

Computation with Fractions

MATH FOCUS POINTS

- Multiplying a fraction by a whole number
- Adding and subtracting fractions and mixed numbers
- Using visual models to solve word problems involving multiplication of a fraction by a whole number
- Solving word problems involving measurement

TODAY'S PLAN

MATERIALS

10



TEN-MINUTE MATH: REVIEW AND PRACTICE

Counting Around the Class

20



1 DISCUSSION

Strategies for Multiplying a Fraction by a Whole Number

Student Activity Book, p. 411 (from Session 4.1)

40

2 MATH WORKSHOP

Operations with Fractions

2A More Multiplying Fractions by Whole Numbers

2B Fraction Word Problems

2A *Student Activity Book*, pp. 415–416

A53*

2B *Student Activity Book*, pp. 417–418

S58*

S60*

SESSION FOLLOW-UP: REVIEW AND PRACTICE

Daily Practice and Homework

Student Activity Book, pp. 419–420

* See *Materials to Prepare* in the Investigation 4 Planner.

Common Core State Standards	<p>Ten-Minute Math: 4.NF.B.4a, 4.NF.B.4b Session: 4.NF.B.3c, 4.NF.B.3d, 4.NF.B.4a, 4.NF.B.4b, 4.NF.B.4c, 4.NF.C.5, 4.MD.A.2</p>	<p>Daily Practice: 4.NF.B.4a, 4.NF.B.4b, 4.NF.B.4c</p>
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TEN-MINUTE MATH: REVIEW AND PRACTICE

Counting Around the Class



MATH FOCUS POINTS

- Finding the multiples of numbers through skip counting by fractions
- Using multiplication patterns to determine a sequence of multiples
- Applying the properties of multiplication to find missing factors

Students count around the class by $\frac{2}{5}$ s until all students have counted once. Ask students to say each number as a fraction, not a mixed number ($\frac{2}{5}$, $\frac{4}{5}$, $\frac{6}{5}$, etc.).

Draw a number line marked in fifths, but with only whole numbers labeled. As students count, ask them to help you figure out where to put each fraction.

- **What did the 6th person say? How do we write $\frac{12}{5}$ as a whole number or mixed number?** ($2\frac{2}{5}$)
- **What is a multiplication equation that would represent 6 people counting by $\frac{2}{5}$ s?** ($6 \times \frac{2}{5} = \frac{12}{5}$, or $6 \times \frac{2}{5} = 2\frac{2}{5}$)
- **What did the 12th person say? How do we write $\frac{24}{5}$ as a whole number or mixed number?** ($4\frac{4}{5}$)
- **What is a multiplication equation that would represent 12 people counting by $\frac{2}{5}$ s?** ($12 \times \frac{2}{5} = \frac{24}{5}$, or $12 \times \frac{2}{5} = 4\frac{4}{5}$)

1 DISCUSSION

Strategies for Multiplying a Fraction by a Whole Number



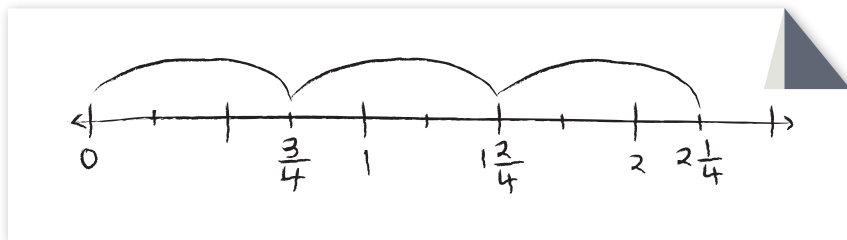
Refer students to Problem 1 on *Student Activity Book* page 411.

Ask the students you identified during the last session to share their solutions. These solutions may include the following. **MWI** **MPN** **PD**

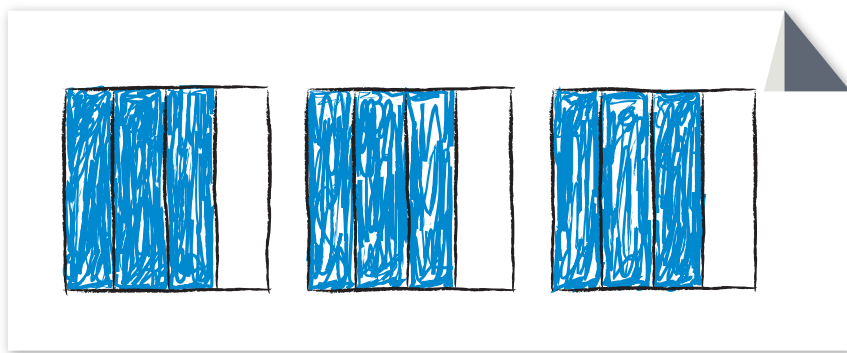
STUDENTS MIGHT SAY



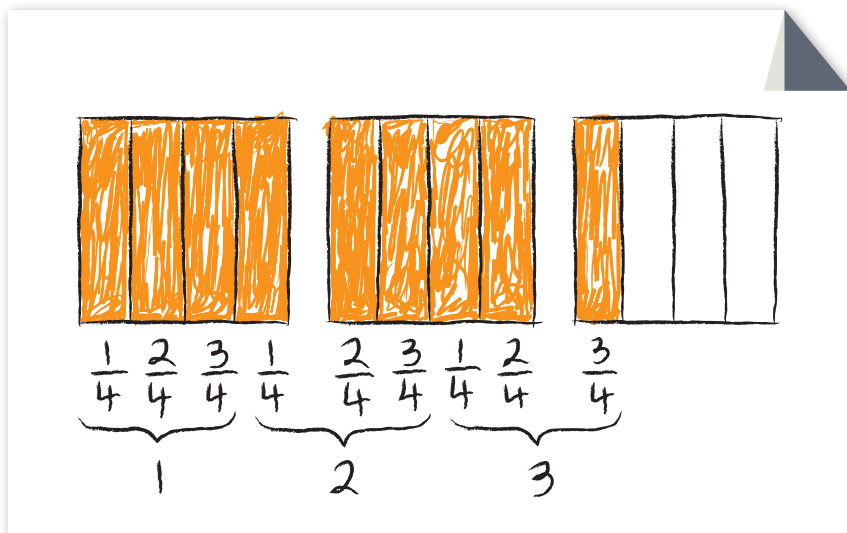
"I did three jumps of $\frac{3}{4}$ because there are 3 pizzas with $\frac{3}{4}$ eaten in each."



"There are three $\frac{1}{4}$ s eaten in each pizza. There are 3 pizzas. So that is $3 \times 3 \times \frac{1}{4}$ pieces. That's nine $\frac{1}{4}$ pieces eaten, which means there is $\frac{9}{4}$ of a pizza eaten".



"Three $\frac{3}{4}$ pizzas equal 2 wholes and $\frac{1}{4}$ which equals $2\frac{1}{4}$."



MATH WORDS AND IDEAS

MWI Multiplying Fractions by Whole Numbers

MATH PRACTICE NOTE

MPN **MP6** Attend to precision.

Student arguments in the elementary grades combine words and representations. As students explain their ideas, either orally or in writing, encourage them to consider how to provide a complete explanation—one that someone else could follow. Ask questions that encourage students to connect their explanations with the representation they used as they explain why $3 \times \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$.

PROFESSIONAL DEVELOPMENT

PD **DIALOGUE BOX 4:** Strategies for Multiplying a Fraction by a Whole Number

For each solution, ask the class the following questions.

- **What equation could we write for this solution?** ($3 \times \frac{3}{4} = \frac{9}{4}$, $3 \times \frac{3}{4} = 2\frac{1}{4}$, $3 \times 3 \times \frac{1}{4} = \frac{9}{4}$ are some of the equations students might suggest.)
- **Which number in this equation tells us the number of groups? Which number tells us the size of the group?**
- **Where do you see the number of groups and the size of the groups in this representation?** **MPN**

STUDENTS MIGHT SAY



"In [Damian's] solution, the number of groups is the number of jumps on the number line, and the size of the group is the size of the jump."



"In [Anna's] work, the number of groups is the number of squares, and the size of the group is the amount she shaded on each square."



"You can see that number of groups is the number of times you can count off three $\frac{1}{4}$ s in [Marisol's] work. The size of the group is the amount shaded in each group you count."

[Anna] said the answer to this problem is $\frac{9}{4}$. [Marisol and Damian] said the answer is $2\frac{1}{4}$. Are these answers equal?

Discuss briefly whether $\frac{9}{4}$ and $2\frac{1}{4}$ are equal.

2 MATH WORKSHOP

Operations with Fractions



During this Math Workshop (and in the next session), use the **Assessment Checklist**: MP6, Attend to precision (A53) to assess how precise students are with their explanations as they work on operations with fractions. Use your observations and interactions with students as well as their written work to assess them.

MATH PRACTICE NOTE

MPN **MP2 Reason abstractly and quantitatively.** Linking each part of a problem and the elements of its solution is an important part of reasoning. Support students in explaining clearly and with detail by asking questions such as, "How does this diagram show multiplying by 3?" "How is $\frac{3}{4}$ represented in the number line?" and "What part of the arithmetic matches the 3 pizzas in the story?"



RESOURCE MASTERS, A53



Assessment Checklist: MP6, Attend to precision			
STUDENT	Offers complete and clear explanations	Includes references to the representations in their explanations	Uses mathematical symbols (+, −, ×, and =) to express equations

UNIT 6 | A53 | SESSION 4.2.4

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ASSESSMENT CHECKLIST

Students continue work on problems in which they multiply fractions and whole numbers. They continue using representations (drawings or a number line) to show solutions. Explain to students that during this Math Workshop they will also be solving problems about fractions that involve a variety of operations. To solve the problems, they may need to add, subtract, multiply, or use a combination of the operations.

2 A More Multiplying Fractions by Whole Numbers



Students solve problems on *Student Activity Book* pages 415–416, in which they multiply fractions and whole numbers.

ONGOING ASSESSMENT Observing Students at Work

Students solve problems in which they multiply fractions by whole numbers.

- What representations and strategies do students use to solve the problems? Are they using pictures or number lines? How do they keep track of each part of the problem and the product?
- Can students write a multiplication equation for the problem? Can they identify which number in the equation and in the word problem represents the number of groups and which represents the size of the group? MP6

STUDENT ACTIVITY BOOK, P. 415



NAME		DATE	(PAGE 1 OF 2)
ACTIVITY			
More Multiplying Fractions by Whole Numbers			
Use a representation to solve each problem. For each word problem, write a multiplication equation that represents the problem.			
Review students' work.			
1	Sabrina walks to school every morning. Her house is $\frac{3}{8}$ of a mile from school. How many miles would she walk to school in 5 days? $5 \times \frac{3}{8} = \frac{15}{8}$ (or $1\frac{7}{8}$) miles		
2	$6 \times \frac{2}{5} = \frac{12}{5}$ or $2\frac{2}{5}$		
3	Damian has a recipe that calls for $\frac{2}{3}$ of a cup of flour. He wants to make 4 times the recipe. How much flour does he need? $4 \times \frac{2}{3} = \frac{8}{3}$ (or $2\frac{2}{3}$) cups		
UNIT 6 415 SESSION 4.2 © Pearson Education, Inc.			

STUDENT ACTIVITY BOOK, P. 416



NAME		DATE	(PAGE 2 OF 2)
ACTIVITY			
More Multiplying Fractions by Whole Numbers			
4	$3 \times \frac{3}{4} = \frac{9}{4}$ or $2\frac{1}{4}$		
5	In the store Damian found pretzels that came in $\frac{1}{3}$ -pound bags. He bought 5 bags of pretzels. How many pounds of pretzels did he buy? $5 \times \frac{1}{3} = \frac{5}{3}$ (or $1\frac{2}{3}$) pounds		
6	$3 \times \frac{6}{8} = \frac{18}{8}$ or $2\frac{2}{8}$		
UNIT 6 416 SESSION 4.2 © Pearson Education, Inc.			



DIFFERENTIATION Supporting the Range of Learners

EXTENSION Adapt the Task If students are easily solving problems that involve multiplying fractions by whole numbers, give them some problems to solve that involve multiplying whole numbers by fractions. For example, ask students to solve the following problem and write an equation to go with the problem: *A grocery store sells bags of 9 apples. Anna used $\frac{2}{3}$ of the apples in a bag for an apple pie. How many apples did she use in the pie?*

For a more comprehensive extension activity to be done outside of class, see *Part of a Group* at the end of this investigation.

2 B Fraction Word Problems



Students solve problems about fractions and mixed numbers on *Student Activity Book* pages 417–418 that involve a variety of operations. They decide which operation or operations they need to use to solve each problem and show how they solve it. Encourage students to use representations, rectangles, drawings, or number lines to help them solve the problems. Students should have access to 10×10 Squares (S60) and 4×6 Rectangles (S58). **MWI1 MWI2 MWI3**

ONGOING ASSESSMENT Observing Students at Work

Students solve problems with fractions or mixed numbers that involve a variety of operations.

- Are students able to determine what operations to use to solve each problem?
- How do students solve each problem?
- Do students use representations to solve the problems? Do they use rectangles? Other pictures? Number lines?



DIFFERENTIATION Supporting the Range of Learners

For another practice activity to be done outside of class, see *More Story Problems with Fractions* at the end of this investigation.

INTERVENTION Clarify the Problem If students are not sure how to start solving the problem or what operation to choose, have them talk through the whole problem. Ask them “What happened first?” “What happened next?” and have them draw pictures to show what is happening in each part of the problem. Then ask them “Do you add, subtract, or multiply to solve this problem?”

STUDENT ACTIVITY BOOK, P. 417



NAME _____ DATE _____ (PAGE 1 OF 2)

Fraction Word Problems

Solve each problem and show how you solved it.
Review students' work.

1 Jill used stones that were each $\frac{3}{4}$ of a foot high to build a wall. She piled 6 stones on top of each other. How many feet high was her wall?
 $\frac{18}{4}$ (or $4\frac{2}{4}$) feet

2 Anna worked for $\frac{5}{6}$ of an hour in the garden. She dug up her garden for $\frac{3}{6}$ of an hour, planted seeds for $\frac{1}{6}$ of an hour, and watered the garden for the rest of the time. For what fraction of an hour did Anna water the garden?
 $\frac{1}{6}$ of an hour

3 Yuki was making costumes for a play. She needed $\frac{7}{8}$ of a yard of orange fabric for one costume and $1\frac{3}{8}$ yards of orange fabric for the other costume. How much orange fabric did she need to make the two costumes?
 $\frac{18}{8}$ (or $2\frac{2}{8}$) yards

UNIT 6 | 417 | SESSION 4.2 © Pearson Education 4

STUDENT ACTIVITY BOOK, P. 418



NAME _____ DATE _____ (PAGE 2 OF 2)

Fraction Word Problems

4 Bill biked $\frac{6}{10}$ of a kilometer on Monday. He biked $\frac{75}{100}$ of a kilometer on Tuesday. How far did he bike altogether on Monday and Tuesday?
 $\frac{135}{100}$ (or $1\frac{35}{100}$) kilometers

5 Luke had $\frac{8}{12}$ of a carton of eggs. He used $\frac{5}{12}$ of the carton of eggs to make a quiche. He used $\frac{1}{12}$ of the carton of eggs to make a cake. What fraction of the carton of eggs does he have left?
 $\frac{1}{12}$ of the carton

6 An office building has 14 offices, all the same size. Steve uses $\frac{3}{4}$ of a gallon of paint to paint one office ceiling. How much paint will Steve need to paint all of the office ceilings?
 $\frac{42}{4}$ (or $10\frac{2}{4}$) gallons

UNIT 6 | 418 | SESSION 4.2 © Pearson Education 4

MATH WORDS AND IDEAS


MWI1 Adding Fractions With Like Denominators


MWI2 Subtracting Fractions With Like Denominators

MWI3 Adding and Subtracting Mixed Numbers

SESSION FOLLOW-UP: REVIEW AND PRACTICE

Daily Practice and Homework

 **DAILY PRACTICE** For reinforcement of this unit's content, have students complete *Student Activity Book* page 419.

 **HOMEWORK** On *Student Activity Book* page 420, students use addition, subtraction, or multiplication to solve problems that involve fractions.

STUDENT ACTIVITY BOOK, P. 419



DAILY PRACTICE

NAME _____ DATE _____

Multiplying with Fractions

Use a representation to solve each problem. For the word problem, write a multiplication equation that represents the problem.

Review students' work.

1 $4 \times \frac{1}{5} = \frac{4}{5}$

2 $12 \times \frac{1}{2} = \frac{12}{2}$ or 6

- 3 Helena needs 8 pieces of wire. Each piece needs to be $\frac{3}{4}$ of a foot long. What is the total length of the wire Helena needs?

$$8 \times \frac{3}{4} = \frac{24}{4} \text{ (or 6) feet}$$

NOTE

Students solve problems involving multiplication of whole numbers and fractions.
How? Multiplying Fractions by Whole Numbers

UNIT 6 | 419 | SESSION 4.2

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STUDENT ACTIVITY BOOK, P. 420



HOMEWORK

NAME _____ DATE _____

More Operations with Fractions

Solve each problem and show how you solved it.

Review students' work.

- 1 Ursula has a pet rabbit. Each day, the rabbit eats $\frac{3}{8}$ of a cup of carrots. How many cups of carrots does the rabbit eat over 7 days?

$$\frac{21}{8} \text{ (or } 2\frac{5}{8}\text{) cups}$$

- 2 Terrell goes apple picking. He uses $\frac{3}{10}$ of his apples to make apple pie. He uses $\frac{2}{10}$ of his apples to make applesauce. What fraction of his apples does he have left?

$$\frac{2}{10} \text{ of his apples}$$

- 3 Ramona has two buckets of water. One has $1\frac{3}{4}$ gallons of water in it. The other has $2\frac{3}{4}$ gallons of water in it. How much water does Ramona have in the two buckets?

$$4\frac{2}{4} \text{ gallons}$$

NOTE

Students solve word problems involving fractions.
How? Adding and Subtracting Mixed Numbers With Like Denominators

UNIT 6 | 420 | SESSION 4.2

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