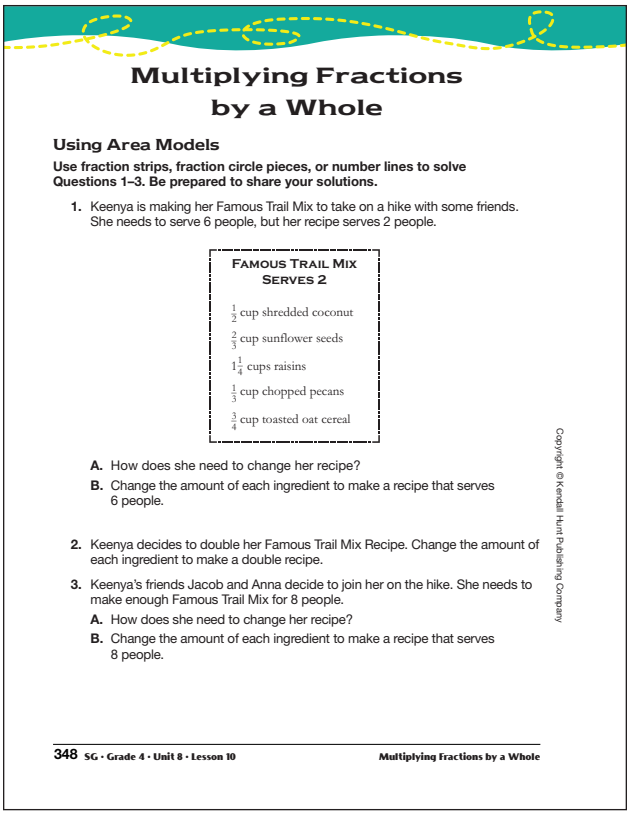


Multiplying Fractions by a Whole

Using Area Models

Use fraction strips, fraction circle pieces, or number lines to solve Questions 1–3. Be prepared to share your solutions.

1. Keenya is making her Famous Trail Mix to take on a hike with some friends. She needs to serve 6 people, but her recipe serves 2 people.

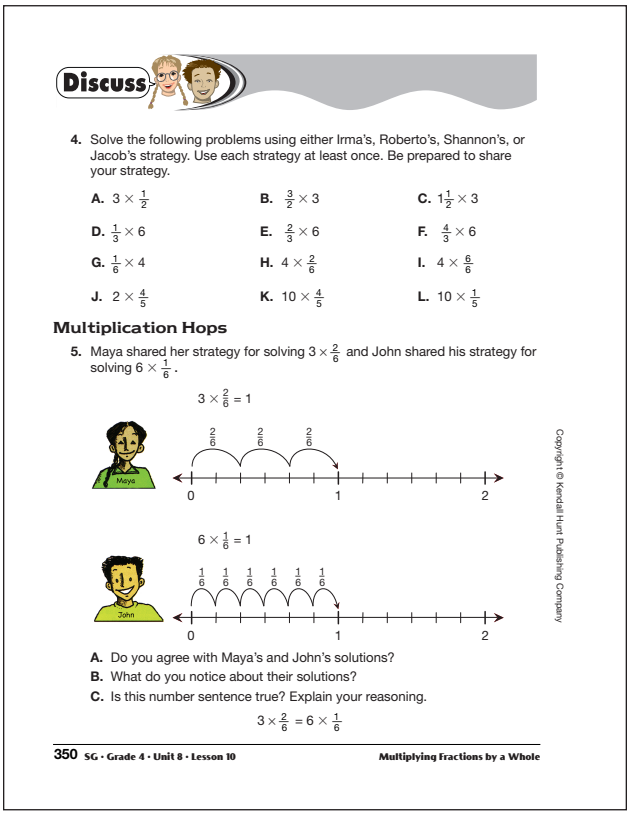
Famous Trail Mix Serves 2

- $\frac{1}{2}$ cup shredded coconut
- $\frac{2}{3}$ cup sunflower seeds
- $1\frac{1}{4}$ cups raisins
- $\frac{1}{3}$ cup chopped pecans
- $\frac{3}{4}$ cup toasted oat cereal

   A. How does she need to change her recipe?
   B. Change the amount of each ingredient to make a recipe that serves 6 people.

2. Keenya decides to double her Famous Trail Mix Recipe. Change the amount of each ingredient to make a double recipe.
3. Keenya's friends Jacob and Anna decide to join her on the hike. She needs to make enough Famous Trail Mix for 8 people.
   A. How does she need to change her recipe?
   B. Change the amount of each ingredient to make a recipe that serves 8 people.

***Student Guide* - Page 348**



Discuss

4. Solve the following problems using either Irma's, Roberto's, Shannon's, or Jacob's strategy. Use each strategy at least once. Be prepared to share your strategy.

A. $3 \times \frac{1}{2}$	B. $\frac{3}{2} \times 3$	C. $1\frac{1}{2} \times 3$
D. $\frac{1}{3} \times 6$	E. $\frac{2}{3} \times 6$	F. $\frac{4}{3} \times 6$
G. $\frac{1}{6} \times 4$	H. $4 \times \frac{2}{6}$	I. $4 \times \frac{6}{6}$
J. $2 \times \frac{4}{5}$	K. $10 \times \frac{4}{5}$	L. $10 \times \frac{1}{5}$

Multiplication Hops

5. Maya shared her strategy for solving $3 \times \frac{2}{6}$ and John shared his strategy for solving $6 \times \frac{1}{6}$.

   A. Do you agree with Maya's and John's solutions?
   B. What do you notice about their solutions?
   C. Is this number sentence true? Explain your reasoning.

$$3 \times \frac{2}{6} = 6 \times \frac{1}{6}$$

***Student Guide* - Page 350**

Student Guide

Multiplying Fractions by a Whole

Questions 1–17 (SG pp. 348–354)

1. **A.** Keenya needs to triple her recipe or multiply each ingredient by 3.

   B. $\frac{1}{2}$ cup shredded coconut $\times 3 = \frac{3}{2}$ or $1\frac{1}{2}$ cups shredded coconut; $\frac{2}{3}$ cups sunflower seeds $\times 3 = \frac{6}{3}$ or 2 cups sunflower seeds; $1\frac{1}{4}$ cups raisins $\times 3 = 3\frac{3}{4}$ cups raisins; $\frac{1}{3}$ cups chopped pecans $\times 3 = \frac{3}{3}$ or 1 cup chopped pecans; $\frac{3}{4}$ cups toasted oat cereal $\times 3 = \frac{9}{4}$ or $2\frac{1}{4}$ cups toasted oat cereal

2. $\frac{1}{2}$ cup shredded coconut $\times 2 = 1$ cup shredded coconut; $\frac{2}{3}$ cups sunflower seeds x $2 = \frac{4}{3}$ or $1\frac{1}{3}$ cups sunflower seeds; $1\frac{1}{4}$ cups raisins $\times 2 = 2\frac{2}{4}$ or $2\frac{1}{2}$ cups raisins; $\frac{1}{3}$ cups chopped pecans $\times 2 = \frac{2}{3}$ of a cup chopped pecans; $\frac{3}{4}$ cups toasted oat cereal $\times 2 = \frac{6}{4}$ or $1\frac{2}{4}$ or $1\frac{1}{2}$ cups toasted oat cereal

3. **A.** Keenya needs to multiply each ingredient by 4.

   B. $\frac{1}{2}$ cup shredded coconut $\times 4 = \frac{4}{2}$ or 2 cups shredded coconut; $\frac{2}{3}$ cups sunflower seeds $\times 4 = \frac{8}{3}$ or $2\frac{2}{3}$ cups sunflower seeds; $1\frac{1}{4}$ cups raisins $\times 4 = 4\frac{4}{4}$ or 5 cups raisins; $\frac{1}{3}$ cups chopped pecans $\times 4 = \frac{4}{3}$ or $1\frac{1}{3}$ cups chopped pecans; $\frac{3}{4}$ cups toasted oat cereal $\times 4 = \frac{12}{4}$ or 3 cups toasted oat cereal

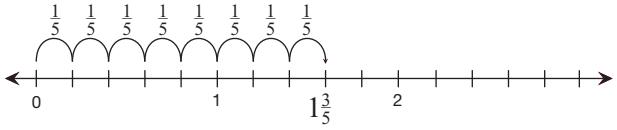
4. **A.** $\frac{3}{2}$ or $1\frac{1}{2}$ **B.** $\frac{9}{2}$ or $4\frac{1}{2}$
   C. $3\frac{3}{2}$ or $4\frac{1}{2}$ **D.** $\frac{6}{3}$ or 2
   E. $\frac{12}{3}$ or 4 **F.** $\frac{24}{3}$ or 8
   G. $\frac{4}{6}$ or $\frac{2}{3}$ **H.** $\frac{8}{6}$ or $1\frac{2}{6}$ or $1\frac{1}{3}$
   I. $\frac{24}{6}$ or 4 **J.** $\frac{8}{5}$ or $1\frac{3}{5}$
   K. $\frac{40}{5}$ or 8 **L.** $\frac{10}{5}$ or 2

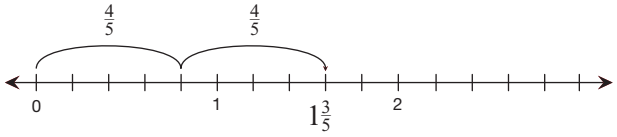
5. **A.** Responses may vary. Possible response: Yes, I agree with Maya and John.

   B. Both Maya and John land on 1.

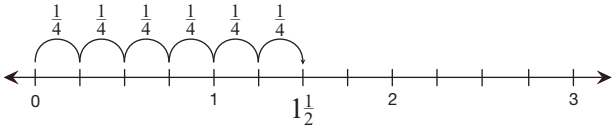
   C. $3 \times \frac{2}{6} = 6 \times \frac{1}{6}$ is a true number sentence. Possible response: When I look at John and Maya's hops, both sides of the number sentence are 1 so they are equal to each other.

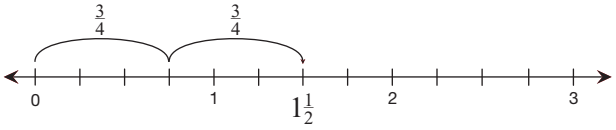
6. A. True;





B. True;





7. A.* 3 apples

B.* 6 apples

8. A.* The 4 in the denominator tells us to divide the whole into 4 equal groups.

B.* The 1 in the numerator tells us that we are interested in 1 of the 4 groups.

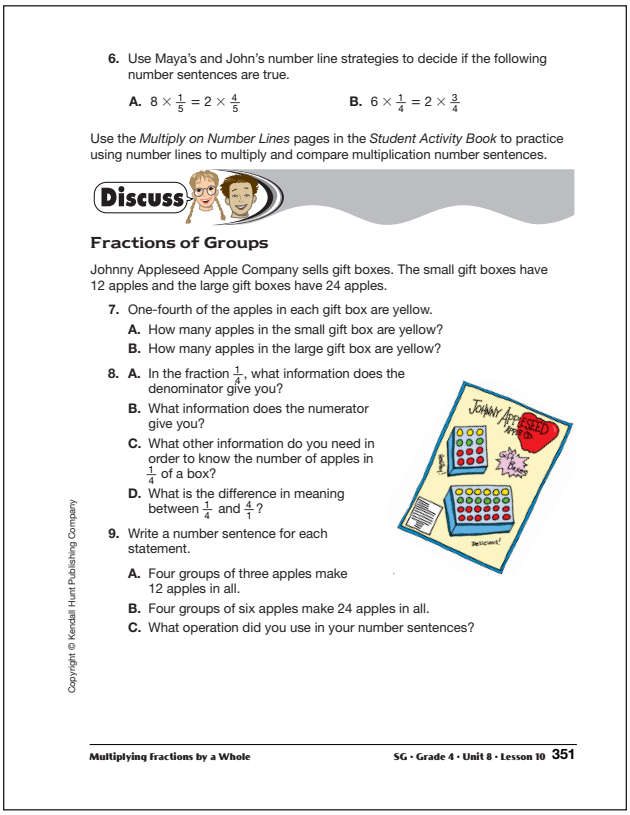
C.* The number of apples in a whole box.

D.* $\frac{1}{4}$ means that the whole set is divided into 4 groups and we are interested in one of these groups. $\frac{4}{1}$ means that the whole set is one group and we are interested in 4 of these groups which is the same as 4 whole sets.

9. A. $4 \times 3 = 12$ apples

B.* $4 \times 6 = 24$ apples

C. Multiplication



6. Use Maya's and John's number line strategies to decide if the following number sentences are true.

A. $8 \times \frac{1}{5} = 2 \times \frac{4}{5}$ B. $6 \times \frac{1}{4} = 2 \times \frac{3}{4}$

Use the *Multiply on Number Lines* pages in the *Student Activity Book* to practice using number lines to multiply and compare multiplication number sentences.

Discuss

Fractions of Groups

Johnny Appleseed Apple Company sells gift boxes. The small gift boxes have 12 apples and the large gift boxes have 24 apples.

7. One-fourth of the apples in each gift box are yellow.
   - A. How many apples in the small gift box are yellow?
   - B. How many apples in the large gift box are yellow?

8. A. In the fraction $\frac{1}{4}$, what information does the denominator give you?
   - B. What information does the numerator give you?
   - C. What other information do you need in order to know the number of apples in $\frac{1}{4}$ of a box?
   - D. What is the difference in meaning between $\frac{1}{4}$ and $\frac{4}{1}$?

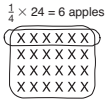
9. Write a number sentence for each statement.
   - A. Four groups of three apples make 12 apples in all.
   - B. Four groups of six apples make 24 apples in all.
   - C. What operation did you use in your number sentences?

***Student Guide* - Page 351**

***Answers and/or discussion are included in the lesson.**

Lin used the diagram and number sentence shown here to represent one-fourth of the apples in the large box. Both her diagram and number sentence represent one-fourth of a group of 24 apples. We write this as: $\frac{1}{4} \times 24 = 6$ apples.

$\frac{1}{4} \times 24 = 6$ apples



10. Draw a diagram and write a number sentence similar to Lin's for each statement.

- **A.** one-fourth of a group of 24 apples
- **B.** two-fourths of a group of 24 apples
- **C.** three-fourths of a group of 24 apples
- **D.** four-fourths of a group of 24 apples

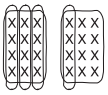
11. **A.** What patterns do you see in the number sentences?

B. What is another name for $\frac{4}{4}$? Write another number sentence for Question 10D using this name.

John used this diagram to show one-third of a small box of apples.

$\frac{1}{3} \times 12 = 4$ apples

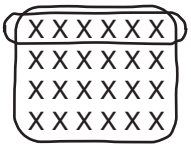
He used this diagram to show four-thirds of a small box of apples.



$\frac{4}{3} \times 12 = 16$ apples

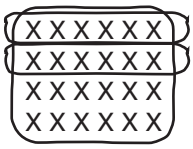
***Student Guide* - Page 352**

10. **A.**



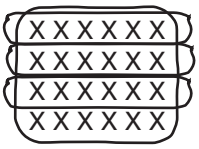
$\frac{1}{4} \times 24 = 6$ apples

B.



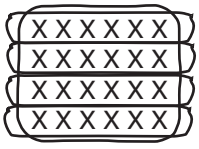
$\frac{2}{4} \times 24 = 12$ apples

C.



$\frac{3}{4} \times 24 = 18$ apples

D.



$\frac{4}{4} \times 24 = 24$ apples

11. **A.** All of the number sentences show the multiplication of a fraction times 24. The fraction increases by $\frac{1}{4}$ each time. The product increases by 6. You can get the products by skip counting by 6.

B. 1; $1 \times 24 = 24$ apples

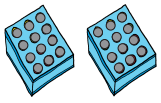
12.*

Multiplication Number Sentences
$\frac{1}{3} \times 12 = 4$
$\frac{2}{3} \times 12 = 8$
$\frac{3}{3} \times 12 = 12$
$\frac{4}{3} \times 12 = 16$
$\frac{5}{3} \times 12 = 20$
$\frac{6}{3} \times 12 = 24$

Estimate Products

12. Copy the following chart on a sheet of paper. Complete the chart following the example in the first row. (Remember, the answer to a multiplication problem is a **product.** For example, 4 is the product of $\frac{1}{4} \times 12$.)

Multiplication Number Sentences
$\frac{1}{3} \times 12 = 4$
$\frac{2}{3} \times 12 =$
$\frac{3}{3} \times 12 =$
$\frac{4}{3} \times 12 =$
$\frac{5}{3} \times 12 =$
$\frac{6}{3} \times 12 =$



13. **A.** Describe the patterns you see in the table.

B. When is the product less than 12? Why?

C. When is the product equal to 12? Why?

D. When is the product greater than 12? Why?

14. For each of the following problems, decide which products will be less than 12, equal to 12, or greater than 12.

A. $\frac{1}{4} \times 12$ **B.** $\frac{2}{4} \times 12$ **C.** $\frac{3}{4} \times 12$

D. $\frac{4}{4} \times 12$ **E.** $\frac{5}{4} \times 12$ **F.** $\frac{6}{4} \times 12$

15. Solve each problem in Question 14. Draw a diagram and write a number sentence for each.

***Student Guide* - Page 353**

***Answers and/or discussion are included in the lesson.**

13. A.* See possible answers in Lesson 10. Multiplying 12 by a fraction less than one is the same as finding a fractional part of 12. So, the product will be less than 12.

B. The product is less than 12 when the fraction is less than 1.

C.* The product is equal to 12 when the fraction is $\frac{3}{3}$. $\frac{3}{3} = 1$ and multiplying a number by 1 gives the same number.

D. The product is greater than 12 when the fraction is greater than 1. Multiplying a number by a fraction greater than one means that you have more than one group of 12, so the product will be greater than 12.

14. A. less than 12

B. less than 12

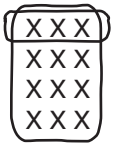
C. less than 12

D. equal to 12

E. greater than 12

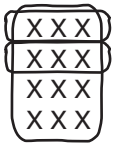
F. greater than 12

15. A.



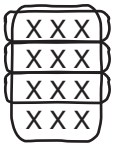
$\frac{1}{4} \times 12 = 3$

B.



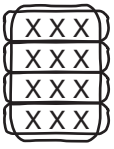
$\frac{2}{4} \times 12 = 6$

C.



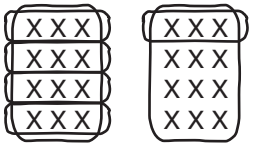
$\frac{3}{4} \times 12 = 9$

D.



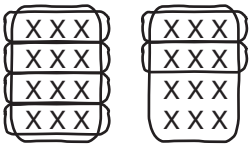
$\frac{4}{4} \times 12 = 12$

E.



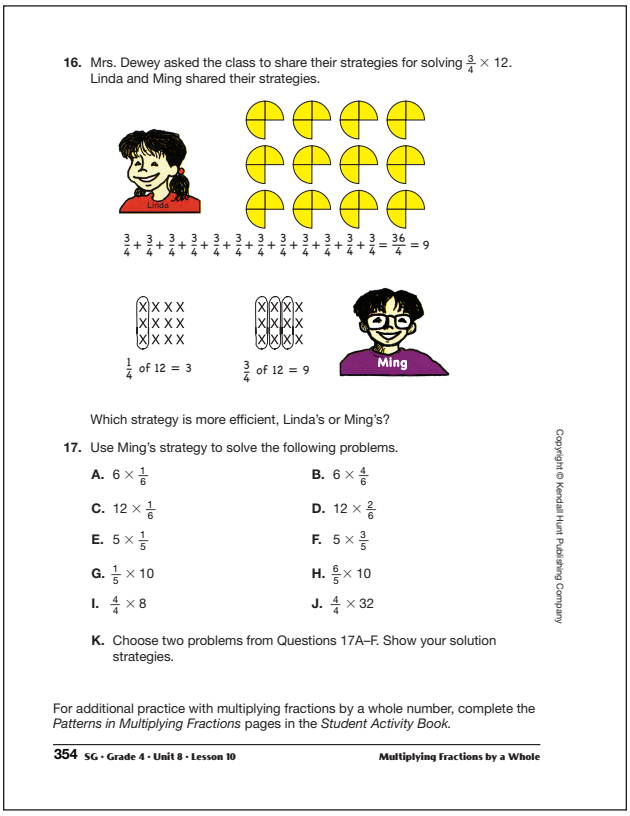
$\frac{5}{4} \times 12 = 15$

F.



$\frac{6}{4} \times 12 = 18$

***Answers and/or discussion are included in the lesson.**



16. Mrs. Dewey asked the class to share their strategies for solving $\frac{3}{4} \times 12$. Linda and Ming shared their strategies.

Linda

$\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}+\frac{3}{4}=\frac{36}{4}=9$

$\frac{1}{4}$ of 12 = 3

$\frac{3}{4}$ of 12 = 9

Ming

Which strategy is more efficient, Linda's or Ming's?

17. Use Ming's strategy to solve the following problems.

A. $6 \times \frac{1}{6}$ B. $6 \times \frac{4}{6}$

C. $12 \times \frac{1}{6}$ D. $12 \times \frac{2}{6}$

E. $5 \times \frac{1}{5}$ F. $5 \times \frac{3}{5}$

G. $\frac{1}{5} \times 10$ H. $\frac{6}{5} \times 10$

I. $\frac{4}{4} \times 8$ J. $\frac{4}{4} \times 32$

K. Choose two problems from Questions 17A–F. Show your solution strategies.

For additional practice with multiplying fractions by a whole number, complete the *Patterns in Multiplying Fractions* pages in the *Student Activity Book*.

354 SG • Grade 4 • Unit 8 • Lesson 10 Multiplying Fractions by a Whole

***Student Guide* - Page 354**

16. Responses will vary.

17. A. 1 B. 4
C. 2 D. 4
E. 1 F. 3
G. 2 H. 12
I. 8 J. 32

K. Possible response for Question 17D

$12 \times \frac{2}{6}$

$\frac{1}{6}$ of 12 = 2, so $\frac{2}{6}$ of 12 = 4

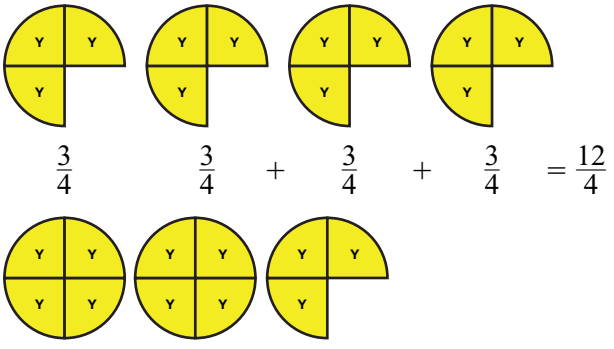
Homework (SG pp. 355–357)

Questions 1–10

1. A.

Ingredients	Amount for 1 Loaf	Amount for 4 Loaves
cups raisins, chopped	$1\frac{1}{4}$	$1\frac{1}{4} \times 4 = 5$
cups boiling water	$\frac{3}{4}$	$\frac{3}{4} \times 4 = \frac{12}{4} = 3$
teaspoon baking soda	1	$1 \times 4 = 4$
egg	1	$1 \times 4 = 4$
cup brown sugar	$\frac{3}{4}$	$\frac{3}{4} \times 4 = \frac{12}{4} = 3$
teaspoon salt	$\frac{3}{4}$	$\frac{3}{4} \times 4 = \frac{12}{4} = 3$
teaspoon vanilla	1	$1 \times 4 = 4$
cups flour	$1\frac{3}{4}$	$1\frac{3}{4} \times 4 = 7$
cup chopped nuts	$\frac{1}{2}$	$\frac{1}{2} \times 4 = \frac{4}{2} = 2$
cup melted butter	$\frac{3}{8}$	$\frac{3}{8} \times 4 = \frac{12}{8} = 1\frac{4}{8} = 1\frac{1}{2}$

B. Possible response:



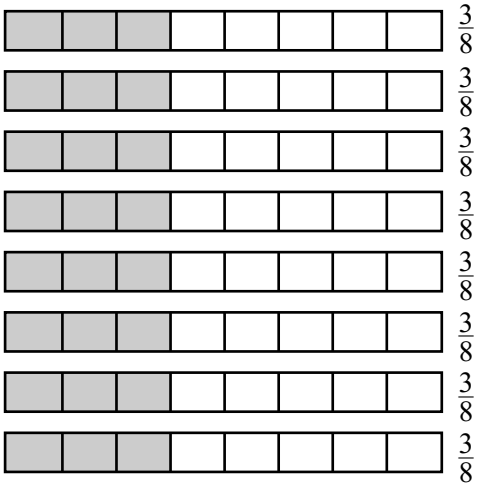
$\frac{3}{4}$ $\frac{3}{4}$ + $\frac{3}{4}$ + $\frac{3}{4}$ = $\frac{12}{4}$

3 teaspoons salt for 4 loaves

C.

Ingredients	Amount for 1 Loaf	Amount for 8 Loaves
cups raisins, chopped	$1\frac{1}{4}$	$1\frac{1}{4} \times 8 = 10$
cups boiling water	$\frac{3}{4}$	$\frac{3}{4} \times 8 = \frac{24}{4} = 6$
teaspoon baking soda	1	$1 \times 8 = 8$
egg	1	$1 \times 8 = 8$
cup brown sugar	$\frac{3}{4}$	$\frac{3}{4} \times 8 = \frac{24}{4} = 6$
teaspoon salt	$\frac{3}{4}$	$\frac{3}{4} \times 8 = \frac{24}{4} = 6$
teaspoon vanilla	1	$1 \times 8 = 2$
cups flour	$1\frac{3}{4}$	$1\frac{3}{4} \times 8 = 10$
cup chopped nuts	$\frac{1}{2}$	$\frac{1}{2} \times 8 = \frac{8}{2} = 4$
cup melted butter	$\frac{3}{8}$	$\frac{3}{8} \times 8 = \frac{24}{8} = 3$

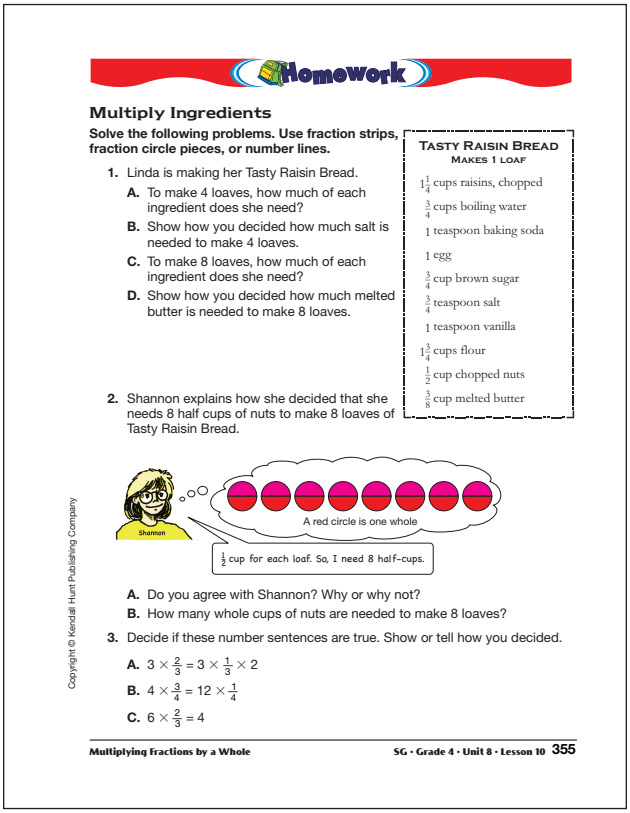
D. Possible response:



$\frac{24}{8} = 3$ cups melted butter

2. A. Yes, I agree with Shannon. Her picture makes sense. $\frac{1}{2}$ cup for each loaf of bread.

B. 4 cups of nuts are needed to make 8 loaves of bread



Homework

Multiply Ingredients

Solve the following problems. Use fraction strips, fraction circle pieces, or number lines.

1. Linda is making her Tasty Raisin Bread.
   - **A.** To make 4 loaves, how much of each ingredient does she need?
   - **B.** Show how you decided how much salt is needed to make 4 loaves.
   - **C.** To make 8 loaves, how much of each ingredient does she need?
   - **D.** Show how you decided how much melted butter is needed to make 8 loaves.

TASTY RAISIN BREAD
MAKES 1 LOAF

- $1\frac{1}{4}$ cups raisins, chopped
- $\frac{3}{4}$ cups boiling water
- 1 teaspoon baking soda
- 1 egg
- $\frac{3}{4}$ cup brown sugar
- $\frac{3}{4}$ teaspoon salt
- 1 teaspoon vanilla
- $1\frac{3}{4}$ cups flour
- $\frac{1}{2}$ cup chopped nuts
- $\frac{3}{8}$ cup melted butter

2. Shannon explains how she decided that she needs 8 half cups of nuts to make 8 loaves of Tasty Raisin Bread.

   - **A.** Do you agree with Shannon? Why or why not?
   - **B.** How many whole cups of nuts are needed to make 8 loaves?

3. Decide if these number sentences are true. Show or tell how you decided.
   - **A.** $3 \times \frac{2}{3} = 3 \times \frac{1}{3} \times 2$
   - **B.** $4 \times \frac{3}{4} = 12 \times \frac{1}{4}$
   - **C.** $6 \times \frac{2}{3} = 4$

***Student Guide* - Page 355**

3. Strategies will vary.

A. True; I used my fraction circle pieces and made each side of the equation. Both sides equal 2 wholes.

B. True; I used my fraction strips. I made $\frac{3}{4}$ with the yellow pieces four times. The pieces can be rearranged into 3 wholes. I did the same with $12 \times \frac{1}{4}$. $\frac{12}{4}$ can be rearranged into 3 wholes as well.

$4 \times \frac{3}{4} = 12 \times \frac{1}{4}$.

C. True; I hopped on the number line. Each of the 6 hops was $\frac{2}{3}$ and I landed on 4.

Groups of Apples

Solve the following problems. Draw a diagram and write a number sentence for each problem. Follow the example.

Example: Edward gave $\frac{2}{3}$ of a small box of 12 apples to his grandmother. How many apples did he give her?

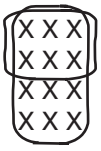
$\frac{2}{3} \times 12 = 8$

Remember, there are 12 apples in a small box and 24 apples in a large box.

4. **A.** One-half of the apples in the small box of apples are red. How many are red?
   B. One-fourth of the apples in the small box are green. How many are green?
5. Nila's family received a large box of apples.
   A. Nila ate $\frac{1}{6}$ of the apples. How many apples did Nila eat?
   B. Nila's father took $\frac{5}{6}$ of the apples to work to share with his co-workers. How many apples did he take to work?
6. For each problem, decide how many apples each person ate.
   A. Manny ate $\frac{1}{3}$ of a large box of apples.
   B. Blanca ate $\frac{1}{8}$ of the apples in a large box.
   C. Michael ate $\frac{3}{4}$ of the apples in a small box.
   D. Romesh ate $\frac{5}{6}$ of the apples in a small box.

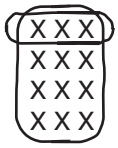
***Student Guide* - Page 356**

4. A. 6 apples



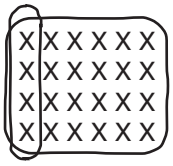
$\frac{1}{2} \times 12 = 6$ apples

B. 3 apples



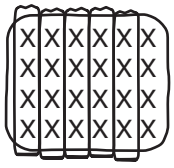
$\frac{1}{4} \times 12 = 3$ apples

5. A. 4 apples



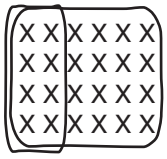
$\frac{1}{6} \times 24 = 4$ apples

B. 20 apples



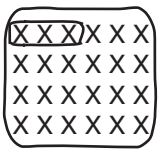
$\frac{5}{6} \times 24 = 20$ apples

6. A. 8 apples



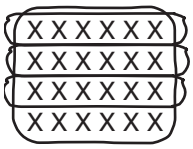
$\frac{1}{3} \times 24 = 8$ apples

B. 3 apples



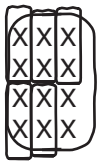
$\frac{1}{8} \times 24 = 3$ apples

C. 18 apples



$\frac{3}{4} \times 24 = 18$ apples

D. 10 apples



$\frac{5}{6} \times 12 = 10$ apples

7.

Multiplication Number Sentences
$\frac{1}{4} \times 8 = 2$
$\frac{2}{4} \times 8 = 4$
$\frac{3}{4} \times 8 = 6$
$\frac{4}{4} \times 8 = 8$
$\frac{5}{4} \times 8 = 10$
$\frac{6}{4} \times 8 = 12$

8. A. Answers will vary. As the fraction gets larger, the product gets larger. You can find products by skip counting by 2 because $\frac{1}{4} \times 8 = 2$.

B. The product is equal to the number of muffins in the whole package when the fraction is $\frac{4}{4}$. $\frac{4}{4} = 1$, and when a number is multiplied by 1, the product is the same number.

C. The product is less than the number of muffins in the whole package when the fraction is less than 1. When the number of muffins is multiplied by a fraction less than 1, you are finding a part of the whole package.

D. The product is more than the number of muffins in the whole package when the fraction is greater than 1. When the number is multiplied by a fraction greater than 1, the product is more than one whole package.

E. $\frac{1}{2}$; $\frac{1}{2} \times 8 = 4$

9. 12 muffins

10. A. 2

B. 4

C. 5

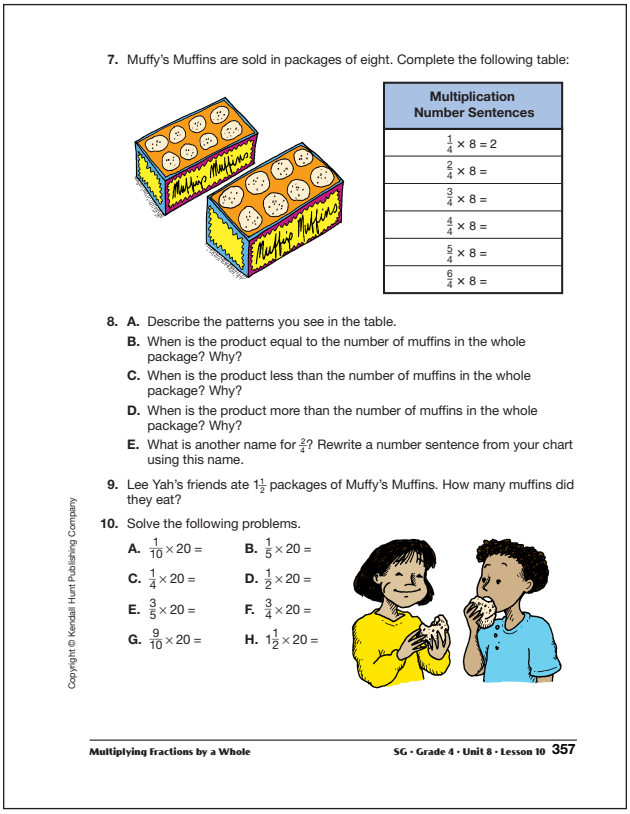
D. 10

E. 12

F. 15

G. 18

H. 30



7. Muffy's Muffins are sold in packages of eight. Complete the following table:

Multiplication Number Sentences
$\frac{1}{4} \times 8 = 2$
$\frac{2}{4} \times 8 =$
$\frac{3}{4} \times 8 =$
$\frac{4}{4} \times 8 =$
$\frac{5}{4} \times 8 =$
$\frac{6}{4} \times 8 =$

8. **A.** Describe the patterns you see in the table.
B. When is the product equal to the number of muffins in the whole package? Why?
C. When is the product less than the number of muffins in the whole package? Why?
D. When is the product more than the number of muffins in the whole package? Why?
E. What is another name for $\frac{2}{4}$? Rewrite a number sentence from your chart using this name.

9. Lee Yah's friends ate $1\frac{1}{2}$ packages of Muffy's Muffins. How many muffins did they eat?

10. Solve the following problems.

A. $\frac{1}{10} \times 20 =$ **B.** $\frac{1}{5} \times 20 =$
C. $\frac{1}{4} \times 20 =$ **D.** $\frac{1}{2} \times 20 =$
E. $\frac{3}{5} \times 20 =$ **F.** $\frac{3}{4} \times 20 =$
G. $\frac{9}{10} \times 20 =$ **H.** $1\frac{1}{2} \times 20 =$

Multiplying Fractions by a Whole SG • Grade 4 • Unit 8 • Lesson 10 357

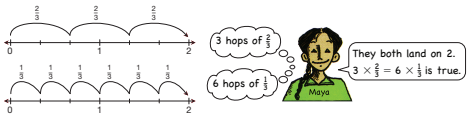
***Student Guide* - Page 357**

Name _____ Date _____

Multiply on Number Lines

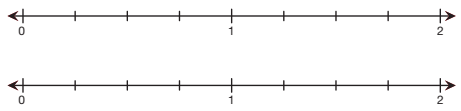
Maya used number lines to check if the following number sentence is true.

$3 \times \frac{2}{3} = 6 \times \frac{1}{3}$

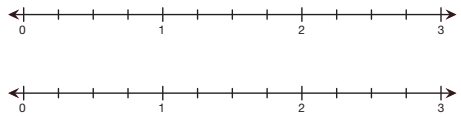


Use number lines to decide if each number sentence is true. Circle the true number sentences.

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



2. $4 \times \frac{3}{4} = 7 \times \frac{1}{4}$



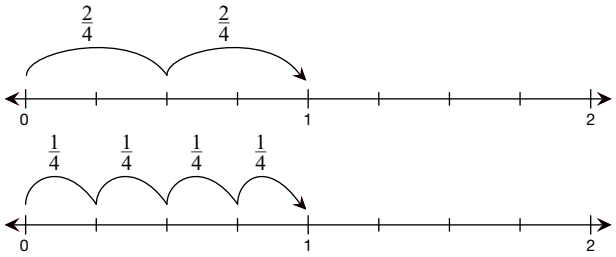
Student Activity Book **- Page 305**

Student Activity Book

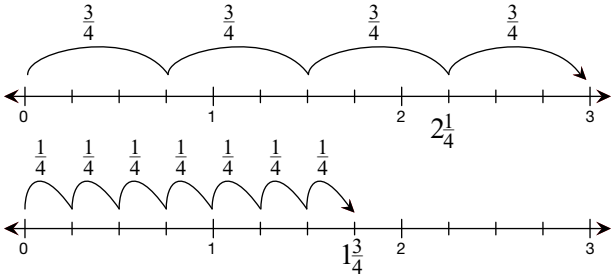
Multiply on Number Lines (SAB pp. 305–306)

Questions 1–6

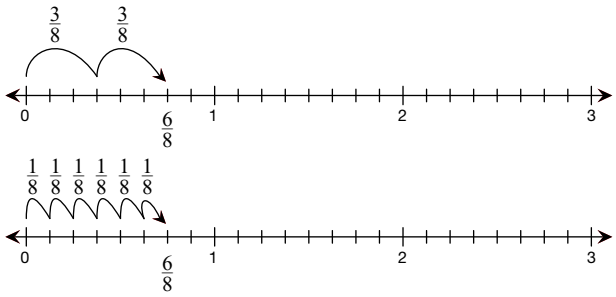
1. True;



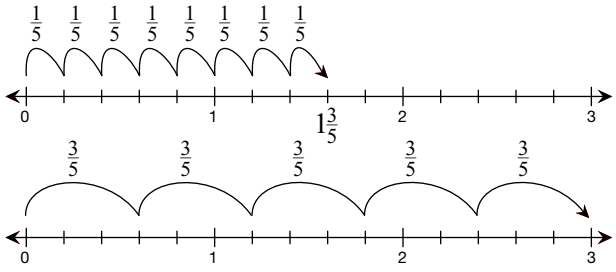
2. Not true;



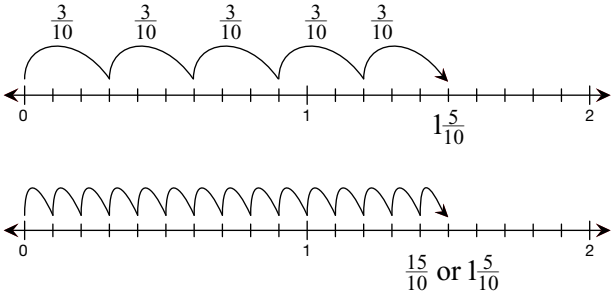
3. True;



4. Not true;



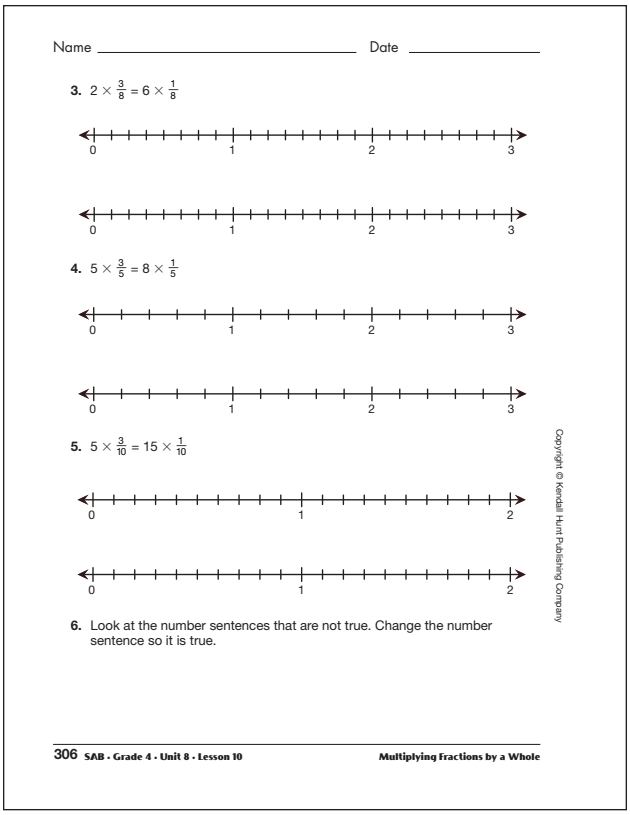
5. True;



6. Possible responses:

Question 2: $4 \times \frac{3}{4} = 12 \times \frac{1}{4}$

Question 4: $5 \times \frac{3}{4} = 15 \times \frac{1}{5}$


Name _____ Date _____

3. $2 \times \frac{3}{8} = 6 \times \frac{1}{8}$

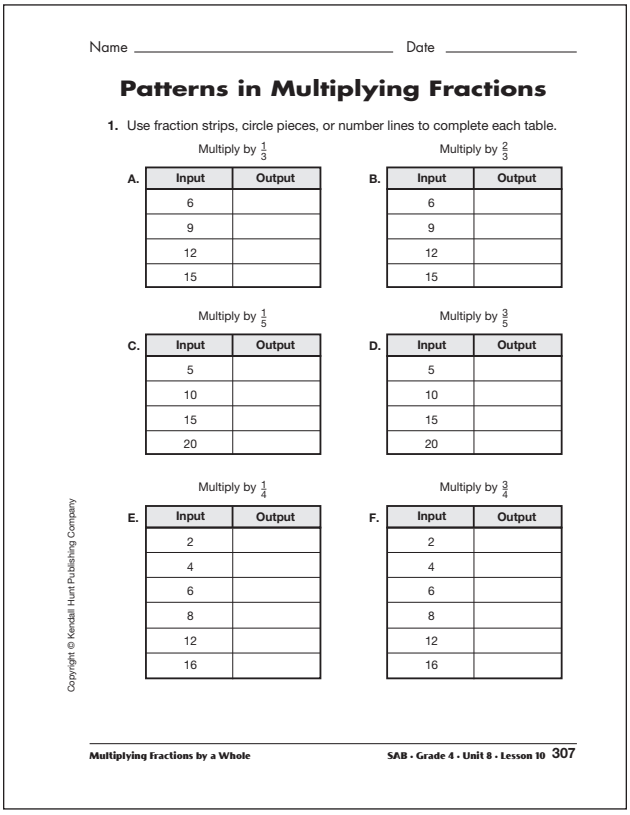
4. $5 \times \frac{3}{5} = 8 \times \frac{1}{5}$

5. $5 \times \frac{3}{10} = 15 \times \frac{1}{10}$

6. Look at the number sentences that are not true. Change the number sentence so it is true.

306 SAB • Grade 4 • Unit 8 • Lesson 10 Multiplying Fractions by a Whole

***Student Activity Book* - Page 306**



Name _____ Date _____

Patterns in Multiplying Fractions

1. Use fraction strips, circle pieces, or number lines to complete each table.

Multiply by $\frac{1}{3}$

A.

Input	Output
6	
9	
12	
15	

Multiply by $\frac{2}{3}$

B.

Input	Output
6	
9	
12	
15	

Multiply by $\frac{1}{5}$

C.

Input	Output
5	
10	
15	
20	

Multiply by $\frac{3}{5}$

D.

Input	Output
5	
10	
15	
20	

Multiply by $\frac{1}{4}$

E.

Input	Output
2	
4	
6	
8	
12	
16	

Multiply by $\frac{3}{4}$

F.

Input	Output
2	
4	
6	
8	
12	
16	

Student Activity Book **- Page 307**

Student Activity Book

Patterns in Multiplying Fractions (SAB pp. 307–308)

Questions 1–2

1. A.

Input	Output
6	$\frac{6}{3} = 2$
9	$\frac{9}{3} = 3$
12	$\frac{12}{3} = 4$
15	$\frac{15}{3} = 5$

B.

Input	Output
6	$\frac{12}{3} = 4$
9	$\frac{18}{3} = 6$
12	$\frac{24}{3} = 8$
15	$\frac{30}{3} = 10$

C.

Input	Output
5	$\frac{5}{5} = 1$
10	$\frac{10}{5} = 2$
15	$\frac{15}{5} = 3$
20	$\frac{20}{5} = 4$

D.

Input	Output
5	$\frac{15}{5} = 3$
10	$\frac{30}{5} = 6$
15	$\frac{45}{5} = 9$
20	$\frac{60}{5} = 12$

E.

Input	Output
2	$\frac{2}{4} = \frac{1}{2}$
4	$\frac{4}{4} = 1$
6	$\frac{4}{4} = 1\frac{2}{4}$ or $1\frac{1}{2}$
8	$\frac{8}{4} = 2$
12	$\frac{12}{4} = 3$
16	$\frac{16}{4} = 4$

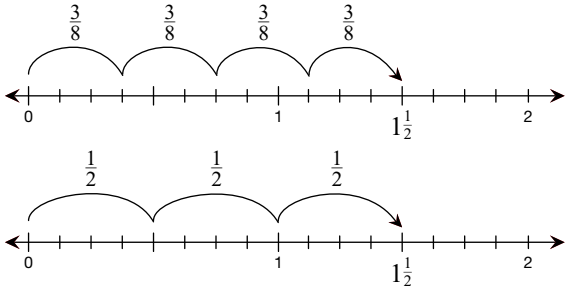
F.

Input	Output
2	$1\frac{2}{4}$ or $1\frac{1}{2}$
4	$\frac{12}{4} = 3$
6	$\frac{18}{4} = 4\frac{2}{4}$ or $4\frac{1}{2}$
8	$\frac{24}{4} = 6$
12	$\frac{36}{4} = 9$
16	$\frac{48}{4} = 12$

2.

	True	False
A. $3 \times \frac{2}{3} = 3 \times \frac{1}{3} \times 2$	✓	
B. $6 \times \frac{1}{3} = 2$	✓	
C. $4 \times \frac{3}{8} = 2 \times 3$		✓
D. $4 \times \frac{3}{8} = \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8}$	✓	
E. $4 \times \frac{3}{8} = \frac{12}{8}$	✓	
F. $4 \times \frac{3}{8} = \frac{12}{32}$		✓
G. $4 \times \frac{3}{8} = \frac{1}{2} \times 3$	✓	

H. Possible response: The number sentence is true. I used number lines. Both number sentences land on the same number, $1\frac{1}{2}$.



Name _____ Date _____

2. Which number sentences are true?

	True	False
A. $3 \times \frac{2}{3} = 3 \times \frac{1}{3} \times 2$		
B. $6 \times \frac{1}{3} = 2$		
C. $4 \times \frac{3}{8} = 2 \times 3$		
D. $4 \times \frac{3}{8} = \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8}$		
E. $4 \times \frac{3}{8} = \frac{12}{8}$		
F. $4 \times \frac{3}{8} = \frac{12}{32}$		
G. $4 \times \frac{3}{8} = \frac{1}{2} \times 3$		

H. Show or tell how you know the number sentence in Question G is true.

308 SAB • Grade 4 • Unit 8 • Lesson 10 Multiplying Fractions by a Whole

Student Activity Book **- Page 308**

Name _____ Date _____

Multiply Fractions

Use fraction strips, circle pieces, drawings, or number lines to solve each problem.

1. Jerome is making punch for a party. His recipe serves 6 people. He needs enough punch to serve 18 people. Help Jerome change the amounts of the ingredients in his recipe. Show how you solved each problem.

Fruit Party Punch
Serves 6

$\frac{3}{4}$ cup fruit punch
$\frac{1}{4}$ cup frozen strawberries
$1\frac{1}{2}$ cups lemon-lime soda
$\frac{1}{2}$ cups ice

A. How much fruit punch will he need?

B. How many strawberries will he need?

C. How much lemon-lime soda?

D. If 14 people have punch, can each person have a $\frac{1}{2}$ cup of punch?

***Teacher Guide* - Page 1**

Name _____ Date _____

Use fraction strips, circle pieces, drawings, or number lines to solve each problem.

2. **A.** $\frac{3}{4} \times 2 =$ **B.** $2 \times 1\frac{3}{4} =$

C. $3 \times \frac{1}{5} =$ **D.** $\frac{3}{5} \times 3 =$

E. Show or tell how you solved one problem from Questions 2A–D.

3. Grace expects 8 people at her party.
   A. If each person at the party drinks $\frac{1}{2}$-cup of punch, how much punch will she need?

   B. If each person at the party eats $\frac{1}{8}$ of a pie, how many pies will she need?

***Teacher Guide* - Page 2**

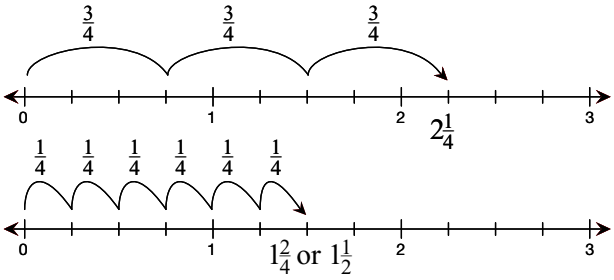
Teacher Guide

Multiply Fractions (TG pp. 1–3)

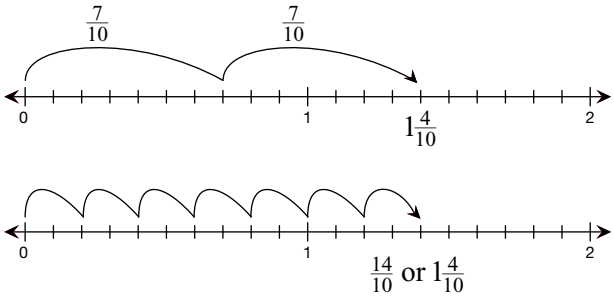
Questions 1–4

1. **A.** $2\frac{1}{4}$ cups fruit punch; $\frac{3}{4} \times 3 = \frac{9}{4} = 2\frac{1}{4}$
   B. $\frac{3}{4}$ cups frozen strawberries; $\frac{1}{4} \times 3 = \frac{3}{4}$
   C. $4\frac{1}{4}$ cups lemon-lime soda; $1\frac{1}{2} \times 3 = 3 + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 4\frac{1}{2}$
   D. Yes. The recipe yields $7\frac{1}{2}$ cups of punch ($4\frac{1}{2} + 2\frac{1}{4} + \frac{3}{4} = 7\frac{1}{2}$) without the ice and 7 cups are needed to serve 14 people ($14 \times \frac{1}{2} = 7$).
2. **A.** $\frac{6}{4}$ or $1\frac{2}{4} = 1\frac{1}{2}$
   B. $3\frac{1}{2}$
   C. $\frac{3}{5}$
   D. $\frac{9}{5} = 1\frac{4}{5}$
   E. Possible response for Question B: $2 \times 1\frac{3}{4} = 3\frac{1}{2}$; $2 \times 1 = 2$ and $2 \times \frac{3}{4} = \frac{6}{4}$ or $1\frac{1}{2}$. $2 + 1\frac{1}{2} = 3\frac{1}{2}$
3. **A.** 4 cups of punch; $8 \times \frac{1}{2} = 4$
   B. 2 pies; $8 \times \frac{1}{6} = \frac{8}{6} = 1\frac{2}{6}$ or $1\frac{1}{3}$. One pie is not enough.

4. A. Not true.

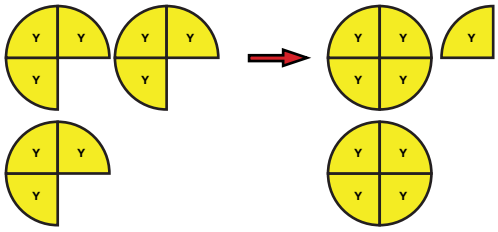


B. True.

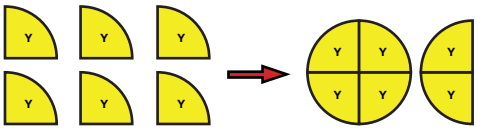


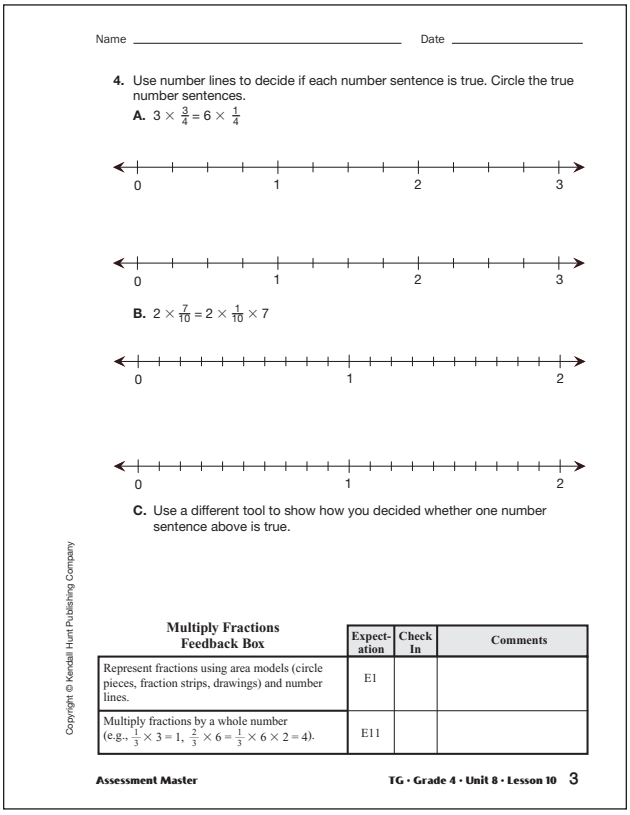
C. Possible response for Question 4A: I used circle pieces and $3 \times \frac{3}{4}$ is $\frac{9}{4}$, but $6 \times \frac{1}{4} = \frac{6}{4}$. The number sentence is not true.

$$3 \times \frac{3}{4} = \frac{9}{4}$$



$$6 \times \frac{1}{4} = \frac{6}{4}$$





Name _____ Date _____

4. Use number lines to decide if each number sentence is true. Circle the true number sentences.

A. $3 \times \frac{3}{4} = 6 \times \frac{1}{4}$

0 1 2 3

0 1 2 3

B. $2 \times \frac{7}{10} = 2 \times \frac{1}{10} \times 7$

0 1 2

0 1 2

C. Use a different tool to show how you decided whether one number sentence above is true.

Multiply Fractions Feedback Box	Expectation	Check In	Comments
Represent fractions using area models (circle pieces, fraction strips, drawings) and number lines.	E1		
Multiply fractions by a whole number (e.g., $\frac{1}{3} \times 3 = 1$, $\frac{2}{3} \times 6 = \frac{1}{3} \times 6 \times 2 = 4$).	E11		

Assessment Master TG • Grade 4 • Unit 8 • Lesson 10 3

***Teacher Guide* - Page 3**