Chapter 8

Multiply Fractions by Whole Numbers

Show What You Know

Check your understanding of important skills.

Name _____

Relate Addition to Multiplication Complete.

1. 

_____ + _____ + _____ + _____ = _____

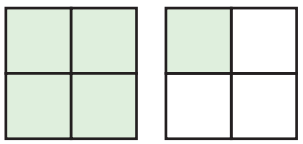
_____ × _____ = _____

2. 

_____ + _____ + _____ = _____

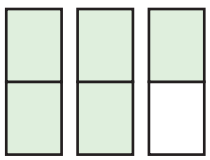
_____ × _____ = _____

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

3. 

Shaded: _____

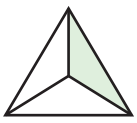
Unshaded: _____

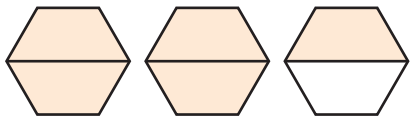
4. 

Shaded: _____

Unshaded: _____

Model Fractions and Mixed Numbers Write a fraction or mixed number for the model.

5.  _____

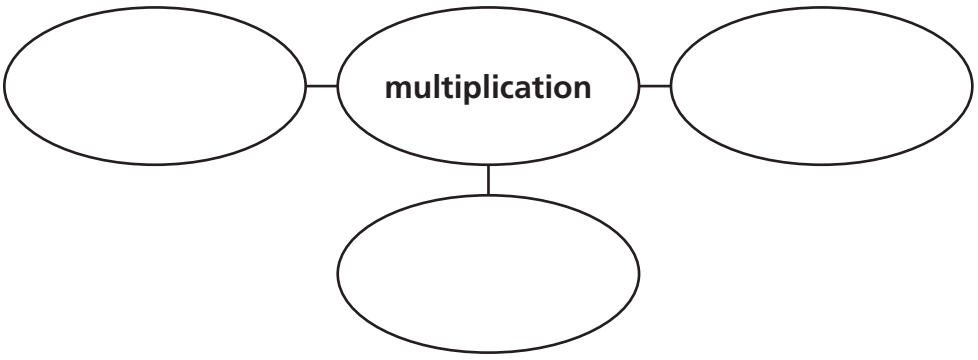
6.  _____

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. Be a Math Detective. How much money is spent on staffing the party?

Vocabulary Builder

Visualize It

Complete the bubble map using the review words.



Review Words

fraction
Identity Property of Multiplication
multiple
product
unit fraction

Understand Vocabulary

Write the word or phrase that matches the description.

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. _____ states that the product of any number and 1 is that number.

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Name _____

Multiples of Unit Fractions

Essential Question How can you write a fraction as a product of a whole number and a unit fraction?

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?

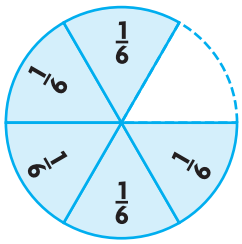
- How many slices of pizza were eaten?

_____

- 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 parts.

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

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

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

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

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 MATHEMATICAL PRACTICES

Explain how you can write $\frac{3}{2}$ as a mixed number.

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

_____

_____

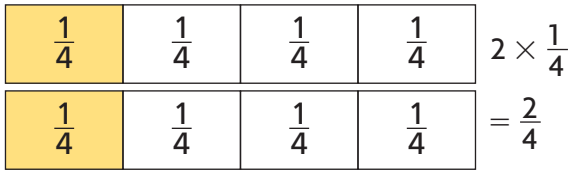
_____

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

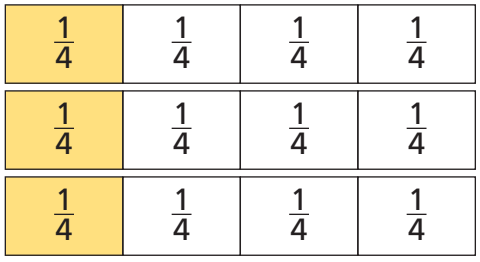
The products 1×4, 2×4, 3×4, and so on are multiples of 4. The numbers 4, 8, 12, and so on are multiples of 4.

You can also find multiples of unit fractions.

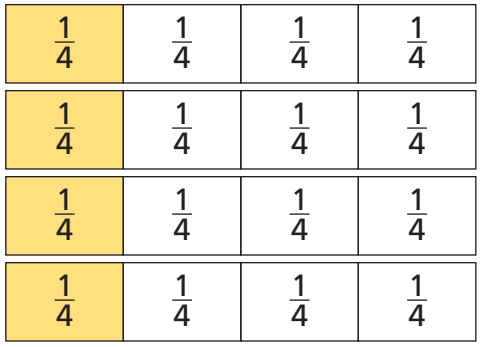
$1 \times \frac{1}{4}$ is $\frac{1}{4}$. Use models to write the next four multiples of $\frac{1}{4}$. Complete the last model.



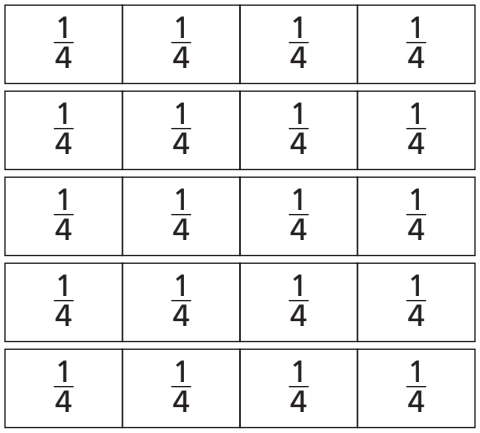
$2 \times \frac{1}{4} = \frac{2}{4}$



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



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



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

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

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

$\frac{1}{5}$ $\frac{2}{5}$ $\frac{3}{5}$ $\frac{\square}{\square}$ $\frac{\square}{\square}$

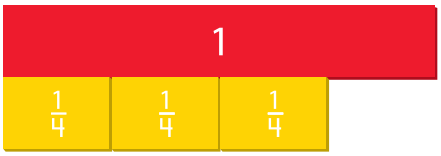
Multiples of $\frac{1}{5}$ are $\frac{1}{5}$, $\square$, $\square$, $\square$, and $\square$.

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

On Your Own

MATHEMATICAL PRACTICES

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

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

7. $\frac{7}{8} = \_\_\_\_$

8. $\frac{1}{12} = \_\_\_\_$

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

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

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

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

List the next four multiples of the unit fraction.

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

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

Problem Solving

REAL WORLD

15. H.O.T. **Write Math** Robyn 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.

16. **Test Prep** Tom makes 8 loaves of blueberry bread. He uses $\frac{1}{2}$ cup of blueberries in each loaf. How many cups of blueberries does he use for the 8 loaves?

Ⓐ $\frac{5}{2}$ Ⓑ $\frac{6}{2}$ Ⓒ $\frac{7}{2}$ Ⓓ $\frac{8}{2}$

Sense or Nonsense?

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

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

Abigail

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

FOR MORE PRACTICE:
Standards Practice Book, pp. P157–P158

Name _____

Multiples of Fractions

Essential Question How can you write a product of a whole number and a fraction as a product of a whole number and a unit fraction?

UNLOCK the Problem REAL WORLD

Jen 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 of $4 \times \frac{2}{3}$ 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 parts.

$\frac{2}{3} =$ _____ + _____ 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, Jen needs _____ third-size scoops of cheese for 4 pans of ziti.

MATHEMATICAL PRACTICES

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

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

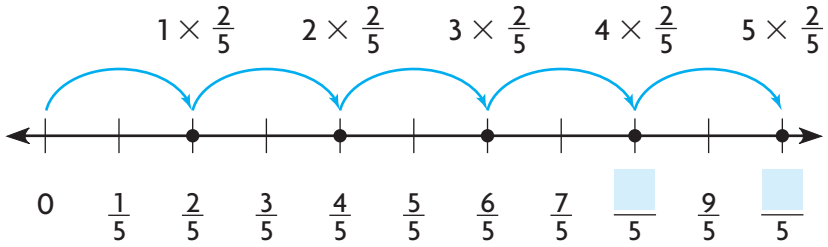
_____

_____

_____

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

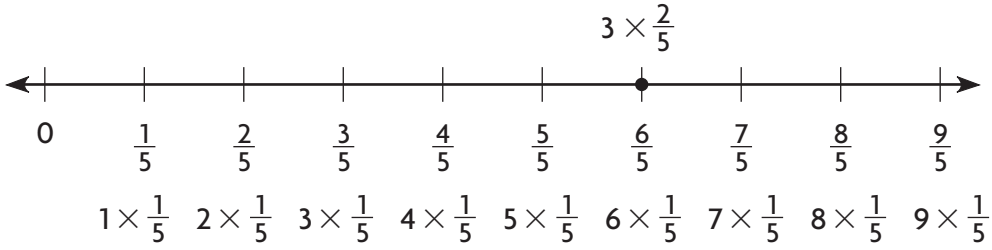
Example 2 Use a number line to write multiples of $\frac{2}{5}$.



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.

_____

_____

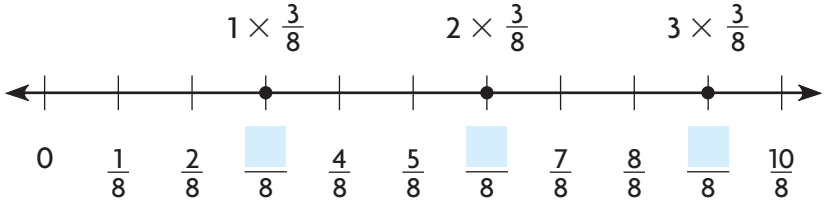
Share and Show MATH BOARD

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 _____

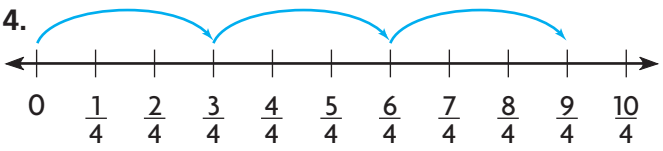
List the next four multiples of the fraction.

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

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

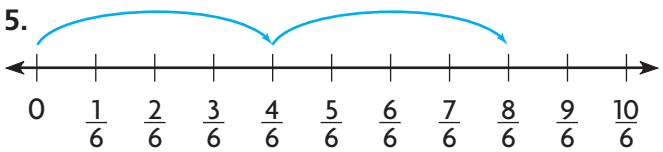
Write the product as the product of a whole number and a unit fraction.

4.



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

5.



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

MATHEMATICAL PRACTICES

Math Talk **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. $\frac{4}{5}$, ____, ____, ____, ____

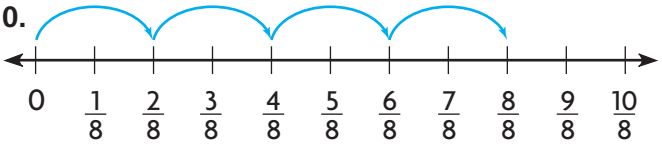
7. $\frac{2}{4}$, ____, ____, ____, ____

8. $\frac{5}{12}$, ____, ____, ____, ____

9. $\frac{3}{8}$, ____, ____, ____, ____

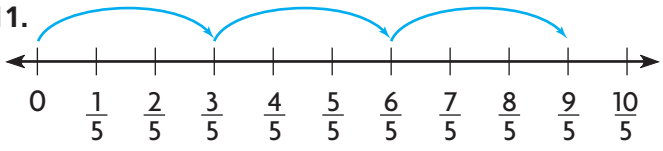
Write the product as the product of a whole number and a unit fraction.

10.



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

11.



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

12. H.O.T. Are $\frac{6}{10}$ and $\frac{6}{30}$ multiples of $\frac{3}{10}$? **Explain.**

_____

_____

UNLOCK the Problem REAL WORLD

13. Josh 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.

Josh will fill his watering can _____ times.

14. What is $\frac{5}{12}$ written as a product of a whole number and a unit fraction?

15. **Test Prep** Which is a multiple of $\frac{5}{6}$?

Ⓐ $\frac{5}{12}$

Ⓑ $\frac{10}{12}$

Ⓒ $\frac{10}{5}$

Ⓓ $\frac{10}{6}$

FOR MORE PRACTICE:
Standards Practice Book, pp. P159–P160

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

Vocabulary
multiple
product
unit fraction

1. A _____ of a number is the product of the number and a counting number. (p. 316)

2. A _____ always has a numerator of 1. (p. 314)

Concepts and Skills

List the next four multiples of the unit fraction.

3. $\frac{1}{2}$, ____, ____, ____, ____

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

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

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

6. $\frac{8}{12} =$ _____

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

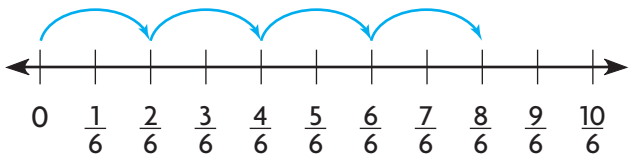
List the next four multiples of the fraction.

8. $\frac{2}{5}$, ____, ____, ____, ____

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

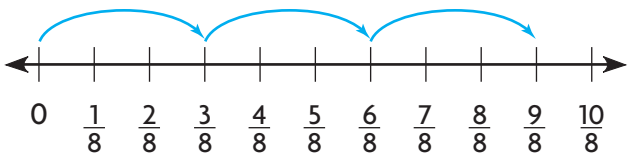
Write the product as the product of a whole number and a unit fraction.

10.



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

11.



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

Fill in the bubble completely to show your answer.

12. Pedro cut a sheet of poster board into 10 equal parts. His brother used some of the poster board and now $\frac{8}{10}$ is left. Pedro wants to make a sign from each remaining part of the poster board. How many signs can he make?

Ⓐ 1

Ⓑ 2

Ⓒ 8

Ⓓ 10

13. Ella is making 3 batches of banana milkshakes. She needs $\frac{3}{4}$ gallon of milk for each batch. Her measuring cup holds $\frac{1}{4}$ gallon. How many times will she need to fill the measuring cup to make all 3 batches of milkshakes?

Ⓐ 3

Ⓑ 4

Ⓒ 6

Ⓓ 9

14. Darren cut a lemon pie into 8 equal slices. His friends ate some of the pie and now $\frac{5}{8}$ is left. Darren wants to put each slice of the leftover pie on its own plate. What part of the pie will he put on each plate?

Ⓐ $\frac{1}{8}$

Ⓑ $\frac{3}{8}$

Ⓒ $\frac{5}{8}$

Ⓓ $\frac{8}{8}$

15. Beth is putting liquid fertilizer on the plants in 4 flowerpots. Her measuring spoon holds $\frac{1}{8}$ teaspoon. The directions say to put $\frac{5}{8}$ teaspoon of fertilizer in each pot. How many times will Beth need to fill the measuring spoon to fertilize the plants in the 4 pots?

Ⓐ 4

Ⓑ 8

Ⓒ 20

Ⓓ 32

Name _____

Multiply a Fraction by a Whole Number Using Models

Essential Question How can you use a model to multiply a fraction by a whole number?

UNLOCK the Problem REAL WORLD

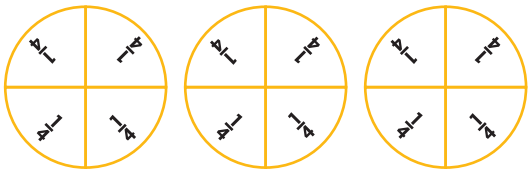
Rafael practices the violin for $\frac{3}{4}$ hour each day. He has a recital in 3 days. How much time will he practice in 3 days?

- 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, Rafael will practice for _____ hours in all.

MATHEMATICAL PRACTICES

Math Talk 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 of $3 \times \frac{3}{4}$.

_____

_____

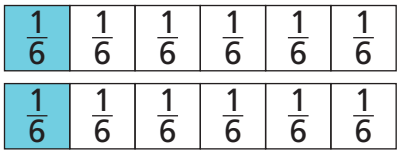
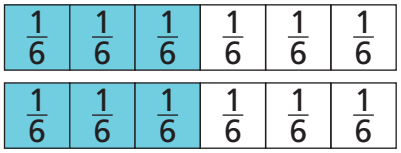
2. Rafael's daily practice of $\frac{3}{4}$ hour is in sessions that last for $\frac{1}{4}$ hour each. **Describe** how the model shows the number of practice sessions Rafael has in 3 days.

_____

_____

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. Summarize 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 of $4 \times \frac{2}{3}$.

Name _____

Share and Show

MATH BOARD

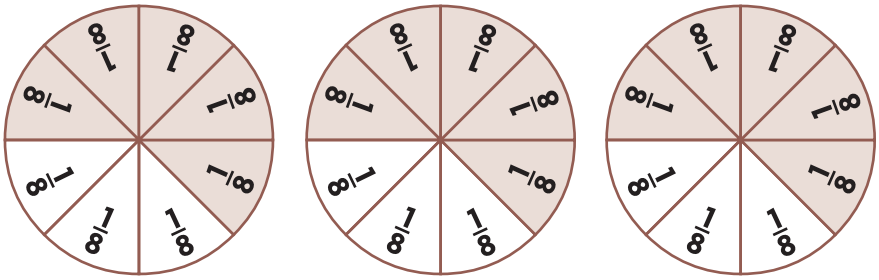
1. Find the product of $3 \times \frac{5}{8}$.

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

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

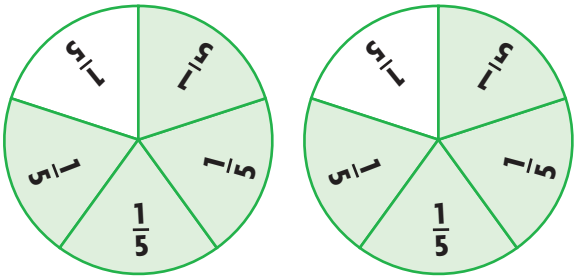
3 groups of $\frac{5}{8} = \frac{\square}{8}$

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

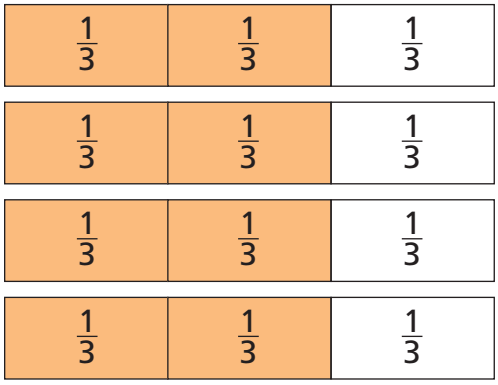


3 groups of $\frac{5}{8}$

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 MATHEMATICAL PRACTICES

Describe how to model Exercise 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. $4 \times \frac{2}{5} =$ _____

H.O.T. **Algebra** Write the unknown number.

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

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

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

UNLOCK the Problem REAL WORLD

15. Lisa 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?

Ⓐ $\frac{8}{6}$ yard

Ⓑ $\frac{15}{6}$ yards

Ⓒ $\frac{24}{6}$ yards

Ⓓ 15 yards

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.

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

e. Fill in the bubble for the correct answer choice.

16. Manuel's dog eats $\frac{3}{4}$ bag of dog food in 1 month. How many bags of dog food does Manuel's dog eat in 6 months?

Ⓐ 9 bags

Ⓑ $\frac{24}{4}$ bags

Ⓒ $\frac{18}{4}$ bags

Ⓓ $\frac{9}{4}$ bags

17. Carla walks her dog $\frac{2}{3}$ mile every day. How far does she walk her dog in 7 days?

Ⓐ 14 miles

Ⓑ $\frac{9}{3}$ miles

Ⓒ $\frac{21}{7}$ miles

Ⓓ $\frac{14}{3}$ miles

FOR MORE PRACTICE:
Standards Practice Book, pp. P161–P162

Name _____

Multiply a Fraction or Mixed Number by a Whole Number

Essential Question How can you multiply a fraction by a whole number to solve a problem?

UNLOCK the Problem REAL WORLD

Christina is planning a dance routine. At the end of each measure of music, she will make a $1\frac{1}{4}$ turn. How many turns will she make after the first 3 measures of music?

- Will Christina make more or less than $1\frac{1}{4}$ turns in 3 measures of music?

_____

- What operation will you use to solve the problem?

_____

You can multiply a mixed number by a whole number.

Example

STEP 1 Write and solve an equation.

$3 \times 1\frac{1}{4} = 3 \times \frac{\square}{\square} = \frac{\square}{\square}$ Write $1\frac{1}{4}$ as a fraction. Multiply.

STEP 2 Write the product as a mixed number.

$\frac{15}{4} = \underbrace{\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}}_{1} + \underbrace{\frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square}}_{1} + \underbrace{\frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square}}_{1} + \frac{\square}{\square} + \frac{\square}{\square} + \frac{\square}{\square}$

$= \square + \frac{\square}{\square}$ Combine the wholes. Then combine the remaining parts.

$= \square\ \frac{\square}{\square}$ Write the mixed number.

So, Christina will make _____ turns.

MATHEMATICAL PRACTICES

Math Talk **Explain** how writing the mixed number as a fraction in Step 2 is related to division.

1. If you multiply $3 \times \frac{1}{4}$, is the product greater than or less than 3? **Explain.**

_____

_____

2. **Explain** how you can tell that $3 \times 1\frac{1}{4}$ is greater than 3 without finding the exact product.

_____

Rename Mixed Numbers and Fractions You can use multiplication and division to rename fractions and mixed numbers.

Remember
The Identity Property of Multiplication states that the product of any number and 1 is that number.

Write $8\frac{1}{5}$ as a fraction.

$8\frac{1}{5} = 8 + \frac{1}{5}$

$= (8 \times \_\_\_\_) + \frac{1}{5}$ Use the Identity Property of Multiplication.

$= \left(8 \times \frac{\square}{\square}\right) + \frac{1}{5}$ Rename 1.

$= \frac{\square}{\square} + \frac{\square}{\square}$ Multiply.

$= \frac{\square}{\square}$ Add.

Write $\frac{32}{5}$ as a mixed number.

Find how many groups of $\frac{5}{5}$ are in $\frac{32}{5}$.

- Divide 32 by 5.
- The quotient is the number of wholes in $\frac{32}{5}$.
- The remainder is the number of fifths left over.

$5\overline{)32}$ $\square$ r $\square$

$-\square$

$\square$

There are 6 groups of $\frac{5}{5}$, or 6 wholes.
There are 2 fifths, or $\frac{2}{5}$ left over.

$\frac{32}{5} = \square\frac{\square}{\square}$

Try This! **Find $5 \times 2\frac{2}{3}$. Write the product as a mixed number.**

$5 \times 2\frac{2}{3} = 5 \times \_\_\_\_$ Write $2\frac{2}{3}$ as a fraction.

$= \_\_\_\_$ Multiply.

$= \_\_\_\_$ Divide the numerator by 3.

3. **Explain** why your solution to $5 \times 2\frac{2}{3} = 13\frac{1}{3}$ is reasonable.

4. **Sense or Nonsense?** To find $5 \times 2\frac{2}{3}$, Dylan says he can find $(5 \times 2) + \left(5 \times \frac{2}{3}\right)$. Does this make sense? **Explain.**

Name _____

Share and Show

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

$=$ _____

$=$ _____

Multiply. Write the product as a mixed number.

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

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

4. $2 \times 1\frac{5}{6} =$ _____

MATHEMATICAL PRACTICES

Math Talk **Explain** how you know your answer to Exercise 3 is reasonable.

On Your Own

Multiply. Write the product as a mixed number.

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

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

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

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

9. $5 \times 1\frac{2}{4} =$ _____

10. $4 \times 2\frac{2}{5} =$ _____

H.O.T. **Algebra** **Write the unknown number.**

11. $\square \times 2\frac{1}{3} = 9\frac{1}{3}$

12. $3 \times 2\frac{2}{\square} = 7\frac{2}{4}$

13. $3 \times \square\frac{3}{8} = 4\frac{1}{8}$

14. **Describe** two different ways to write $\frac{7}{3}$ as a mixed number.

_____

_____

_____

_____

_____

Problem Solving REAL WORLD

Use the recipe for 15–18.

15. Otis plans to make 3 batches of sidewalk chalk. How much plaster of Paris does he need?

16. **What's the Question?** The answer is $\frac{32}{3}$.

17. **Write Math** Patty has 2 cups of warm water. Is that enough water to make 4 batches of sidewalk chalk? **Explain** how you know without finding the exact product.

18. **Pose a Problem** Look back at Problem 15. Change the number and write a similar problem.

19. **H.O.T.** **What's the Error?** Brian says that $4 \times \frac{2}{5} = \frac{2}{5} + \frac{2}{5} + \frac{2}{5}$. **Describe** and correct his error.

20. **Test Prep** Linda's favorite movie is $2\frac{1}{4}$ hours long. She watched the movie 3 times last week. How many hours did she watch the movie?

Ⓐ $\frac{3}{4}$ hour

Ⓑ $1\frac{1}{3}$ hours

Ⓒ 6 hours

Ⓓ $6\frac{3}{4}$ hours

Sidewalk Chalk Recipe

$\frac{3}{4}$ cup warm water

$1\frac{1}{2}$ cups plaster of Paris

$2\frac{2}{3}$ tablespoons powdered paint

FOR MORE PRACTICE:
Standards Practice Book, pp. P163–P164

Name _____

Problem Solving • Comparison Problems with Fractions

Essential Question How can you use the strategy *draw a diagram* to solve comparison problems with fractions?

UNLOCK the Problem REAL WORLD

The deepest part of the Grand Canyon is about $1\frac{1}{6}$ miles deep. The deepest part of the ocean is located in the Mariana Trench, in the Pacific Ocean. The deepest part of the ocean is almost 6 times as deep as the deepest part of the Grand Canyon. About how deep is the deepest part of the ocean?

Read the Problem

What do I need to find?

I need to find _____

_____

_____

What information do I need to use?

The deepest part of the Grand Canyon is about _____ miles deep. The deepest part of the ocean is about _____ times as deep.

How will I use the information?

I can _____ to compare the depths.

Solve the Problem

Draw a bar model. Compare the depth of the deepest part of the Grand Canyon and the deepest part of the ocean, in miles.

_____ $1\frac{1}{6}$

_____

m

Write an equation and solve.

m is the deepest part of _____, in miles.

m = _____ _____ Write an equation.

m = _____ _____ Write the mixed number as a fraction.

m = _____ Multiply.

m = _____ Write the fraction as a whole number.

So, the deepest part of the ocean is about _____ miles deep.

Try Another Problem

Mountains are often measured by the distance they rise above sea level. Mount Washington rises more than $1\frac{1}{10}$ miles above sea level. Mount Everest rises about 5 times as high. About how many miles above sea level does Mount Everest rise?

Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use the information?	

So, Mount Everest rises about _____ miles above sea level.

- How did drawing a diagram help you solve the problem?

_____

_____

Math Talk MATHEMATICAL PRACTICES

Explain how you could use the strategy *act it out* to find the height of Mount Everest.

Name _____

Share and Show

MATH BOARD

UNLOCK the Problem Tips

- Use the Problem-Solving MathBoard.
- Underline the important facts.

1. Komodo dragons are the heaviest lizards on earth. A baby Komodo dragon is $1\frac{1}{4}$ feet long when it hatches. Its mother is 6 times as long. How long is the mother?

First, draw a bar model to show the problem.

SHOW YOUR WORK

Then, write the equation you need to solve.

_____

Finally, find the length of the mother Komodo dragon.

The mother Komodo dragon is _____ feet long.

2. H.O.T. **What if** a male Komodo dragon is 7 times as long as the baby Komodo dragon? How long is the male? How much longer is the male than the mother?

_____

3. The smallest hummingbird is the Bee hummingbird. It has a mass of about $1\frac{1}{2}$ grams. A Rufous hummingbird's mass is 3 times the mass of the Bee hummingbird. What is the mass of a Rufous hummingbird?

_____

4. Sloane needs $\frac{3}{4}$ hour to drive to her grandmother's house. It takes her 5 times as long to drive to her cousin's house. How long does it take to drive to her cousin's house?

_____

On Your Own

Choose a STRATEGY

- Act It Out
- Draw a Diagram
- Find a Pattern
- Make a Table or List
- Solve a Simpler Problem

Use the table for 5 and 6.

Payton has a variety of flowers in her garden. The table shows the average height of the flowers.

Flower	Height
tulip	$1\frac{1}{4}$ feet
daisy	$2\frac{1}{2}$ feet
tiger lily	$3\frac{1}{3}$ feet
sunflower	$7\frac{3}{4}$ feet

SHOW YOUR WORK

5. What is the difference between the tallest flower and the shortest flower in Payton's garden?

6. Write Math Payton says her average sunflower is 7 times the height of her average tulip. Do you agree or disagree with her statement? **Explain** your reasoning.

7. H.O.T. Miguel ran $1\frac{3}{10}$ miles on Monday. He wants to increase the distance he runs each day, so that on Friday he runs 3 times the distance he did on Monday. How far will Miguel run on Friday?

8. **Test Prep** Jack bought $1\frac{3}{4}$ pounds of cheese for a platter. He bought 3 times as much deli meat as cheese. How many pounds of deli meat did Jack buy?

Ⓐ $1\frac{5}{4}$ pounds

Ⓑ 5 pounds

Ⓒ $5\frac{1}{4}$ pounds

Ⓓ 7 pounds

FOR MORE PRACTICE:
Standards Practice Book, pp. P165–P166

Name _____

Chapter Review/Test

Vocabulary

Choose the best term from the box.

Vocabulary
fraction
multiple
product

1. A _____ can name part of a whole or part of a group. (p. 316)

2. A _____ of a number is the product of the number and a counting number. (p. 316)

Concepts and Skills

List the next four multiples of the unit fraction.

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

4. $\frac{1}{4}$, ____, ____, ____, ____

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

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

6. $\frac{4}{12} =$ _____

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

List the next four multiples of the fraction.

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

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

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

10. $3 \times \frac{2}{4} =$ _____

11. $2 \times \frac{3}{5} =$ _____

12. $4 \times \frac{2}{3} =$ _____

Multiply.

13. $5 \times \frac{7}{10} =$ _____

14. $4 \times \frac{3}{4} =$ _____

15. $3 \times \frac{8}{12} =$ _____

Multiply. Write the product as a mixed number.

16. $3 \times 1\frac{1}{8} =$ _____

17. $2 \times 2\frac{1}{5} =$ _____

18. $8 \times 1\frac{3}{5} =$ _____

GO Online Assessment Options Chapter Test

Fill in the bubble completely to show your answer.

19. Bryson has soccer practice for $2\frac{1}{4}$ hours 2 times a week. How much time does Bryson spend at soccer practice in 1 week?

Ⓐ 2 hours

Ⓑ 4 hours

Ⓒ $4\frac{2}{4}$ hours

Ⓓ $8\frac{2}{4}$ hours

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

Ⓐ 5

Ⓑ 7

Ⓒ 12

Ⓓ 17

21. Micala made a list of some multiples of $\frac{3}{5}$. Which could be Micala's list?

Ⓐ $\frac{3}{5}, \frac{9}{5}, \frac{12}{5}, \frac{19}{5}$

Ⓑ $\frac{3}{5}, \frac{6}{10}, \frac{9}{15}, \frac{12}{20}$

Ⓒ $\frac{1}{5}, \frac{3}{5}, \frac{6}{5}, \frac{9}{5}$

Ⓓ $\frac{3}{5}, \frac{6}{5}, \frac{9}{5}, \frac{12}{5}$

22. Lincoln spent $1\frac{1}{4}$ hours reading a book. Phoebe spent 3 times as much time as Lincoln reading a book. How much time did Phoebe spend reading?

Ⓐ $1\frac{1}{16}$ hours

Ⓑ $3\frac{1}{4}$ hours

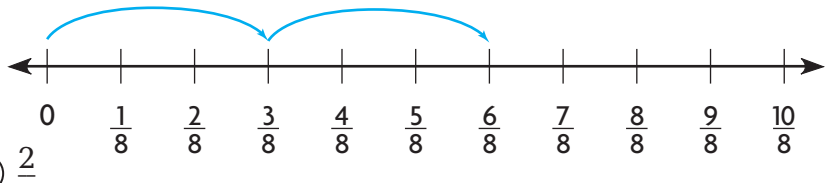
Ⓒ $3\frac{3}{4}$ hours

Ⓓ $4\frac{1}{4}$ hours

Name _____

Fill in the bubble completely to show your answer.

23. Griffin used a number line to write the multiples of $\frac{3}{8}$. Which multiple on the number line shows the product $2 \times \frac{3}{8}$?



Ⓐ $\frac{2}{8}$

Ⓑ $\frac{3}{8}$

Ⓒ $\frac{6}{8}$

Ⓓ $\frac{9}{8}$

24. Serena's rabbit weighs $3\frac{1}{2}$ pounds. Jarod's rabbit weighs 3 times as much as Serena's rabbit. How much does Jarod's rabbit weigh?

Ⓐ $3\frac{1}{6}$ pounds

Ⓑ $7\frac{1}{6}$ pounds

Ⓒ $9\frac{1}{2}$ pounds

Ⓓ $10\frac{1}{2}$ pounds

25. Jacadi is setting up a tent. Each section of a tent pole is $\frac{2}{3}$ yard long. She needs 4 sections to make 1 pole. How long is 1 tent pole?

Ⓐ $\frac{12}{3}$ yards

Ⓑ $\frac{8}{3}$ yards

Ⓒ 8 yards

Ⓓ $\frac{4}{3}$ yards

Constructed Response

26. Oliver has music lessons Monday, Wednesday, and Friday. Each lesson is $\frac{3}{4}$ hour. Oliver says he will have lessons for $2\frac{1}{2}$ hours this week. Do you agree or disagree? **Explain** your reasoning.

Performance Task

27. The common snapping turtle is a freshwater turtle. It can grow to about $1\frac{1}{6}$ feet long. The leatherback sea turtle is the largest of all sea turtles. The average length of a leatherback is about 5 times as long as a common snapping turtle.

A Draw a diagram to compare the lengths of the turtles. Then write an equation to find the length of a leatherback. **Explain** how the diagram helps you write the equation.

B About how long is the leatherback sea turtle? _____

C A loggerhead sea turtle is about 3 times as long as the common snapping turtle. How long is the loggerhead? **Explain** your answer.