Chapter 11

Name _____

Multiply Fractions and Whole Numbers

Show What You Know

Relate Addition to Multiplication Complete.

1. 

_____ + _____ + _____ + _____ = _____

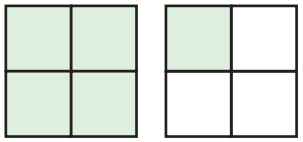
_____ × _____ = _____

2. 

_____ + _____ + _____ = _____

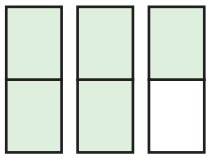
_____ × _____ = _____

Read and Write Mixed Numbers Write a mixed number for the shaded part. Write a fraction for the unshaded part.

3. 

Shaded: _____

Unshaded: _____

4. 

Shaded: _____

Unshaded: _____

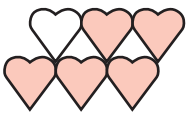
Part of a Group Write a fraction that names the shaded part.

1. 

shaded parts _____

total parts _____

fraction _____

2. 

shaded parts _____

total parts _____

fraction _____

MATH in the Real World

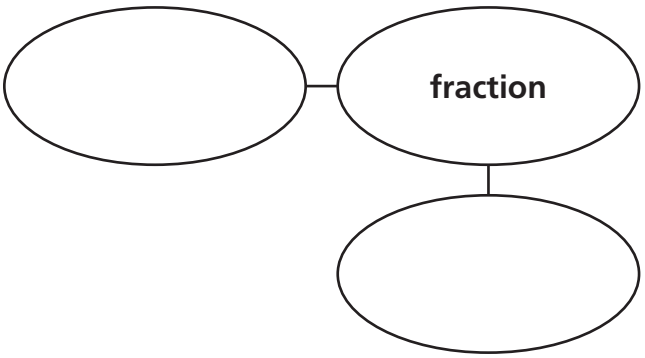
The budget for Carter Museum's annual party is $10,000. Food accounts for $\frac{1}{2}$ of the budget, beverages for $\frac{1}{4}$, and decorations for $\frac{1}{10}$ of the budget. The remainder is spent on staffing the party. How much money is spent on staffing the party?

Vocabulary Builder

Go Online For more help

Visualize It

Complete the bubble map using the review words.



Connect to Vocabulary

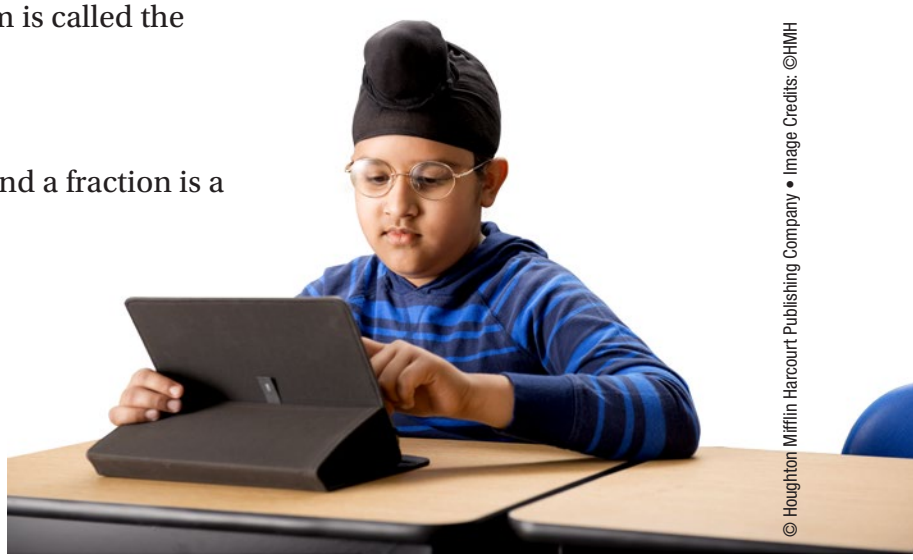
Review Words

- fraction
- mixed number
- multiple
- product
- unit fraction

Understand Vocabulary

Complete the sentences.

1. A _____ can name a part of a group or a whole.
2. You can write _____ of 10 such as 10, 20, 30, and so on.
3. _____ have one as the numerator.
4. The answer to a multiplication problem is called the _____.
5. An amount given as a whole number and a fraction is a _____.



Name _____

Multiples of Unit Fractions

I Can find multiples of a unit fraction by multiplying a unit fraction by a whole number.

Florida's B.E.S.T.

- **Algebraic Reasoning** 4.AR.1.3
- **Fractions** 4.FR.2.4
- **Mathematical Thinking & Reasoning** MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1

UNLOCK the Problem

Real World

At a pizza party, each pizza was cut into 6 equal slices. At the end of the party, there was $\frac{5}{6}$ of a pizza left. Roberta put each of the leftover slices in its own freezer bag. How many bags did she use? What part of a pizza did she put in each bag?

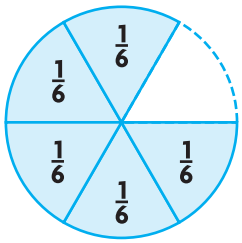
- How many slices of pizza were eaten?

_____

- What fraction of the pizza is 1 slice?

_____

Example Write $\frac{5}{6}$ as the product of a whole number and a unit fraction.



The picture shows $\frac{5}{6}$ or _____ sixth-size pieces.

Each sixth-size pieces of the pizza can be shown by the unit fraction _____.

You can use unit fractions to show $\frac{5}{6}$ in two ways.

$\frac{5}{6}$ = _____ + _____ + _____ + _____ + _____

$\frac{5}{6}$ = _____ × $\frac{1}{6}$

The number of addends, or the multiplier, represents the number of bags used.

The unit fractions represent the part of a pizza in each bag.

So, Roberta used _____ bags. She put _____ of a pizza in each bag.

Remember

You can use multiplication to show repeated addition.

3×4 means $4 + 4 + 4$.

4×2 means $2 + 2 + 2 + 2$.

Math Talk

MTR 3.1 Complete tasks with mathematical fluency.

Give an example of how you would write a fraction greater than 1 as a mixed number.

- Explain how you can write $\frac{3}{2}$ as the product of a whole number and a unit fraction.

_____

_____

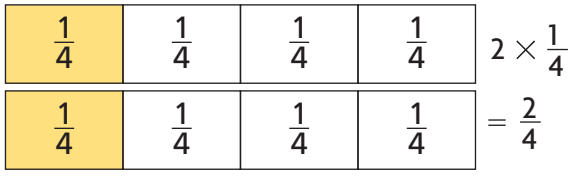
_____

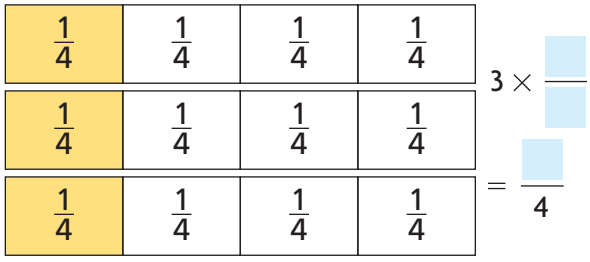
Multiples The product of a number and a counting number is a multiple of the number. You have learned about multiples of whole numbers.

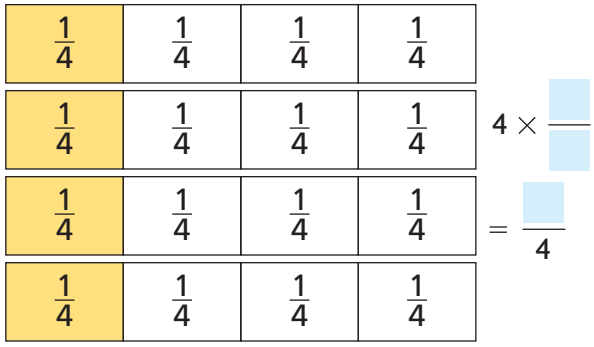
The products 1×4, 2×4, 3×4, and so on are multiples of 4. The numbers 4, 8, 12, and so on are multiples of 4.

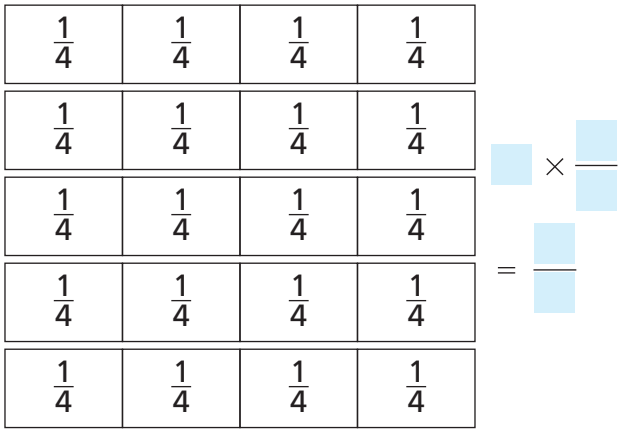
You can also find multiples of unit fractions.

$1 \times \frac{1}{4}$ is $\frac{1}{4}$. Use models to write the next four multiples of $\frac{1}{4}$. Complete the last model.



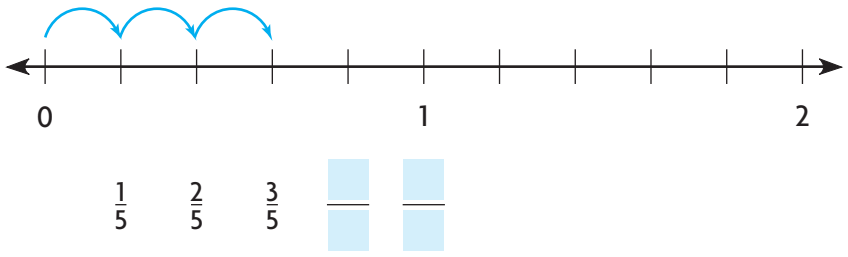






Multiples of $\frac{1}{4}$ are $\frac{1}{4}$, ____, ____, ____, and ____.

Use a number line to write multiples of $\frac{1}{5}$.

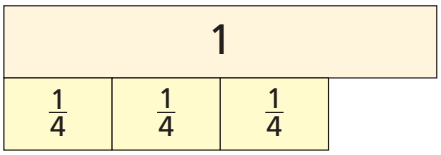


Multiples of $\frac{1}{5}$ are $\frac{1}{5}$, ____, ____, ____, and ____.

Name _____

Share and Show Math Board

1. Use the picture to complete the equations.



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

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

Write the fraction as a product of a whole number and a unit fraction.

2. $\frac{4}{5} = \_\_\_\_$

3. $\frac{3}{10} = \_\_\_\_$

4. $\frac{8}{3} = \_\_\_\_$

List the next four multiples of the unit fraction.

5. $\frac{1}{6}$, ____, ____, ____, ____

6. $\frac{1}{3}$, ____, ____, ____, ____

Math Talk

MTR 3.1 Complete tasks with mathematical fluency.

Explain why $\frac{8}{5}$ is a multiple of $\frac{1}{5}$.

On Your Own

Write the fraction as a product of a whole number and a unit fraction.

7. $\frac{5}{6} = \_\_\_\_$

8. $\frac{9}{4} = \_\_\_\_$

9. $\frac{3}{100} = \_\_\_\_$

List the next four multiples of the unit fraction.

10. $\frac{1}{10}$, ____, ____, ____, ____

11. $\frac{1}{8}$, ____, ____, ____, ____

Problem Solving · Applications Real World

12. **MTR** Ailee uses $\frac{1}{2}$ cup of blueberries to make each loaf of blueberry bread. Explain how many loaves of blueberry bread she can make with $2\frac{1}{2}$ cups of blueberries.

13. Sinna cut a loaf of bread into 12 equal slices. His family ate some of the bread and now $\frac{5}{12}$ of the loaf is left. Sinna wants to put each of the leftover slices in its own bag. How many bags does Sinna need?

14. Which fraction is a multiple of $\frac{1}{5}$? Mark all that apply.

- ○ $\frac{4}{5}$
- ○ $\frac{5}{12}$
- ○ $\frac{5}{16}$
- ○ $\frac{3}{5}$

15. Whose statement makes sense? Whose statement is nonsense? Explain your reasoning.

MATH on the Spot

There is no multiple of $\frac{1}{6}$ between $\frac{3}{6}$ and $\frac{4}{6}$.

$\frac{4}{5}$ is a multiple of $\frac{1}{4}$.

Gavin

Meera

- For the statement that is nonsense, write a new statement that makes sense.

Name _____

Multiples of Unit Fractions

Go Online
Interactive Examples

Write the fraction as a product of a whole number and a unit fraction.

1. $\frac{5}{6} =$ $5 \times \frac{1}{6}$

2. $\frac{7}{8} =$ _____

3. $\frac{5}{3} =$ _____

4. $\frac{9}{10} =$ _____

5. $\frac{3}{4} =$ _____

6. $\frac{11}{12} =$ _____

List the next four multiples of the unit fraction.

7. $\frac{1}{5}$, ____, ____, ____, ____

8. $\frac{1}{8}$, ____, ____, ____, ____

Problem Solving Real World

9. So far, Midori has read $\frac{5}{6}$ of a book. She has read the same number of pages each day for 5 days. What fraction of the book does Midori read each day?

_____

10. Nicholas buys $\frac{3}{8}$ pound of cheese. He puts the same amount of cheese on 3 sandwiches. How much cheese does Nicholas put on each sandwich?

_____

11. Explain how to write $\frac{5}{3}$ as a product of a whole number and a unit fraction.

_____

_____

_____

Lesson Check

12. Selena walks from home to school each morning and back home each afternoon. Altogether, she walks $\frac{2}{3}$ mile each day. How far does Selena live from school?

13. Will uses $\frac{3}{4}$ cup of olive oil to make 3 batches of salad dressing. How much oil does Will use for one batch of salad dressing?

Spiral Review

14. Liza bought $\frac{5}{8}$ pound of trail mix. She gives $\frac{2}{8}$ pound of trail mix to Michael. How much trail mix does Liza have left?

15. Ximena has a piece of rope that is $6\frac{2}{3}$ feet long. How do you write $6\frac{2}{3}$ as a fraction greater than 1?

16. A group of students makes a pattern with their house numbers. Kyrie's house number is missing. What is Kyries house number?

29, 39, ?, 59, 69, 79

17. Blima buys 12 cupcakes. Nine of the cupcakes have chocolate frosting and the rest have vanilla frosting. What fraction of the cupcakes have vanilla frosting?

Name _____

Multiples of Fractions

Florida's B.E.S.T.

- **Algebraic Reasoning** 4.AR.1.3
- **Fractions** 4.FR.2.4
- **Mathematical Thinking & Reasoning** MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1

I Can find multiples of fractions by multiplying a fraction by a whole number.

UNLOCK the Problem Real World

Gema is making 4 pans of baked ziti. For each pan, she needs $\frac{2}{3}$ cup cheese. Her measuring cup can scoop $\frac{1}{3}$ cup of cheese. How many scoops of cheese does she need for the 4 pans?

Example 1 Use a model to write the product $4 \times \frac{2}{3}$ as the product of a whole number and a unit fraction.

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

Think: $\frac{2}{3}$ is 2 third-size pieces.

$\frac{2}{3} =$ _____ + _____ or $2 \times$ _____

There are 4 pans of baked ziti. Each pan needs $\frac{2}{3}$ cup cheese.

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

← 1 pan: $2 \times \frac{1}{3} = \frac{2}{3}$

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

← 2 pans: $2 \times 2 \times \frac{1}{3} = 4 \times \frac{1}{3} = \frac{4}{3}$

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

← 3 pans: $3 \times 2 \times \frac{1}{3} = 6 \times \frac{1}{3} = \frac{6}{3}$

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

← 4 pans: $4 \times 2 \times \frac{1}{3} = 8 \times \frac{1}{3} = \frac{8}{3}$

$4 \times \frac{2}{3} = 4 \times$ _____ $\times \frac{1}{3} =$ _____ $\times \frac{1}{3} = \frac{\square}{3}$

So, Gema needs _____ third-size scoops of cheese for 4 pans of ziti.

Math Talk

MTR 3.1 Complete tasks with mathematical fluency.

Explain how this model of $4 \times \frac{2}{3}$ is related to a model of 4×2.

1. What if Gema decides to make 10 pans of ziti? Describe a pattern you could use to find the number of scoops of cheese she would need.

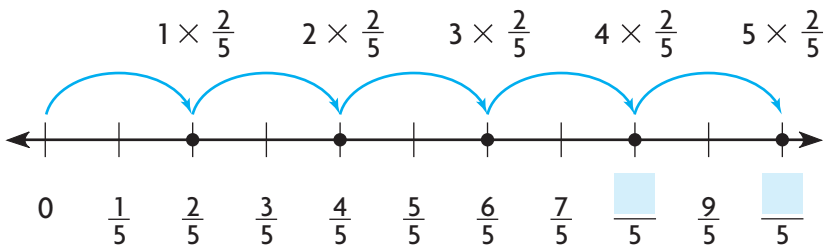
_____

_____

_____

Multiples You have learned to write multiples of unit fractions. You can also write multiples of non-unit fractions.

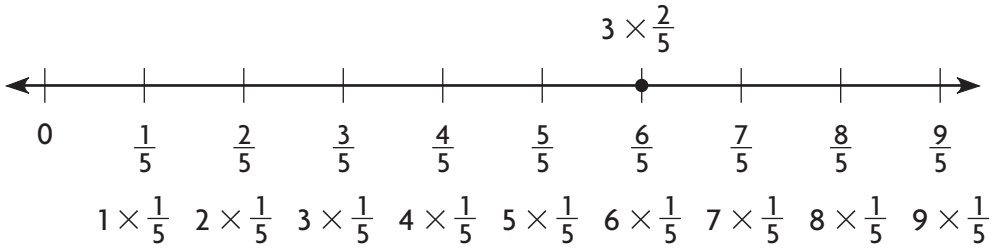
Example 2 Use a number line to write multiples of $\frac{2}{5}$.



Think: Multiply $\frac{2}{5}$ by counting numbers.

Multiples of $\frac{2}{5}$ are $\frac{2}{5}$, ____, ____, ____, and ____.

$3 \times \frac{2}{5} = \frac{6}{5}$. Write $\frac{6}{5}$ as a product of a whole number and a unit fraction.



$3 \times \frac{2}{5} = \frac{6}{5} =$ _____ × _____

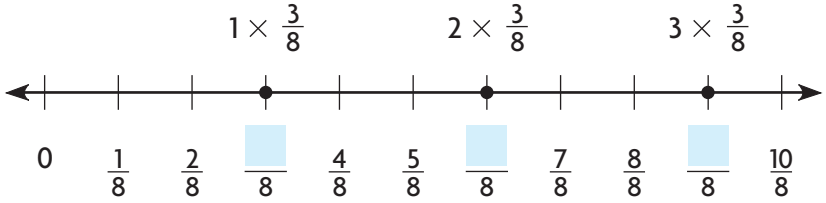
2. Explain how to use repeated addition to write the multiple of a fraction as the product of a whole number and a unit fraction.

_____

_____

Share and Show Math Board

1. Write three multiples of $\frac{3}{8}$.



$1 \times \frac{3}{8} =$ _____

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

$3 \times \frac{3}{8} =$ _____

Multiples of $\frac{3}{8}$ are _____, _____, and _____.

Name _____

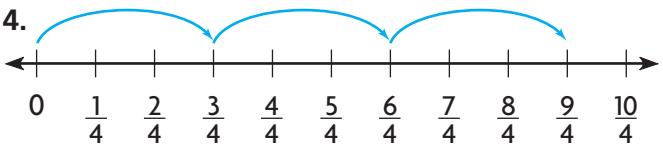
List the next four multiples of the fraction.

2. $\frac{3}{6}$, ____, ____, ____, ____

3. $\frac{2}{10}$, ____, ____, ____, ____

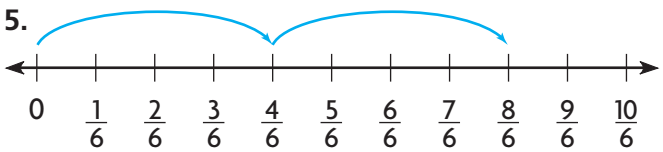
Write the product as the product of a whole number and a unit fraction.

4.



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

5.



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

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Explain how to write a product of a whole number and a fraction as a product of a whole number and a unit fraction.

On Your Own

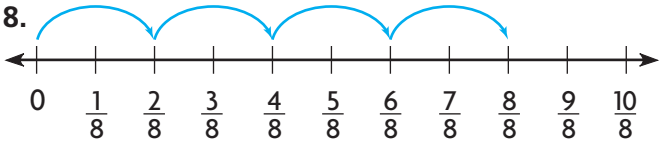
List the next four multiples of the fraction.

6. $\frac{4}{5}$, ____, ____, ____, ____

7. $\frac{2}{4}$, ____, ____, ____, ____

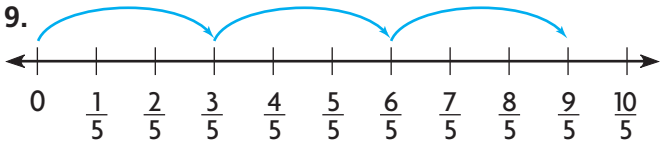
Write the product as the product of a whole number and a unit fraction.

8.



$4 \times \frac{2}{8} =$ _____

9.



$3 \times \frac{3}{5} =$ _____

10. Are $\frac{6}{10}$ and $\frac{6}{30}$ multiples of $\frac{3}{10}$? Explain.

_____

_____

11. Which is greater, $4 \times \frac{2}{16}$ or $3 \times \frac{3}{16}$? Explain.

_____

_____

Problem Solving · Applications

MATH on the Spot

12. Shulem is watering his plants. He gives each of 2 plants $\frac{3}{5}$ pint of water. His watering can holds $\frac{1}{5}$ pint. How many times will he fill his watering can to water both plants?

a. What do you need to find?

b. What information do you need to use?

c. How can drawing a model help you solve the problem?

d. Show the steps you use to solve the problem.

e. Complete the sentence.

Shulem will fill his watering can _____ times.

13. Alma is making 3 batches of tortillas. She adds $\frac{3}{4}$ cup of water to each batch. The measuring cup holds $\frac{1}{4}$ cup. How many times must Alma measure $\frac{1}{4}$ cup of water to have enough for the tortillas? Shade the model to show your answer.

Alma must measure $\frac{1}{4}$ cup ☐ times.

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

Name _____

Multiples of Fractions

Go Online
Interactive Examples

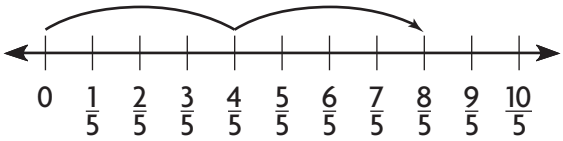
List the next four multiples of the fraction.

1. $\frac{3}{5}$, ____, ____, ____, ____

2. $\frac{2}{6}$, ____, ____, ____, ____

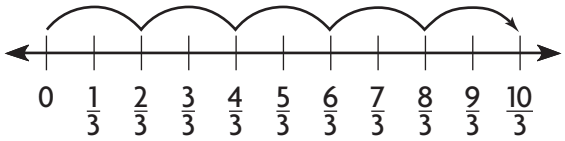
Write the product as the product of a whole number and a unit fraction.

3.



$2 \times \frac{4}{5} =$ _____

4.



$5 \times \frac{2}{3} =$ _____

Problem Solving Real World

5. Lia is making 2 loaves of banana bread. She needs $\frac{3}{4}$ cup of sugar for each loaf. Her measuring cup can only hold $\frac{1}{4}$ cup of sugar. How many times will Lia need to fill the measuring cup in order to get enough sugar for both loaves of bread?

6. A group of 4 students is performing an experiment with salt. Each student must add $\frac{3}{8}$ teaspoon of salt to a solution. The group only has a $\frac{1}{8}$-teaspoon measuring spoon. How many times will the group need to fill the measuring spoon in order to perform the experiment?

_____ _____

7. Explain how to write $3 \times \frac{3}{8}$ as the product of a whole number and a unit fraction.

_____

_____

_____

Lesson Check

8. Eloise made a list of some multiples of $\frac{8}{5}$. Write 5 fractions that could be in Eloise's list.

9. David is filling five $\frac{3}{4}$-quart bottles with a sports drink. His measuring cup only holds $\frac{1}{4}$ quart. How many times will David need to fill the measuring cup in order to fill the 5 bottles?

Spiral Review

10. Ira has 128 stamps in his stamp album. He has the same number of stamps on each of the 8 pages. How many stamps are on each page?

11. Enrique is saving up for a bike that costs $198. So far, he has saved $15 per week for the last 12 weeks. How much more money does Enrique need in order to be able to buy the bike?

12. Amalia buys $3\frac{7}{8}$ yards of material at the fabric store. She uses it to make a skirt. Afterward, she has $1\frac{3}{8}$ yards of the fabric left over. How many yards of material did Amalia use?

13. Order these fractions from **least** to **greatest**: $\frac{2}{3}$, $\frac{7}{12}$, $\frac{3}{4}$

Name _____

Multiply a Fraction by a Whole Number Using Models

Florida's B.E.S.T.

- **Algebraic Reasoning** 4.AR.1.3
- **Fractions** 4.FR.2.4
- **Mathematical Thinking & Reasoning** MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1

I Can use a model to multiply a fraction by a whole number.

UNLOCK the Problem

Real World

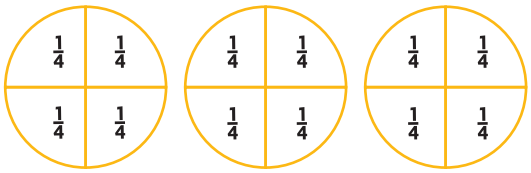
Khai practices the violin for $\frac{3}{4}$ hour each day. He has a recital in 3 days. How much time will he practice in 3 days?

- How many equal groups of $\frac{3}{4}$ should you model?

_____

Example 1 Use a model to multiply $3 \times \frac{3}{4}$.

Think: $3 \times \frac{3}{4}$ is 3 groups of $\frac{3}{4}$ of a whole. Shade the model to show 3 groups of $\frac{3}{4}$.



1 group of $\frac{3}{4}$ = _____

2 groups of $\frac{3}{4}$ = _____

3 groups of $\frac{3}{4}$ = _____

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

So, Khai will practice for _____ hours in all.

Math Talk

MTR 3.1 Complete tasks with mathematical fluency.

If you multiply $4 \times \frac{2}{6}$, is the product greater than or less than 4? Explain.

1. Explain how you can use repeated addition with the model to find the product $3 \times \frac{3}{4}$.

_____

_____

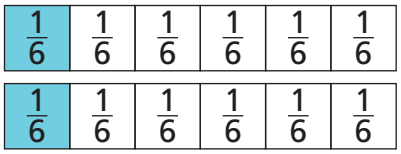
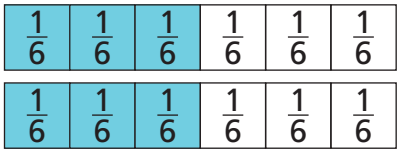
2. Khai's daily practice of $\frac{3}{4}$ hour is in sessions that last for $\frac{1}{4}$ hour each. Describe how the model shows the number of practice sessions Khai has in 3 days.

_____

_____

Example 2 Use a pattern to multiply.

You know how to use a model and repeated addition to multiply a fraction by a whole number. Look for a pattern in the table to discover another way to multiply a fraction by a whole number.

Multiplication problem	Whole number (number of groups)	Fraction (size of groups)	Product
 $2 \times \frac{1}{6}$	2	$\frac{1}{6}$ of a whole	$\frac{2}{6}$
 $2 \times \frac{2}{6}$	2	$\frac{2}{6}$ of a whole	$\frac{4}{6}$
 $2 \times \frac{3}{6}$	2	$\frac{3}{6}$ of a whole	$\frac{6}{6}$

When you multiply a fraction by a whole number, the numerator in the product is the product of the _____ and the _____ of the fraction. The denominator in the product is the same as the _____ of the fraction.

3. How do you multiply a fraction by a whole number without using a model or repeated addition?

4. Describe two different ways to find the product $4 \times \frac{2}{3}$.

Name _____

Share and Show

Math Board

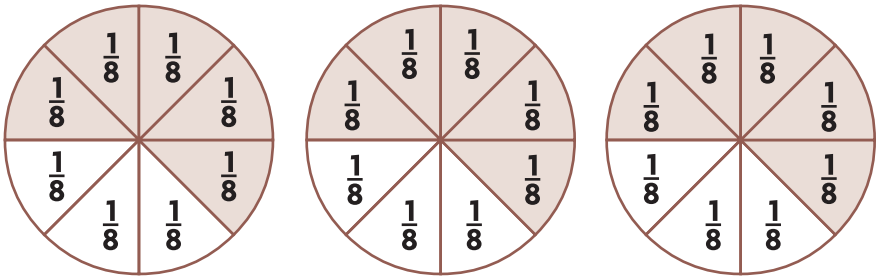
1. Find the product $3 \times \frac{5}{8}$.

1 group of $\frac{5}{8} = \frac{\square}{8}$

2 groups of $\frac{5}{8} = \frac{\square}{8}$

3 groups of $\frac{5}{8} = \frac{\square}{8}$

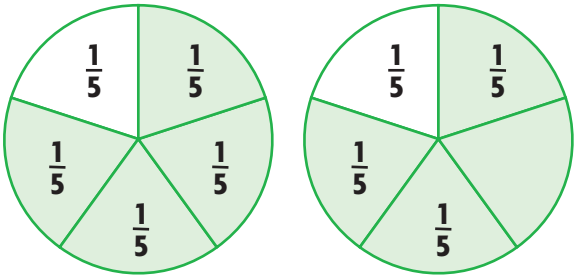
$3 \times \frac{5}{8} =$ _____



3 groups of $\frac{5}{8}$

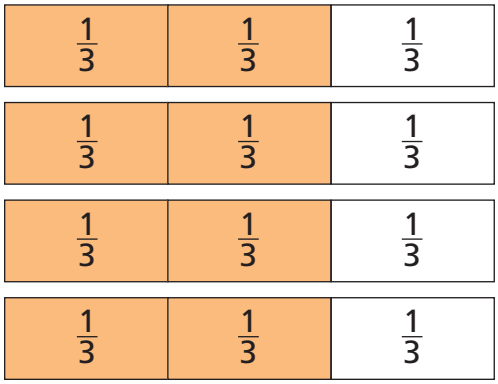
Multiply.

2.



$2 \times \frac{4}{5} =$ _____

3.



$4 \times \frac{2}{3} =$ _____

4. $5 \times \frac{3}{10} =$ _____

5. $4 \times \frac{5}{6} =$ _____

Math Talk

MTR 3.1 Complete tasks with mathematical fluency.

Describe how to model Problem 5.

On Your Own

Multiply.

6. $2 \times \frac{7}{12} =$ _____

7. $6 \times \frac{3}{8} =$ _____

8. $5 \times \frac{2}{4} =$ _____

9. $3 \times \frac{4}{6} =$ _____

10. $2 \times \frac{5}{10} =$ _____

11. $4 \times \frac{2}{8} =$ _____

MTR Write the unknown number.

12. $\square \times \frac{2}{3} = \frac{12}{3}$

13. $5 \times \frac{\square}{4} = \frac{10}{4}$

14. $2 \times \frac{7}{\square} = \frac{14}{8}$

Problem Solving · Applications

15. Eloisa makes clothes for pets. She needs $\frac{5}{6}$ yard of fabric to make 1 dog coat. How much fabric does she need to make 3 dog coats?

MATH on the Spot

a. What do you need to find?

b. What information do you need?

c. Show the steps you use to solve the problem.

d. Complete the sentence.

Eloisa needs _____ yards of fabric to make 3 dog coats.

16. Manuel's small dog eats $\frac{2}{4}$ bag of dog food in 1 month. His large dog eats $\frac{3}{4}$ bag of dog food in 1 month. How many bags do both dogs eat in 6 months?

17. Select the correct product for the equation.

$\frac{24}{12}$ $\frac{18}{12}$ $\frac{24}{16}$ $\frac{18}{16}$

$9 \times \frac{2}{12} = \square$ $3 \times \frac{6}{16} = \square$

$6 \times \frac{4}{16} = \square$ $8 \times \frac{3}{12} = \square$

Name _____

Multiply a Fraction by a Whole Number Using Models

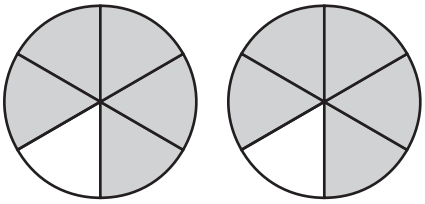
Go Online
Interactive Examples

Multiply.

1. $2 \times \frac{5}{6} =$ $\frac{10}{6}$

2. $3 \times \frac{2}{5} =$ _____

3. $7 \times \frac{3}{10} =$ _____



4. $3 \times \frac{5}{12} =$ _____

5. $6 \times \frac{3}{4} =$ _____

6. $4 \times \frac{2}{5} =$ _____

Problem Solving Real World

7. Ivan walks $\frac{5}{8}$ mile to the bus stop each morning. How far will he walk in 5 days?

_____

8. Milana uses $\frac{2}{3}$ cup of milk to make one batch of muffins. How many cups of milk will Milana use if she makes 3 batches of muffins?

_____

9. Explain how you can use a model to find $4 \times \frac{3}{8}$. Include a drawing and a solution.

_____

_____

_____

_____

Lesson Check

10. Aleta's puppy gained $\frac{3}{8}$ pound each week for 4 weeks. Altogether, how much weight did the puppy gain during the 4 weeks?

11. Pedro mixes $\frac{3}{4}$ teaspoon of plant food into each gallon of water. How many teaspoons of plant food should Pedro mix into 5 gallons of water?

Spiral Review

12. Ivana has $\frac{3}{4}$ pound of hamburger meat. She makes 3 hamburger patties. Each patty weighs the same amount. How much does each hamburger patty weigh?

13. Write $\frac{7}{10}$ as a sum of fractions two different ways.

14. Arjun wants to find the total length of 3 boards. He uses the expression $3\frac{1}{2} + (2 + 4\frac{1}{2})$. How can Arjun rewrite the expression using both the Associative and Commutative Properties of Addition?

15. Fill in the blank with a symbol that makes this statement true:

$$\frac{5}{12} \bigcirc \frac{1}{3}$$

Name _____

Find Part of a Group

Florida's B.E.S.T.

- **Algebraic Reasoning** 4.AR.1.3
- **Fractions** 4.FR.2.4
- **Mathematical Thinking & Reasoning** MTR.1.1, MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1

I Can find part of a group by multiplying a whole number by a fraction.

UNLOCK the Problem Real World

Maya collects stamps. She has 20 stamps in her collection. Four-fifths of her stamps have been canceled. How many of the stamps in Maya's collection have been canceled?

Find $\frac{4}{5}$ of 20.

▲ The post office cancels stamps to keep them from being reused.

- Put 20 counters on your MathBoard.

  Since you want to find $\frac{4}{5}$ of the stamps, you should arrange the 20 counters in _____ equal groups.

- Draw the counters in equal groups below. How many counters are in each group? _____

- Each group represents _____ of the stamps. Circle $\frac{4}{5}$ of the counters.

  How many groups did you circle? _____

  How many counters did you circle? _____

  $\frac{4}{5}$ of 20 = _____, or $\frac{4}{5} \times 20$ = _____

So, _____ of the stamps have been canceled.

MTR 3.1 Complete tasks with mathematical fluency.

How many groups would you circle if $\frac{3}{5}$ of the stamps were canceled? Explain.

Example

Alejandro's stamp collection has stamps from different countries. He has 12 stamps from Canada. Of those twelve, $\frac{2}{3}$ of them have pictures of Queen Elizabeth II. How many stamps have the queen on them?

- Draw an array to represent the 12 stamps by drawing an ✗ for each stamp. Since you want to find $\frac{2}{3}$ of the stamps, your array should show _____ rows with an equal number of ✗s.

- Circle _____ of the 3 rows to show $\frac{2}{3}$ of 12. Then count the number of ✗s in the circle.

  There are _____ ✗s circled.

- Complete the equations.

  $\frac{2}{3}$ of 12 = _____, or $\frac{2}{3} \times 12$ = _____

So, there are _____ stamps with a picture of Queen Elizabeth II.

- MTR On your MathBoard, use counters to find $\frac{4}{6}$ of 12. Explain why the answer is the same as the answer when you found $\frac{2}{3}$ of 12.

Try This! Draw an array.

Zainab has 16 stamps. In her collection, $\frac{3}{4}$ of the stamps are from the United States. How many of her stamps are from the United States and how many are not?

So, _____ of Zainab's stamps are from the United States, and _____ stamps are not.

Name _____

Share and Show Math Board

1. Complete the model to solve.

$\frac{7}{8}$ of 16, or $\frac{7}{8} \times 16$

- How many rows of counters are there? _____
- How many counters are in each row? _____
- Circle _____ rows to solve the problem.
- How many counters are circled? _____

$\frac{7}{8}$ of 16 = _____, or $\frac{7}{8} \times 16$ = _____

Use a model to solve.

2. $\frac{2}{3} \times 18 =$ _____

3. $\frac{2}{5} \times 15 =$ _____

4. $\frac{2}{3} \times 6 =$ _____

Math Talk

MTR 3.1 Complete tasks with mathematical fluency.

Explain how you used a model to solve Problem 4.

On Your Own

Use a model to solve.

5. $\frac{5}{8} \times 24 =$ _____

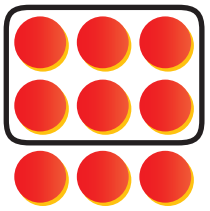
6. $\frac{3}{4} \times 24 =$ _____

7. $\frac{4}{3} \times 21 =$ _____

Solve.

8. MTR What multiplication problem does the model represent?

_____



Problem Solving · Applications

Use the table for Problems 9 and 10.

Stamps Collected	
Name	**Number of stamps**
Zack	30
Teri	18
Paco	24

9. MTR Four-fifths of Zack's stamps have pictures of animals. How many stamps with pictures of animals does Zack have? Use a model to solve.

10. Zack, Teri, and Paco combined the foreign stamps from their collections for a stamp show. Out of their collections, $\frac{3}{10}$ of Zack's stamps, $\frac{5}{6}$ of Teri's stamps, and $\frac{3}{8}$ of Paco's stamps were from foreign countries. How many stamps were in their display? Explain how you solved the problem.

MATH on the Spot

11. Hwasa has 24 stamps in her collection. Among her stamps, $\frac{1}{3}$ have pictures of animals. Out of her stamps with pictures of animals, $\frac{3}{4}$ of those stamps have pictures of birds. How many stamps have pictures of birds on them?

12. Onda bought 16 songs for her MP3 player. Three-fourths of the songs are classical songs. How many of the songs are classical songs? Draw a model to show how you found your answer.

Show the Math

Demonstrate Your Thinking

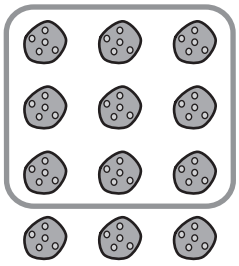
Name _____

Find Part of a Group

Go Online
Interactive Examples

Use a model to solve.

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



2. $\frac{7}{8} \times 16 =$ _____

3. $\frac{6}{10} \times 10 =$ _____

4. $\frac{2}{3} \times 9 =$ _____

5. $\frac{1}{6} \times 18 =$ _____

6. $\frac{4}{5} \times 10 =$ _____

Problem Solving Real World

7. Marco drew 20 pictures. He drew $\frac{3}{4}$ of them in art class. How many pictures did Marco draw in art class?

_____

8. Carolina has 10 marbles. One half of them are blue. How many of Carolina's marbles are blue?

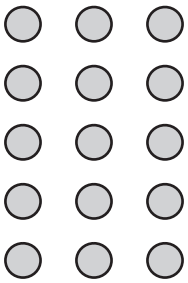
_____

9. Explain how to find $\frac{3}{4}$ of 20 using a model. Include a drawing.

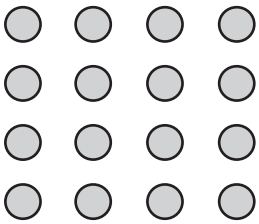
_____

Lesson Check

10. Use the model to find $\frac{1}{3} \times 15$.



11. Use the model to find $\frac{2}{4} \times 16$.



Spiral Review

12. What is the value of the underlined digit?

$\underline{6}{,}560$

13. Nigel has 138 fluid ounces of lemonade. How many 6-fluid-ounce servings of lemonade can he make?

14. Rafi had a board that was $15\frac{5}{8}$ feet long. He cut off a piece of the board that is $11\frac{3}{8}$ feet long. How much of the board is left?

15. Silvia spent $4\frac{2}{8}$ hours during one week and $3\frac{5}{8}$ hours during another week working on a history project. About how long did she spend working on the project?

Name _____

Multiply Fractions and Whole Numbers

Florida's B.E.S.T.

- **Algebraic Reasoning** 4.AR.1.3
- **Fractions** 4.FR.2.4
- **Mathematical Thinking & Reasoning** MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1

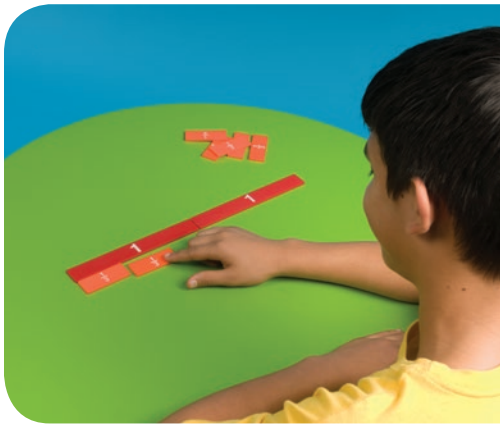
I Can use models to multiply fractions by whole numbers or whole number by fractions.

Investigate

Martin is planting a vegetable garden. Each row is 2 meters long. He wants to plant carrots along $\frac{3}{4}$ of each row. How many meters of each row will he plant with carrots?

Multiply. $\frac{3}{4} \times 2$

Materials ■ fraction strips ■ MathBoard



A. Place two 1-whole fraction strips side-by-side to represent the length of each row.

B. To represent the denominator of the factor $\frac{3}{4}$, the 2 wholes need to be separated into 4 equal parts. So, find 4 fraction strips, all with the same denominator, that fit exactly under the two wholes.

C. Draw a picture of your model.

1	1

D. Circle $\frac{3}{4}$ of 2 on the model you drew.

E. Complete the number sentence. $\frac{3}{4} \times 2 =$ _____

So, Martin will plant carrots along _____ meters of each row.

Draw Conclusions

1. **MTR** Explain why you placed four fraction strips with the same denominator under the two 1-whole strips.

_____

_____

2. **MTR** Explain how you would model $\frac{3}{10}$ of 2.

_____

_____

Make Connections

In the Investigate activity, you multiplied a whole number by a fraction. You can also use a model to multiply a fraction by a whole number.

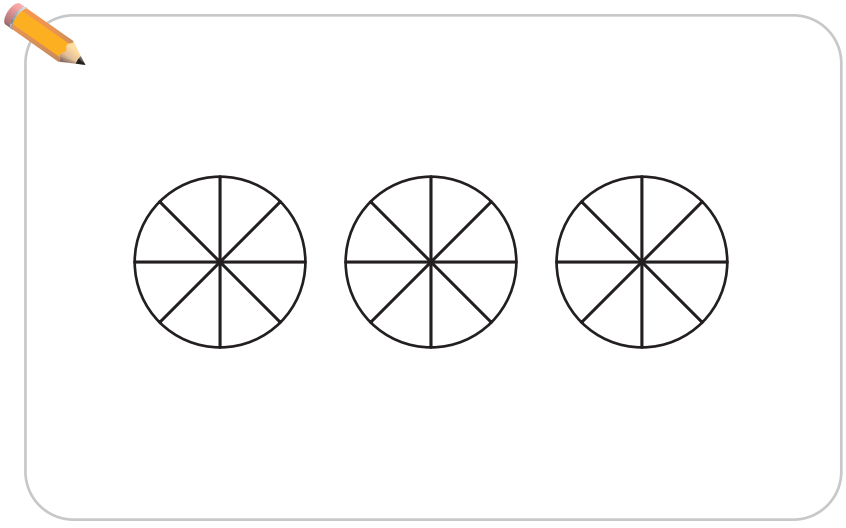
Thuy was helping clean up after a class party. There were 3 boxes remaining with pizza in them. Each box had $\frac{3}{8}$ of a pizza left. How much pizza was left in all?

Materials ■ fraction circles

STEP 1 Find $3 \times \frac{3}{8}$. Model three 1-whole fraction circles to represent the number of boxes containing pizza.

STEP 2 Place $\frac{1}{8}$ fraction circle pieces on each circle to represent the amount of pizza that was left in each box.

- Shade the fraction circles below to show your model.



Each circle shows _____ eighths of a whole.

The 3 circles show _____ eighths.

STEP 3 Complete the number sentences.

$\frac{3}{8} + \frac{3}{8} + \frac{3}{8} =$ _____

$3 \times \frac{3}{8} =$ _____

So, Thuy had _____ pizzas left.

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

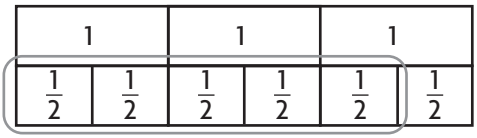
Explain how you would know there is more than one pizza left.

Name _____

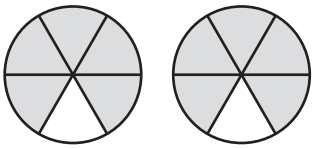
Share and Show Math Board

Use the model to find the product.

1. $\frac{5}{6} \times 3 =$ _____



2. $2 \times \frac{5}{6} =$ _____



Find the product.

3. $\frac{5}{12} \times 3 =$ _____

4. $9 \times \frac{1}{3} =$ _____

5. $\frac{7}{8} \times 4 =$ _____

Problem Solving • Applications

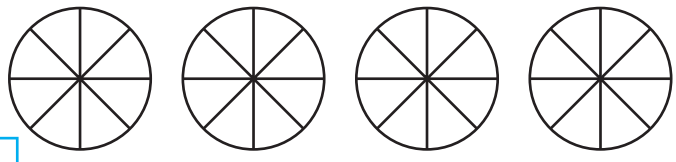
6. Naela brought 3 pans of homemade fruit bars to school. Her classmates ate $\frac{7}{12}$ of each pan. Naela gave 1 whole pan of the leftover fruit bars to the school's secretaries and took the rest home. Explain how to find how much of a pan of fruit bars Naela took home.

_____

_____

_____

7. Huyen is cleaning up after tiling a bathroom. There are 4 open boxes of tile. Each box has $\frac{5}{8}$ of the tiles remaining. How many boxes of tile are left? Shade the model and complete the calculations below to show how you found your answer.



$4 \times \frac{5}{8} = \frac{\square}{8} =$ _____ boxes of tile

8. MTR Tarique drew the model below for a problem. Write 2 problems that can be solved using this model. One of your problems should involve multiplying a whole number by a fraction, and the other problem should involve multiplying a fraction by a whole number.

Pose problems.

Solve your problems.

9. How could you change the model to give you an answer of $4\frac{4}{5}$? Explain and write a new equation.

MATH on the Spot

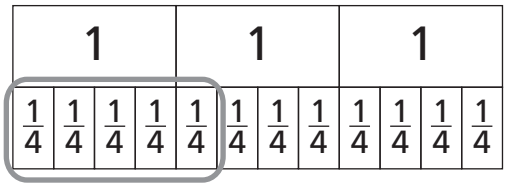
Name _____

Multiply Fractions and Whole Numbers

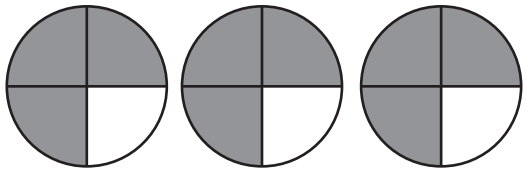
Go Online
Interactive Examples

Use the model to find the product.

1. $\frac{5}{12} \times 3 =$ $\frac{5}{4}$, or $1\frac{1}{4}$



2. $3 \times \frac{3}{4} =$ _____



Find the product.

3. $\frac{2}{5} \times 5 =$ _____

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

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

6. $7 \times \frac{5}{6} =$ _____

7. $\frac{5}{12} \times 6 =$ _____

8. $9 \times \frac{2}{3} =$ _____

Problem Solving Real World

9. Jody has a 5-pound bag of potatoes. She uses $\frac{4}{5}$ of the bag to make potato salad. How many pounds of potatoes does Jody use for the potato salad?

10. Lucas lives $\frac{5}{8}$ mile from school. Kenny lives twice as far as Lucas from school. How many miles does Kenny live from school?

11. Explain how to use models to find $3 \times \frac{3}{4}$ and $\frac{3}{4} \times 3$. Include a picture of each model.

Lesson Check

12. In gym class, Ted runs $\frac{4}{5}$ mile. His teacher runs 6 times that distance each day. How many miles does Ted's teacher run each day?

13. Zico is decorating a banner for a parade. Zico uses a piece of red ribbon, which is $\frac{3}{4}$ yard long. Zico also needs blue ribbon that is 5 times as long as the red ribbon. How much blue ribbon does Zico need?

Spiral Review

14. Mirror Lake Elementary School has 168 students and chaperones going on the fifth-grade class trip. Each bus can hold 54 people. What is the least number of buses needed for the trip?

15. A carpenter has a board $3\frac{1}{4}$ feet long. She sawed off a piece that is $2\frac{3}{4}$ feet long. How much of the board was left?

16. Write $7\ \frac{9}{12}$ as a fraction.

17. What is an equivalent fraction for $\frac{76}{100}$?

Name _____

Fraction and Whole-Number Multiplication

Florida's B.E.S.T.
- **Algebraic Reasoning** 4.AR.1.3
- **Mathematical Thinking & Reasoning** MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1

I Can solve real-world problems that multiply a fraction by a whole number or a whole number by a fraction.

UNLOCK the Problem Real World

Charlene has five 1-pound bags of sand, each a different color. For an art project, she will use $\frac{3}{8}$ pound of each bag of sand to create a colorful sand-art jar. How much sand will be in Charlene's sand-art jar?

- How much sand is in each bag?

_____

- Will Charlene use all of the sand in each bag? Explain.

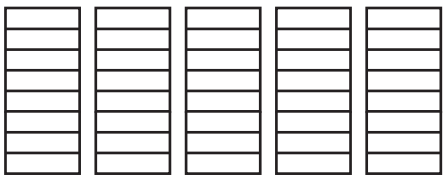
_____

Multiply a fraction by a whole number.

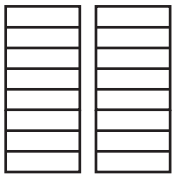
MODEL

- Shade the model to show 5 groups of $\frac{3}{8}$.

$5 \times$  $=$



- Rearrange the shaded pieces to fill as many wholes as possible.

 $=$ ☐

RECORD

- Write an expression to represent the problem.

$5 \times \frac{3}{8}$ **Think:** I need to find 5 groups of 3 eighth-size pieces.

- Multiply the number of eighth-size pieces in each whole by 5. Then write the answer as the total number of eighth-size pieces.

$\frac{\square \times \square}{8} = \frac{\square}{\square}$

- Write the answer as a mixed number.

$\frac{\square}{\square} = \square \frac{\square}{\square}$

So, there are _____ pounds of sand in Charlene's sand-art jar.

Math Talk **MTR 4.1** Engage in discussions on mathematical thinking.

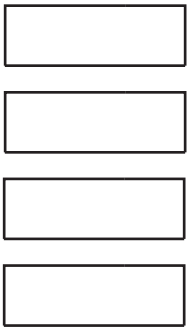
Explain how you can find how much sand Charlene has left.

Example Multiply a whole number by a fraction.

Inaaya brought in 4 loaves of sliced bread to make sandwiches for the class picnic. Her classmates used $\frac{2}{3}$ of the bread. How many loaves of bread were used?

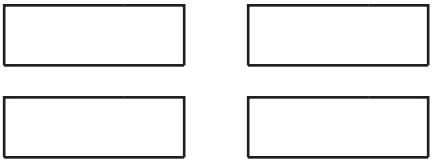
MODEL

- Shade the model to show $\frac{2}{3}$ of 4.



Think: I can cut the loaves into thirds and show $\frac{2}{3}$ of them being used.

- Rearrange the shaded pieces to fill as many wholes as possible.



RECORD

- Write an expression to represent the problem.

$\frac{2}{3} \times 4$

Think: I need to find $\frac{2}{3}$ of 4 wholes.

- Multiply 4 by the number of third-size pieces in each whole. Then, write the answer as the total number of third-size pieces.

$\frac{\square \times \square}{\square} = \frac{\square}{\square}$

- Write the answer as a mixed number.

$\frac{\square}{\square} = \square \frac{\square}{\square}$

So, _____ loaves of bread were used.

- Would we have the same amount of bread if we had 4 groups of $\frac{2}{3}$ of a loaf? Explain.

Try This! Find the product.

A $4 \times \frac{7}{8}$

B $\frac{5}{6} \times 12$

Name _____

Share and Show

Find the product.

1. $3 \times \frac{2}{5} =$ _____

- Multiply the numerator by the whole number. Write the product over the denominator.
- Write the answer as a mixed number.

$$\frac{\square \times \square}{\square} = \frac{\square}{\square}$$

$$\frac{\square}{\square} = \square \frac{\square}{\square}$$

2. $\frac{2}{3} \times 5 =$ _____

3. $6 \times \frac{2}{3} =$ _____

4. $\frac{5}{16} \times 4 =$ _____

On Your Own

Find the product.

5. $\frac{3}{5} \times 11$

6. $3 \times \frac{3}{4}$

7. $\frac{5}{8} \times 3$

MTR Find the unknown digit.

8. $\frac{\square}{2} \times 8 = 4$

$\square =$ _____

9. $\square \times \frac{5}{6} = \frac{20}{6}$, or $3\frac{2}{6}$

$\square =$ _____

10. $\frac{1}{\square} \times 18 = 3$

$\square =$ _____

11. Patty wants to run $\frac{5}{6}$ of a mile every day for 5 days. Keilah wants to run $\frac{3}{4}$ of a mile every day for 6 days. Who will run the greater distance?

MATH on the Spot

_____

12. A baker made 5 pounds of dough. He used $\frac{5}{12}$ of the dough to make sandwich rolls. How much of the dough is left over?

_____

Problem Solving · Applications

13. A chef wants to have enough turkey to feed 24 people. If he wants to provide $\frac{3}{4}$ of a pound of turkey for each person, how much turkey does he need?

a. What do you need to find? _____

_____

b. What operation will you use? _____

c. What information are you given? _____

_____

d. Solve the problem.

e. Complete the sentences.

The chef wants to serve 24 people

_____ of a pound of turkey each.

He will need _____ × _____, or

_____ pounds of turkey.

14. Kali is using this recipe to make salad dressing. The recipe makes 1 batch of dressing. She plans to make 5 batches of the dressing. She has 4 cups of vegetable oil.

Write a multiplication expression to show how much vegetable oil is needed for 5 batches.

_____

Does Kali have enough vegetable oil for 5 batches of the salad dressing? Explain your reasoning.

_____

_____

Salad Dressing

$1\frac{1}{2}$	teaspoons paprika
1	teaspoon dry mustard
$1\frac{1}{2}$	teaspoons salt
$\frac{1}{8}$	teaspoon onion powder
$\frac{3}{4}$	cup vegetable oil
$\frac{1}{4}$	cup vinegar

Name _____

Fraction and Whole Number Multiplication

Go Online
Interactive Examples

Find the product.

1. $4 \times \frac{5}{8} =$ $2\frac{4}{8}$

$4 \times \frac{5}{8} = \frac{20}{8}$

$\frac{20}{8} = 2\frac{4}{8}$

2. $\frac{17}{100} \times 3 =$ _____

3. $\frac{4}{5} \times 10 =$ _____

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

5. $8 \times \frac{5}{6} =$ _____

6. $7 \times \frac{1}{2} =$ _____

7. $\frac{2}{5} \times 6 =$ _____

8. $9 \times \frac{2}{3} =$ _____

9. $\frac{3}{10} \times 9 =$ _____

Problem Solving Real World

10. Linh makes aprons to sell at a craft fair. She needs $\frac{3}{4}$ yard of material to make each apron. How much material does Linh need to make 6 aprons?

_____

11. The gas tank of Mr. Tanaka's car holds 15 gallons of gas. He used $\frac{2}{3}$ of a tank of gas last week. How many gallons of gas did Mr. Tanaka use?

_____

12. WRITE Math Write a word problem that can be solved by multiplying a whole number and a fraction. Include the solution.

_____

Lesson Check

13. At the movies, Liz eats $\frac{1}{4}$ of a box of popcorn. Her friend Kyra eats two times as much popcorn as Liz eats. How much of a box of popcorn does Kyra eat?

14. It takes Vy 45 minutes to complete his science homework. It takes him $\frac{2}{3}$ as long to complete his math homework. How long does it take Vy to complete his math homework?

Spiral Review

15. What is the best estimate for the quotient?

$591 \div 29$

16. Emely bought $\frac{3}{4}$ yard of red ribbon and $\frac{3}{4}$ yard of white ribbon to make some hair bows. Altogether, how many yards of ribbon did she buy?

17. Azem jogged $3\frac{2}{8}$ miles on Monday, $5\frac{5}{8}$ miles on Tuesday, and 8 miles on Wednesday. Suppose he continues the pattern for the remainder of the week. How far will Azem jog on Friday?

18. Qiyana bought 25 pounds of ground beef and made 100 hamburger patties of equal weight. What is the weight of each hamburger patty?

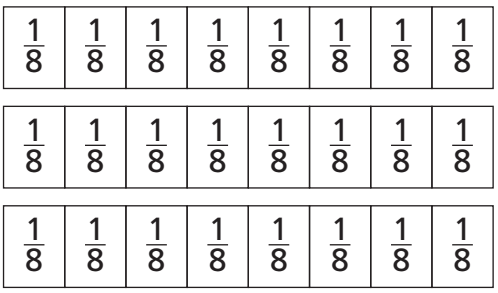
Name _____

Chapter 11

Chapter Review

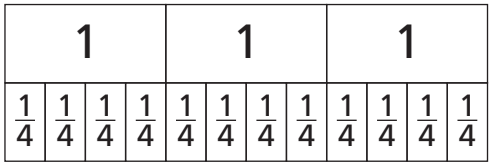
1. Write $\frac{7}{16}$ as the product of a whole number and a unit fraction.

2. Marta is making 3 servings of fruit salad. She adds $\frac{3}{8}$ cup blueberries for each serving. Her measuring cup holds $\frac{1}{8}$ cup. How many times must Marta measure $\frac{1}{8}$ cup of blueberries to have enough for the fruit salad? Shade the models to show your answer.



Marta must measure $\frac{1}{8}$ cup _____ times.

3. Mickey watched $\frac{3}{12}$ of a 3 hour documentary. How many hours of the documentary did he watch? Complete the model to show how you found your answer?



$\frac{3}{12} \times 3 =$ _____ hour

4. Huyen is baking for the Moms and Muffins event at her school. She will bake 4 batches of banana muffins. She needs $\frac{3}{4}$ cup of bananas for each batch of muffins.

Part A

Huyen completed the multiplication below and said she needed $\frac{3}{16}$ cup of bananas for 4 batches of muffins. What is Huyen's error?

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

Part B

What is the correct number of cups Huyen needs for 4 batches of muffins? Explain how you found your answer.

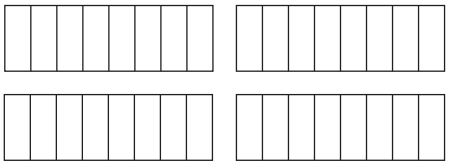
5. Which fraction is a multiple of $\frac{1}{10}$? Mark all that apply.

- ○ $\frac{3}{10}$
- ○ $\frac{10}{12}$
- ○ $\frac{2}{10}$
- ○ $\frac{4}{10}$
- ○ $\frac{10}{6}$
- ○ $\frac{10}{10}$

6. Mimi recorded a soccer game that lasted $\frac{2}{3}$ hour. She watched it 4 times over the weekend to study the plays. How many hours did Mimi spend watching the soccer game? Show your work.

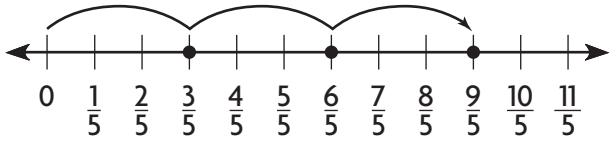
Name _____

7. Mrs. Serna is organizing her craft supplies. There are 4 open boxes of stickers in her cabinet. Each box has $\frac{3}{8}$ of the stickers remaining. How many boxes of stickers are left? Shade the model and complete the calculations below to show how you found your answer.



$4 \times \frac{3}{8} =$ ☐ $=$ _____ full boxes of stickers

8. Joel made a number line showing the multiples of $\frac{3}{5}$.



The product $2 \times \frac{3}{5}$ is shown by the fraction ☐ on the number line.

9. Florian has baseball practice Monday, Wednesday, and Friday. Each practice is $\frac{5}{6}$ hour. Florian says he will have practice for 4 hours this week.

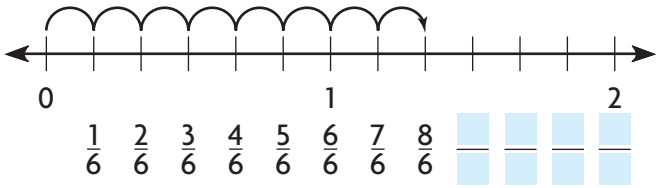
Part A

Without multiplying, explain how you know Florian is incorrect.

Part B

How long will Florian have baseball practice this week? Write your answer as a mixed number. Show your work.

10. Use the number line to write 4 more multiples of $\frac{1}{6}$.

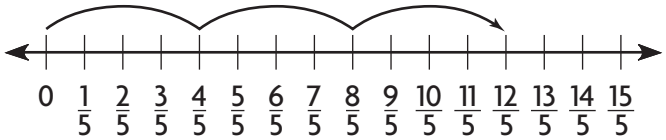


11. Imani's toy dachshund weighed $\frac{15}{16}$ pound when it was born. By age 4, the dog weighed 8 times as much. Fill each box with a number or symbol from the list to show how to find the weight of Imani's dog at age 4. Not all numbers and symbols may be used.

$\frac{15}{16}$	4	3	8
$\frac{16}{15}$	+	=	×

weight = ☐ ☐ ☐

12. Asta made a fraction number line to help her find $3 \times \frac{4}{5}$.



Select a way to write $3 \times \frac{4}{5}$ as the product of a whole number and a unit fraction.

$3 \times \frac{4}{5} =$ ☐

- $4 \times \frac{3}{5}$
- $12 \times \frac{1}{5}$
- $6 \times \frac{1}{5}$

13. Yusif wants to give $\frac{2}{5}$ of his total toy car collection to each of 2 of his friends. How much of his total toy car collection will he give away? Draw a model to solve the problem.

Name _____

14. Select the correct product for the equation.

$4 \times \frac{5}{8} =$ ☐ $4 \times \frac{4}{8} =$ ☐

15. The lengths of different types of snakes at a zoo nursery are shown in the table.

Snake's Name	Type of Snake	Length
Kenny	Kenyan sand boa	$\frac{5}{6}$ foot
Bobby	ball python	$2\frac{3}{6}$ feet
Puck	blood python	$4\frac{1}{6}$ feet

For Problems 15a–15c, select True or False for the statement.

15a. Bobby is 4 times as long as Kenny. ○ True ○ False

15b. Bobby is 3 times as long as Kenny. ○ True ○ False

15c. Puck is 5 times as long as Kenny. ○ True ○ False

16. Nicholas and his three friends went to the school carnival. Each of their treat bags was $\frac{6}{8}$ full. How many bags of treats did they have in total?

_____ treat bags

17. Marisha played a computer quiz game that had 20 multiple-choice questions and 10 True/False questions. She got $\frac{9}{10}$ of the multiple-choice questions correct, and she got $\frac{4}{5}$ of the True/False questions correct.

a. How many multiple-choice questions did Marisha get correct?

_____ multiple-choice questions

b. How many True/False questions did Marisha get correct?

_____ True/False questions

18. Larissa bought 18 donuts. Four-sixths of the donuts have sprinkles.

Part A

How many of the donuts have sprinkles? Draw a model to show how you found your answer.

_____ donuts with sprinkles

Part B

What equation can you write to represent the problem? Explain.

19. Donna buys some fabric to make placemats. She needs $\frac{1}{5}$ yard of each type of fabric. She has 9 different types of fabrics to make her design. Use the following equation. Write the number to make the statement true.

$$\frac{9}{5} = \_\_\_\_\_ \times \frac{1}{5}$$

20. Mr. Tuyen uses $\frac{5}{8}$ of a tank of gas each week to drive to and from his job. How many tanks of gas does Mr. Tuyen use in 5 weeks? Write your answer two different ways.

Mr. Tuyen uses _____ or _____ tanks of gas.

21. Rico is making 4 batches of salsa. Each batch needs $\frac{2}{3}$ cup of corn. He only has a $\frac{1}{3}$-cup measure. How many times must Rico measure $\frac{1}{3}$ cup of corn to have enough for all of the salsa?

_____ times