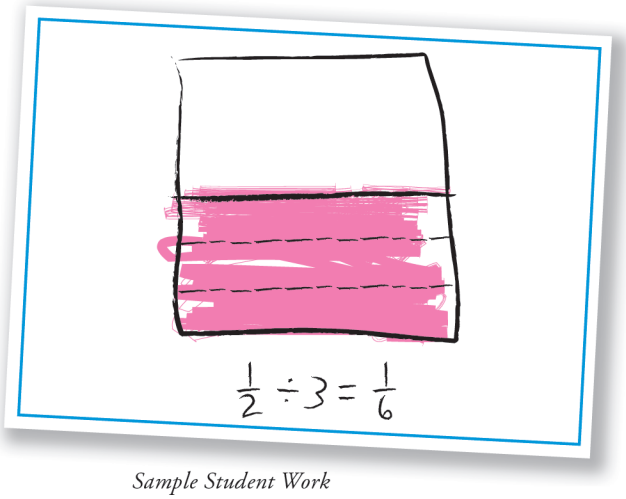
NOTE Students solve problems involving multiplying a whole number by a fraction or a mixed number. They also write an equation for each problem.

Eight students rode their bikes to the park during spring break. The table shows the roundtrip distances and the number of trips to the park each student made. Complete the table to show how many miles each student rode in all.

Name	Roundtrip distance (miles)	Number of roundtrips	Equation	Total distance (miles)
Rachel	$\frac{3}{4}$	3		
Terrence	$\frac{1}{2}$	5		
Zachary	$1\frac{1}{4}$	4		
Talisha	$\frac{7}{8}$	2		
Georgia	$2\frac{1}{3}$	6		
Benito	$\frac{9}{10}$	2		
Martin	$3\frac{2}{3}$	3		
Janet	$2\frac{5}{8}$	4		

Session 4A.9 Unit 4 97

▲ **Student Activity Book, Unit 4, p. 97; Resource Masters, C48**



Sample Student Work

Yesterday, we solved problems like $6 \div \frac{1}{2} = 12$, and some people were surprised the answer was bigger. Today when we solved problems, was anyone surprised with our answers—that $\frac{1}{2} \div 3 = \frac{1}{6}$?

Students might say:

"It's not surprising really. It's just confusing! You have to really think about the problem and about division. Like this problem—if you think about it, if you have $\frac{1}{2}$ of a bag of popcorn, and 3 people are all sharing it, everyone gets a part of $\frac{1}{2}$, so it has to be a number smaller than $\frac{1}{2}$."

"Yeah, I agree with that. You just have to think. Because if you have a part of a thing, and are going to divide that part by a whole number, your answer is going to be smaller than the part. Right?"

If time permits, discuss solutions to other problems on *Student Activity Book* page 95 or C46. Continue emphasizing the connection between the representation and the division (or multiplication) equation.

3 SESSION FOLLOW-UP Daily Practice

Daily Practice: For reinforcement of this unit's content, have students complete *Student Activity Book* page 96 or C47. For ongoing review, have students complete *Student Activity Book* page 97 or C48.

Dividing a Fraction by a Whole Number

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