



4

The Akashi Kaikyo Bridge in Japan (top) is the longest suspension bridge in the world. How does the length of this bridge compare to the length of the Golden Gate Bridge in San Francisco? You will find out in Lesson 12-6.

## Review What You Know!

### Vocabulary

Choose the best term from the box.

- denominator
- numerator
- least common multiple
- least common denominator

1. The number above the fraction bar is the ?.
2. The smallest common multiple of two numbers is called the ?.
3. The number below the fraction bar is the ?.
4. The smallest common multiple of two denominators is called the ?.

### Least Common Denominator

Write each pair of fractions with their LCD.

5.  $\frac{5}{12}$  and  $\frac{1}{4}$

6.  $\frac{3}{4}$  and  $\frac{1}{6}$

7.  $\frac{5}{6}$  and  $\frac{3}{8}$

8.  $\frac{7}{9}$  and  $\frac{1}{2}$

### Adding and Subtracting

Find each sum or difference. Simplify, if possible.

9.  $\frac{5}{8} + \frac{1}{4}$

10.  $\frac{11}{12} - \frac{1}{4}$

11.  $\frac{4}{5} + \frac{1}{2}$

12.  $\frac{6}{15} - \frac{1}{3}$

### Adding Mixed Numbers

13. **Writing to Explain** Write an answer to the question.

How would you find  $2\frac{1}{3} + 1\frac{2}{3}$ ?

Lesson  
**12-1**



NS 2.4 Understand the concept of multiplication and division of fractions. Also NS 2.5.

# Multiplying Fractions and Whole Numbers

What are some ways to think about multiplying fractions and whole numbers?

How many cups of orange juice are needed to make 8 batches of fruit drink?

One way to find  $8 \times \frac{3}{4}$  is to use repeated addition.

$$8 \times \frac{3}{4} = \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{8 \times 3}{4} = \frac{24}{4} = 6$$



$\frac{3}{4}$  cup of orange juice for each batch



## Guided Practice\*

### Do you know HOW?

In 1 through 4, find each product.

1.  $\frac{1}{7}$  of 14
2.  $\frac{3}{7}$  of 14
3.  $25 \times \frac{1}{5}$
4.  $25 \times \frac{4}{5}$

### Do you UNDERSTAND?

5. How is finding  $8 \times \frac{3}{4}$  similar to finding  $\frac{3}{4}$  of 8?
6. If you wanted to make 4 batches using the recipe above, how many cups of orange juice would you need?

## Independent Practice

In 7 through 38, find each product.

- |                             |                             |  |   |
|-----------------------------|-----------------------------|--|---|
| 7. $\frac{1}{4}$ of 40      | 8. $\frac{1}{3}$ of 15      | 9. $\frac{1}{5}$ of 40                                 | 10. $\frac{1}{7}$ of 28                                 |
| 11. $\frac{2}{9}$ of 90     | 12. $\frac{2}{5}$ of 40     | 13. $\frac{1}{2}$ of 50                                | 14. $\frac{5}{8}$ of 32                                 |
| 15. $\frac{3}{4}$ of 12     | 16. $\frac{6}{7}$ of 49     | 17. $\frac{3}{5}$ of 25                                | 18. $\frac{2}{7}$ of 35                                 |
| 19. $\frac{5}{8}$ of 24     | 20. $\frac{3}{7}$ of 21     | 21. $\frac{8}{9}$ of 81                                | 22. $\frac{7}{8}$ of 56                                 |
| 23. $\frac{2}{3} \times 27$ | 24. $\frac{3}{8} \times 16$ | 25. $\frac{5}{6} \times 18$                            | 26. $50 \times \frac{7}{10}$                            |
| 27. $25 \times \frac{4}{5}$ | 28. $12 \times \frac{2}{3}$ | 29. $32 \times \frac{1}{4}$                            | 30. $18 \times \frac{2}{9}$                             |
| 31. $\frac{2}{5} \times 35$ | 32. $\frac{8}{9} \times 18$ | 33. $\frac{4}{7} \times 35$                            | 34. $\frac{5}{8} \times 16$                             |
| 35. $\frac{3}{8} \times 24$ | 36. $\frac{7}{9} \times 36$ | 37. $\left(\frac{3}{4} - \frac{1}{4}\right) \times 24$ | 38. $\left(\frac{3}{5} - \frac{3}{10}\right) \times 30$ |

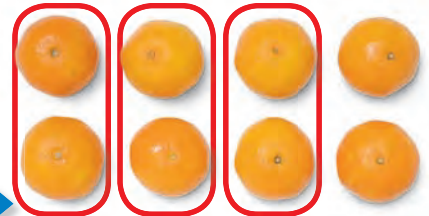
To find  $8 \times \frac{3}{4}$ , you can multiply first and then divide.

$$8 \times \frac{3}{4} = \frac{24}{4} = 6$$

Another way to think about multiplication of a whole number and a fraction is to find a part of a whole group.

Martin has 8 oranges to make juice. If he uses  $\frac{3}{4}$  of the oranges, how many will he use?

To find  $\frac{3}{4}$  of 8, you can draw a picture.



To find  $\frac{3}{4}$  of 8, you can divide first and then multiply.

**Think**  $\frac{1}{4}$  of 8 = 2.

So,  $\frac{3}{4}$  of 8 =  $3 \times 2$  or 6.

Remember that  $\frac{3}{4}$  of 8 means  $\frac{3}{4} \times 8$ .

So,  $\frac{3}{4} \times 8 = 6$ .

### Problem Solving

- 39. Number Sense** Explain how you would find  $36 \times \frac{3}{4}$  mentally.
- 41. Writing to Explain** Jo said that when you multiply a nonzero whole number by a fraction less than 1, the product is always less than the whole number. Do you agree?
- 43.** On Mars, your weight is about  $\frac{1}{3}$  of your weight on Earth. If a fifth grader weighs 96 pounds on Earth, about how much would be his or her weight on Mars?
- 44.** How much change will Stacy get if she buys two CDs and two books and gives the clerk two \$20 bills?
- 40.** Lions spend about  $\frac{5}{6}$  of their days sleeping. How many hours a day does a lion sleep?
- 42.** Who ran the most miles by the end of the week? Use the table below.

	Monday	Wednesday	Saturday
Pat	2.75 mi	3 mi	2.5 mi
Toby	2 mi	2.25 mi	3.5 mi



Sale: CDs for \$8.25 each

Sale: 2 books for \$10.00

- 45.** A recipe calls for  $\frac{1}{2}$  cup of walnuts and  $\frac{3}{16}$  cup of dates. Which of the following shows the correct relationship?
- A**  $\frac{1}{2} > \frac{3}{16}$       **C**  $\frac{3}{8} < \frac{1}{4}$   
**B**  $\frac{1}{2} = \frac{3}{16}$       **D**  $\frac{1}{2} < \frac{3}{16}$
- 46.** A 1965 U.S. half dollar contains  $\frac{2}{5}$  ounce of silver. How many ounces of silver do 100 of those coins contain?

Lesson  
**12-2**



NS 2.4 Understand the concept of multiplication and division of fractions. Also NS 2.5.

# Multiplying Two Fractions

How can you multiply fractions?

Tom has  $\frac{3}{4}$  of a pan of lasagna. His friends ate  $\frac{2}{3}$  of this amount of lasagna.

What fraction of a whole pan of lasagna did his friends eat?

Find  $\frac{2}{3}$  of  $\frac{3}{4}$ .



## Another Example How can you simplify before you multiply?

### A fraction times a fraction

Find  $\frac{3}{4} \times \frac{5}{6}$ .

Find the GCF of any numerator and any denominator.

The GCF of 3 and 6 is 3.

Divide 3 and 6 by 3.

$$\frac{\cancel{3}^1}{4} \times \frac{5}{\cancel{6}_2} = \frac{1 \times 5}{4 \times 2} = \frac{5}{8}$$

So,  $\frac{3}{4} \times \frac{5}{6} = \frac{5}{8}$ .

### A fraction times a whole number

Find  $\frac{2}{3} \times 18$ .

Write 18 as an improper fraction.

$$\frac{2}{3} \times 18 = \frac{2}{3} \times \frac{18}{1}$$

The GCF of 3 and 18 is 3.

Divide 3 and 18 by 3.

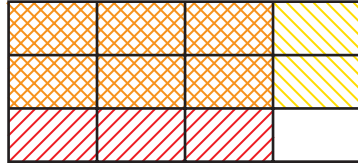
$$\frac{2}{3} \times 18 = \frac{\cancel{2}^1}{\cancel{3}_1} \times \frac{6}{1} = \frac{12}{1} = 12$$

### Explain It

1. To find  $\frac{3}{4} \times \frac{5}{6}$  in the first example above, why is the 3 crossed out with a 1 written above it, and why is the 6 crossed out with a 2 written below it?
2. To find  $\frac{2}{3} \times 18$  in the second example above, how is the problem changed so that you could multiply a fraction by a fraction?

### One Way

Draw a picture to represent  $\frac{3}{4}$ . Shade 3 of the 4 parts red. Then draw two horizontal lines to show thirds. Use yellow to shade  $\frac{2}{3}$  of the whole rectangle. Where the two shadings overlap is orange.



$2 \times 3$  out of  $3 \times 4$  parts are shaded orange.

They ate  $\frac{6}{12}$  or  $\frac{1}{2}$  of the pan of lasagna.

### Another Way

Multiply the numerators and denominators. Simplify if possible.

$$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} = \frac{6}{12} = \frac{1}{2}$$

## Guided Practice\*

### Do you know HOW?

In 1 through 4, find each product. Simplify, if necessary.

1.  $\frac{3}{4} \times \frac{7}{8}$

2.  $15 \times \frac{3}{4}$

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

4.  $\frac{2}{3} \times \frac{1}{2} \times \frac{5}{8}$

### Do you UNDERSTAND?

5. How can you find the product of  $\frac{6}{6} \times \frac{3}{8}$  mentally?

6. In the problem above, find the fraction of a whole pan of lasagna that Tom's friends ate if he started with  $\frac{7}{8}$  of a pan.

## Independent Practice

In 7 through 31, find each product. Simplify, if necessary.

7.  $\frac{3}{5} \times \frac{5}{9}$

8.  $13 \times \frac{1}{5}$

9.  $\frac{3}{4} \times \frac{1}{3} \times 2$

10.  $\frac{2}{3} \times \frac{5}{8} \times 4$

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

12.  $\frac{1}{3} \times \frac{1}{4} \times \frac{2}{3}$

13.  $\frac{1}{7} \times \frac{2}{3} \times 6$

14.  $\frac{1}{2} \times \frac{3}{8} \times \frac{3}{4}$

15.  $\frac{1}{3} \times \frac{2}{5}$

16.  $\frac{7}{8} \times \frac{2}{3}$

17.  $\frac{2}{5} \times \frac{3}{4} \times 10$

18.  $\frac{1}{8} \times \frac{1}{3} \times 24$

19.  $\frac{2}{9} \times \frac{3}{10}$

20.  $\frac{3}{7} \times \frac{1}{3}$

21.  $\frac{1}{6} \times \frac{3}{5} \times 20$

22.  $\frac{1}{2} \times \frac{2}{5} \times 5$

23.  $\left(\frac{3}{4} - \frac{1}{4}\right) \times \frac{7}{8}$

24.  $\left(\frac{2}{3} - \frac{1}{3}\right) \times \frac{4}{9}$

25.  $\left(\frac{5}{8} - \frac{1}{8}\right) \times \frac{2}{5}$

26.  $\left(\frac{2}{3} - \frac{1}{4}\right) \times \frac{5}{6}$

27.  $\left(\frac{3}{4} - \frac{1}{2}\right) \times \frac{5}{9}$

28.  $\left(\frac{3}{4} - \frac{1}{3}\right) \times \frac{3}{5}$

29.  $\left(\frac{5}{8} - \frac{1}{4}\right) \times \frac{1}{2}$

30.  $\left(\frac{4}{5} - \frac{1}{2}\right) \times \frac{3}{8}$

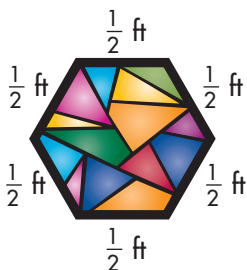
31.  $\left(\frac{1}{2} - \frac{4}{8}\right) \times \frac{3}{7}$

\*For another example, see Set B on page 292.

## Problem Solving

32. In the voting for City Council Precinct 5, only  $\frac{1}{2}$  of all eligible voters cast votes. What fraction of all eligible voters voted for Shelley? Daley? Who received the most votes?

33. **Geometry** The stained glass shown here is a regular hexagon. How can you use multiplication to find its perimeter?



35. **Algebra** What is the value of  $n$  in the equation  $\frac{2}{3} \times n = \frac{4}{9}$ ?

37. **Writing to Explain** To amend the U.S. Constitution,  $\frac{3}{4}$  of the states must approve the amendment. If 35 of the states approve an amendment, will the constitution be amended?

39. Naomi has 3 pounds of apples and  $2\frac{1}{2}$  pounds of grapes. If she gives  $\frac{1}{3}$  of her apples to Christine, how many pounds of apples does she have left?

- A  $\frac{1}{6}$  pound                      C 1 pound  
 B  $\frac{1}{2}$  pound                        D 2 pounds

41. One lap around the Lincoln School track is  $\frac{1}{4}$  mile. If Eddie runs 6 laps around the track and then runs  $2\frac{1}{2}$  miles to get home, how far will he run in all?

Candidate	Fraction of Votes Received
Shelley	$\frac{1}{10}$
Daley	$\frac{2}{8}$

34. **Writing to Explain** Will \$50 be enough to buy 6 cans of paint?



36. **Number Sense**  $\frac{4}{9} \times \frac{7}{8} = \frac{7}{18}$ . What is  $\frac{7}{8} \times \frac{4}{9}$ ? How do you know without multiplying?

38. A plumber charges \$45 for the first hour and \$30 for each additional hour. How much does he charge if it takes him 4 hours to make a repair?

- A \$165                              C \$120  
 B \$135                              D \$75

40. A video rental store has 6,000 movies. One Friday,  $\frac{3}{5}$  of the movies were rented. How many movies were rented that Friday night?

42. Ben found a recipe that calls for  $\frac{3}{4}$  cup of chopped apples. If he wants to make half the recipe, how many cups of chopped apples should he use?



Find each product. Simplify if possible.

1.  $\frac{1}{8} \times 6$       2.  $7 \times \frac{1}{2}$       3.  $\frac{4}{5} \times 3$       4.  $5 \times \frac{7}{10}$   
5.  $8 \times \frac{5}{6}$       6.  $\frac{2}{3} \times 9$       7.  $4 \times \frac{5}{12}$       8.  $\frac{1}{6} \times 12$

Find each product. Simplify if possible.

9.  $\frac{2}{3} \times \frac{1}{4}$       10.  $\frac{3}{5} \times \frac{3}{10}$       11.  $\frac{1}{2} \times \frac{5}{12}$       12.  $\frac{1}{4} \times \frac{1}{8}$       13.  $\frac{2}{3} \times \frac{4}{5}$   
14.  $\frac{3}{4} \times \frac{1}{3}$       15.  $\frac{8}{9} \times \frac{1}{2}$       16.  $\frac{1}{5} \times \frac{1}{5}$       17.  $\frac{3}{8} \times \frac{5}{6}$       18.  $\frac{1}{2} \times \frac{1}{2}$

Find each sum. Simplify if possible.

19.  $\frac{5}{6} + \frac{1}{12}$       20.  $\frac{1}{2} + \frac{3}{8}$       21.  $\frac{1}{3} + \frac{5}{12}$       22.  $\frac{2}{3} + \frac{1}{9}$       23.  $\frac{1}{5} + \frac{3}{10}$

**Error Search** Find each product that is not correct. Write it correctly and explain the error.

24.  $\frac{2}{3} \times 3 = 2$       25.  $\frac{3}{4} \times \frac{2}{5} = \frac{3}{20}$       26.  $\frac{2}{10} \times \frac{3}{10} = \frac{6}{10}$

## Number Sense

**Estimating and Reasoning** Write whether each statement is true or false. Explain your reasoning.

27. The product of 7 and 4.83 is greater than 35.  
28. The sum of 45,752 and 36,687 is greater than 70,000 but less than 90,000.  
29. The difference of  $\frac{1}{2}$  and  $\frac{1}{3}$  equals their product.  
30. The product of  $\frac{3}{4}$  and 5 is less than 5.  
31. The quotient of  $534 \div 9$  greater than 60.  
32. The sum of 21.45 and 4.2 is less than 25.

Lesson  
**12-3**



NS 2.4 Understand the concept of multiplication and division of fractions. Also NS 2.5.

# Dividing a Whole Number by a Fraction

How can you divide by a fraction?

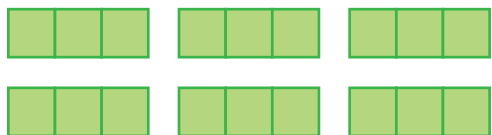
Joyce is making sushi rolls. She needs  $\frac{1}{4}$  cup of rice for each sushi roll. How many sushi rolls can she make if she has 3 cups of rice?



## Guided Practice\*

### Do you know HOW?

In **1** and **2**, use the picture below to find each quotient. Simplify, if necessary.



1. How many  $\frac{1}{3}$ s are in 3?

$$3 \div \frac{1}{3} = \square$$

2. How many  $\frac{2}{3}$ s are in 6?

$$6 \div \frac{2}{3} = \square$$

### Do you UNDERSTAND?

3. **Reasoning** Explain how you could draw a picture to find  $4 \div \frac{2}{3}$ .

4. In the example above, if Joyce had 4 cups of rice, how many rolls could she make?

5. **Writing to Explain** In the example above, why is 3 written as a fraction with the same denominator as  $\frac{1}{4}$ ?

## Independent Practice

In **6** through **7**, use the picture to find each quotient.



6. How many  $\frac{1}{6}$ s are in 1?  $1 \div \frac{1}{6} = \square$

7. How many  $\frac{1}{6}$ s are in 5?  $5 \div \frac{1}{6} = \square$

In **8** through **17**, find each quotient. You can draw pictures to help.

8.  $4 \div \frac{1}{2}$

9.  $8 \div \frac{1}{4}$

10.  $3 \div \frac{1}{5}$

11.  $2 \div \frac{1}{8}$

12.  $3 \div \frac{1}{10}$

13.  $8 \div \frac{1}{3}$

14.  $9 \div \frac{3}{8}$

15.  $6 \div \frac{3}{4}$

16.  $15 \div \frac{3}{5}$

17.  $10 \div \frac{5}{8}$

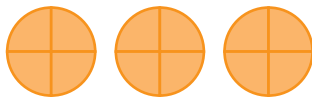


### One Way

Draw a diagram.

How many  $\frac{1}{4}$ s are in 3?

This is the same as finding  $3 \div \frac{1}{4}$ .



There are twelve  $\frac{1}{4}$ s in three whole cups.

So, Joyce can make 12 sushi rolls.

### Another Way

Write 3 as an equivalent fraction with the same denominator as  $\frac{1}{4}$ .

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

Divide the numerators and the denominators.

$$\frac{12}{4} \div \frac{1}{4} = \frac{12}{1} = 12$$

So, Joyce can make 12 sushi rolls.

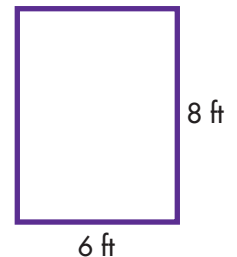
### Problem Solving

For **18** and **19**, use the following information.

Bijan is making a banner for his school. Along the bottom edge of the banner is a row of smaller squares. Each square is 6 inches by 6 inches.

**18.** How many small squares did Bijan put along the bottom (width) of the banner?

**19.** If every fourth square is colored blue, how many blue squares are along the bottom?



**20. Reasoning** When you divide a whole number by a fraction with a numerator of 1, explain how you can find the quotient.

**22.** As of 2006, the world's largest leather work boot is 16 feet tall. A typical men's work boot is  $\frac{1}{2}$  foot tall. How many times as tall is the largest boot as the height of a typical work boot?

**24.** Maria used one bag of flour. She baked two loaves of bread. Each loaf required  $2\frac{1}{4}$  cups of flour. Then she used  $1\frac{3}{4}$  cups of flour to make muffins. She used the remaining  $4\frac{1}{3}$  cups of flour to bake cookies. How much flour was in the bag when she started?

**21. Writing to Explain** Write a word problem that can be solved by dividing 10 by  $\frac{2}{3}$ . Include the answer to the problem.

**23. Estimation** The Nile River is 4,160 miles long. You want to spend three weeks traveling the entire length of the river. Estimate the number of miles you must travel each day.

**25.** Rudy has 8 yards of twine. If he cuts the twine into equal pieces of  $\frac{3}{4}$  feet each, how many pieces can he cut?

**A**  $10\frac{1}{2}$

**C** 32

**B** 24

**D**  $96\frac{1}{2}$



NS 2.4 Understand the concept of multiplication and division of fractions. Also NS 2.5.

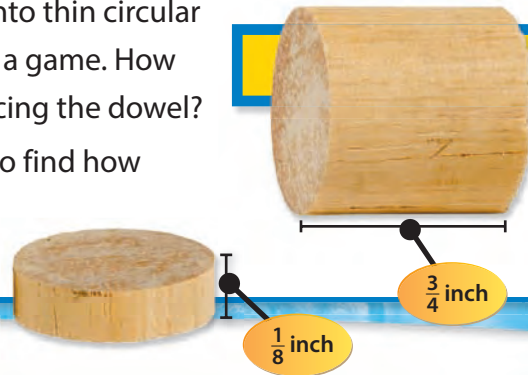
## Dividing Two Fractions

How do you divide with fractions?

Max is slicing a wooden dowel into thin circular slices to make wooden chips for a game. How many chips will he have after slicing the dowel?

**Choose an Operation** Divide to find how many groups of  $\frac{1}{8}$  are in  $\frac{3}{4}$ .

Find  $\frac{3}{4} \div \frac{1}{8}$ .



### Other Examples

#### Simplifying before you divide two fractions

Find  $\frac{3}{8} \div \frac{1}{4}$ .

$\frac{3}{8} \div \frac{1}{4} = \frac{3}{8} \times \frac{4}{1}$  Rewrite the problem as a multiplication problem with the reciprocal of the divisor. The reciprocal of  $\frac{1}{4}$  is  $\frac{4}{1}$ .

$= \frac{3}{\cancel{8}^2} \times \frac{\cancel{4}^1}{1}$  Look for common factors in the numerators and denominators.

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

$= \frac{3}{2} = 1\frac{1}{2}$  Convert to a mixed number, if possible.

#### Dividing a fraction by a whole number

Find  $\frac{5}{6} \div 2$ .

Write 2 as an improper fraction.

$\frac{5}{6} \div 2 = \frac{5}{6} \div \frac{2}{1}$

Then multiply by the reciprocal of  $\frac{2}{1}$ .

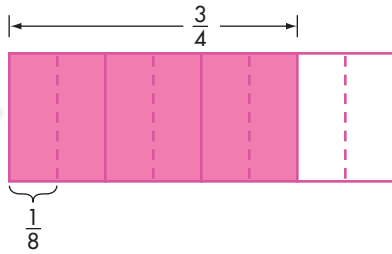
$\frac{5}{6} \div \frac{2}{1} = \frac{5}{6} \times \frac{1}{2} = \frac{5 \times 1}{6 \times 2} = \frac{5}{12}$

#### Explain It

- How is dividing 7 by  $\frac{1}{2}$  different from multiplying 7 by 2?
- Write and solve  $42 \div 7$  as a multiplication problem.

### One Way

Draw a picture.



$$\frac{3}{4} \div \frac{1}{8} = 6$$

### Another Way

Dividing by a fraction is the same as multiplying by its reciprocal.

Two fractions whose product is 1 are **reciprocals**.  
 For example,  $\frac{1}{8} \times \frac{8}{1} = 1$ , so  $\frac{1}{8}$  and  $\frac{8}{1}$  are reciprocals.  
 Reciprocals are also called **multiplicative inverses**.

To divide by a fraction, multiply by the reciprocal of the divisor.

$$\frac{3}{4} \div \frac{1}{8} = \frac{3}{4} \times \frac{8}{1} = \frac{24}{4} = 6.$$

Max can make 6 chips from the dowel.

## Guided Practice\*

### Do you know HOW?

In **1** and **2**, write the reciprocal of each fraction or number.

1.  $\frac{4}{7}$

2. 15

In **3** and **4**, find each quotient. Simplify if possible.

3.  $7 \div \frac{2}{3}$

4.  $\frac{2}{3} \div \frac{3}{4}$

### Do you UNDERSTAND?

5. How can you write  $5 \div \frac{1}{4}$  as a product?  
How can you write  $\frac{1}{4} \div 5$  as a product?

6. How did you find the answer to Exercise 3?

7. If Max started with a dowel  $\frac{1}{2}$  inch in length, how many chips could he make?

## Independent Practice

In **8** through **11**, write the reciprocal of each fraction or whole number.

8.  $\frac{3}{14}$

9. 6

10.  $\frac{1}{18}$

11.  $\frac{7}{3}$

In **12** through **23**, find each quotient. Simplify, if possible.

12.  $9 \div \frac{3}{5}$

13.  $\frac{3}{8} \div \frac{1}{4}$

14.  $\frac{4}{5} \div 6$

15.  $\frac{6}{7} \div \frac{1}{3}$

16.  $24 \div \frac{2}{3}$

17.  $\frac{5}{6} \div \frac{2}{11}$

18.  $(\frac{1}{6} + \frac{1}{3}) \div \frac{3}{4}$

19.  $(\frac{1}{9} + \frac{2}{3}) \div \frac{2}{5}$

20.  $8 \div \frac{3}{4}$

21.  $\frac{7}{9} \div \frac{5}{6}$

22.  $(\frac{1}{4} + \frac{1}{3}) \div \frac{1}{2}$

23.  $(\frac{1}{8} + \frac{1}{4}) \div \frac{1}{3}$



Animated Glossary  
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\*For another example, see Set D on page 292.

## Problem Solving

For **24** through **26**, use the information in the chart at the right.

- 24.** How many pieces can Carl make from the dowel rods?
- 25.** How many shorter pieces of copper wire can Carl get from his original length?
- 26.** If Carl has 2 lengths of plastic tubing, how many pieces can he make?

**27. Number Sense** Explain how to use decimals to find  $6 \div \frac{3}{4}$ .

**29. Writing to Explain** Is the following explanation correct? If not, tell why and write a correct response.

Find  $6 \div \frac{2}{3}$ .

I can rewrite this problem as  $\frac{1}{6} \times \frac{3}{2}$ , because dividing fractions is the same as multiplying their reciprocals.

$$\frac{1}{6} \times \frac{3}{2} = \frac{3}{12} = \frac{1}{4}$$

For **31** and **32**, use the information at the right.

**31.** The Bayou Theater is raising its ticket prices. The new price of each ticket will be the original price plus half the original price. How much will each type of ticket cost after the price increase takes effect?

**32.** If Tracy's family buys 2 student tickets, 1 adult ticket, and 1 senior ticket at the new prices, how much will they pay to go to the theater?

- A** \$5.50                      **C** \$13.75  
**B** \$6.75                      **D** \$19.50

Carl is creating a sculpture for his art class. Here is a summary of the materials he has and what he needs to do with them:

Total Materials	Final Artwork
18 in. dowel rods	$\frac{2}{3}$ in. pieces
28 in. copper wire	$\frac{7}{8}$ in. pieces
10 in. plastic tubing	$\frac{1}{2}$ in. pieces

**28. Reasoning** Will  $5 \div \frac{2}{5}$  have a whole-number answer? Explain.

**30. Think About the Process** Ms. Troy wants to save her students' computer projects on CDs. Each CD holds 750 MB. Each project is 2 MB, and Ms. Troy has four CDs. Which shows how she can determine how many projects she can save?

- A**  $(750 + 2) \div 4$   
**B**  $(750 \times 2) \div 4$   
**C**  $(750 \times 4) \div 2$   
**D**  $(750 \div 4) \times 2$

Original Ticket Prices	
Student	\$2.50
Adult	\$4.50
Senior	\$3.50

**33.** There are 32 students in Mr. Smith's class. Three-eighths of them are in the math club. How many of Mr. Smith's students are in the math club?

# Mixed Problem Solving

New England Colonies			Middle Colonies			Southern Colonies		
Colony	Year	Reason	Colony	Year	Reason	Colony	Year	Reason
Mass. Bay	1630	Escape religious persecution	New York	1664	Build colony on Dutch land	Virginia	1607	Search for gold
Conn.	1639	Farming, trade, political freedom	New Jersey	1664	Build colony on Dutch land	Maryland	1634	Refuge for Catholics
Rhode Island	1636	Colony for all religions	Penna.	1682	Establish religious colony	North Carolina	1729	Farming
New Hampshire	1679	Trade, fishing	Delaware	1704	Trade, farming	South Carolina	1670	Farming
						Georgia	1733	Military defense, religious refuge, farming

- What fraction of the colonies were founded for farming?
- What fraction of the colonies are the Southern Colonies?
- What fraction of the colonies were founded in 1729?
- What fraction of the New England Colonies were founded in 1636?
- James stated that  $\frac{1}{3}$  of the colonies were the Middle Colonies. Is he correct? Why or why not?
- Write a problem using the fraction  $\frac{1}{5}$ . Use the chart to help you.
- What fraction tells you how many colonies were founded because of trade?
- What fraction of the colonies are the Middle Colonies and the Southern Colonies together?

**A**  $\frac{1}{13}$

**C**  $\frac{1}{2}$

**F**  $\frac{1}{2}$

**H**  $\frac{8}{13}$

**B**  $\frac{3}{13}$

**D**  $\frac{3}{4}$

**G**  $\frac{9}{13}$

**J**  $\frac{4}{13}$

9. **Strategy Focus** Solve using the strategy, Draw a Picture and Write an Equation.

How many years passed from the time the first colony was founded until the last one was founded?

Lesson  
**12-5**



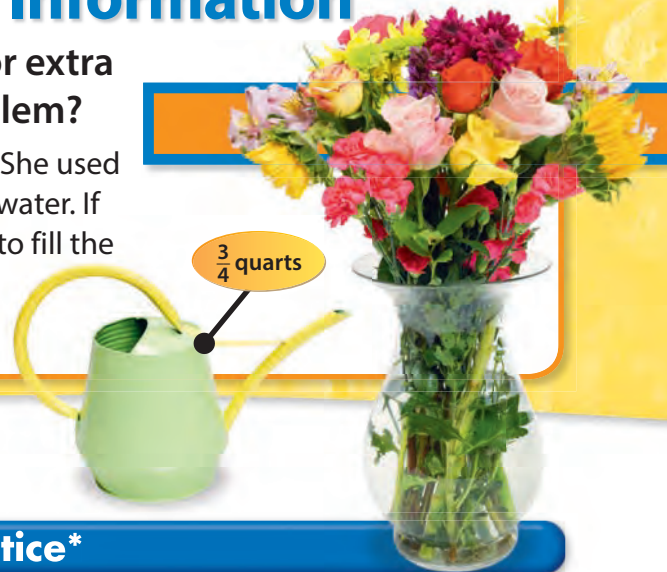
**MR 1.1** Analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.  
Also **NS 2.4**

**Problem Solving**

## Missing or Extra Information

How do I identify missing or extra information in a word problem?

Sela has a large vase that cost \$19. She used a watering can to fill the vase with water. If she filled the watering can 3 times to fill the vase, how many quarts of water did she put in the vase?



### Guided Practice\*

#### Do you know **HOW?**

Decide if each problem has extra or missing information. Solve if you have enough information.

1. Allie feeds her dog  $\frac{1}{2}$  can of food each day. Each can costs \$0.49. How much food does she feed her dog in 7 days?
2. Lacey is buying dried fruit to feed her pet bird. How much will it cost to feed the bird for one month?

#### Do you **UNDERSTAND?**

3. Draw a diagram to show what you know and want to find in Exercise 1.
4. **Write a Problem** Write a real-world problem that does not include all of the information needed to solve it. Under the problem, write what the missing information is.

### Independent Practice

In **5** through **7**, decide if each problem has extra or missing information. Solve if you have enough information.

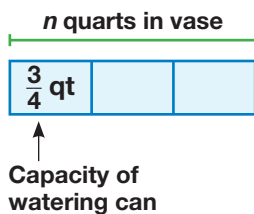
5. Eli is cutting a length of wire into pieces that are  $\frac{1}{2}$  foot long. How many pieces can he cut from the length of wire?
6. Sonja posted 45 band concert flyers in 2 days. Over the next 2 days, Elsie posted 60 flyers, and Frank posted 30 flyers. How many flyers did the 3 students post altogether?

#### Stuck? Try this....

- What do I know?
- What am I asked to find?
- What diagram can I use to help understand the problem?
- Can I use addition, subtraction, multiplication, or division?
- Is all of my work correct?
- Did I answer the right question?
- Is my answer reasonable?

### Read and Understand

Draw a diagram to show what you know and what you want to find.



### Plan

Is there extra information not needed to solve the problem?

*Yes. The cost of the vase is not needed.*

Is there missing information needed to solve the problem?

*No. All the information I need is given.*

### Solve

Let  $n$  = number of quarts to fill the vase.

$$3 \times \frac{3}{4} = n$$
$$3 \times \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$$

Sela put  $2\frac{1}{4}$  quarts of water into the vase.

7. Mrs. Torance has invited 16 people to a party. What information is missing if Mrs. Torance wants to serve submarine sandwiches at the party?



8. Kara and her 4 friends went camping. Each day they hiked  $2\frac{1}{2}$  miles before lunch and  $3\frac{1}{2}$  miles after lunch. How many total miles did all the girls hike on their camping trip?
- Provide possible information needed to solve the problem, then solve it.
9. A package of printing paper contains 500 sheets. If a printer uses 4,000 sheets of paper per week, how many packages are used?
10. Juan and his sister visited an aquarium. While there, they learned that 1 catfish produces 40 eggs. How many eggs will 60 catfish produce?
11. Sylvia had \$20 to spend at the circus. She spent \$5.00 on admission. During lunch Sylvia bought a hot dog and drink for \$6.50. How much money did Sylvia have left to spend after lunch?
12. A carpenter cut  $\frac{1}{2}$  foot from a board that was  $3\frac{1}{4}$  feet long. How long was the board after the cut?
13. Greg bought a sandwich and a drink. He paid \$4.50. Which sandwich and drink did he buy?
14. Ken is making a salad using a recipe that calls for pasta, 3 cherry tomatoes, and 6 sliced carrots. Ken only needs enough salad for two people, so he will make  $\frac{2}{3}$  of the recipe. How many people does the whole recipe serve?

#### Dunstan's Sandwiches

Chicken	.....	\$4.25
Roast Beef	.....	\$3.75
Tuna	.....	\$3.50
Milk	.....	\$0.60
Juice	.....	\$0.75

Lesson  
**12-6**



NS 2.4 Understand the concept of multiplication and division of fractions. Also NS 2.5.

# Multiplying Mixed Numbers

How do you find the product of mixed numbers?

A clothing factory has machines that make jackets. The machines operate for  $7\frac{1}{2}$  hours each day. How many jackets can each machine make in one day?

Jackets Per Hour	
Machine A	Machine B
$2\frac{3}{4}$	$3\frac{1}{3}$

**Choose an Operation** Use multiplication to find how many jackets each machine can make in a day.

## Guided Practice\*

### Do you know HOW?

In **1** and **2**, estimate the product. Then copy and complete the multiplication.

1.  $2\frac{3}{4} \times 8 = \frac{\square}{4} \times \frac{8}{1}$

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

### Do you UNDERSTAND?

- Explain how you would use improper fractions to multiply  $5 \times 2\frac{1}{2}$ .
- How many jackets a day can Machine A make if it can make  $4\frac{1}{4}$  jackets an hour?

## Independent Practice

In **5** through **10**, estimate the product. Then copy and complete the multiplication.

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

6.  $1\frac{3}{5} \times 2\frac{1}{4} = \frac{\square}{5} \times \frac{\square}{4}$

7.  $1\frac{1}{2} \times 3\frac{5}{6} = \frac{\square}{2} \times \frac{\square}{6}$

8.  $4\frac{2}{3} \times 4 = \frac{\square}{3} \times \frac{4}{1}$

9.  $3\frac{1}{7} \times 1\frac{1}{4} = \frac{\square}{7} \times \frac{\square}{4}$

10.  $1\frac{1}{3} \times 2\frac{1}{6} = \frac{\square}{3} \times \frac{\square}{6}$

In **11** through **22**, estimate the product. Then find each product. Simplify if possible.

11.  $2\frac{1}{6} \times 4\frac{1}{2}$

12.  $\frac{3}{4} \times 8\frac{1}{2}$

13.  $1\frac{1}{8} \times 3\frac{1}{3}$

14.  $3\frac{1}{4} \times 6$

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

16.  $2\frac{3}{8} \times 4$

17.  $(\frac{1}{3} + 1\frac{4}{9}) \times (2\frac{3}{4} - 1\frac{1}{2})$

18.  $(1\frac{2}{9} + 2\frac{1}{3}) \times (2\frac{3}{4} - 1\frac{1}{8})$

19.  $(1\frac{1}{8} + 1\frac{1}{2}) \times (2\frac{2}{5} - 1\frac{1}{10})$

20.  $(\frac{1}{6} + 2\frac{2}{3}) \times (1\frac{1}{4} - \frac{1}{2})$

21.  $(2\frac{4}{9} + \frac{1}{3}) \times (1\frac{1}{4} - \frac{1}{8})$

22.  $(1\frac{7}{8} + 2\frac{1}{2}) \times (1\frac{1}{5} - \frac{1}{10})$



### Machine A

**Estimate**  $7\frac{1}{2} \times 2\frac{3}{4}$  is about the same as  $8 \times 3$ , so the answer should be about 24 jackets a day.

Change the mixed numbers to improper fractions.

$$\begin{aligned}7\frac{1}{2} \times 2\frac{3}{4} &= \frac{15}{2} \times \frac{11}{4} \\ &= \frac{165}{8} \\ &= 20\frac{5}{8}\end{aligned}$$

Machine A makes  $20\frac{5}{8}$  jackets each day.

### Machine B

**Estimate**  $7\frac{1}{2} \times 3\frac{1}{3}$  is about the same as  $8 \times 3$ , so the answer should be about 24 jackets per day.

$$\begin{aligned}7\frac{1}{2} \times 3\frac{1}{3} &= \frac{15}{2} \times \frac{10}{3} \\ &= \frac{25}{1} = 25\end{aligned}$$

Machine B makes 25 jackets each day.

### Problem Solving

For **23** through **25**, use the diagram at the right.



- 23.** Bernie and Chloe hiked the Tremont Trail to the end and back. Then they hiked the Wildflower Trail to the end before stopping to eat lunch. How far did they hike before they ate lunch?
- 24.** Before he ate lunch, Ricardo hiked  $2\frac{2}{3}$  times as far as Bernie and Chloe. How far did he hike?
- 25.** The city plans to extend the Wildflower Trail  $2\frac{1}{2}$  times its current length in the next 5 years. How long will the Wildflower Trail be at the end of 5 years?
- 26. Writing to Explain** How can you use multiplication to find  $3\frac{3}{5} + 3\frac{3}{5} + 3\frac{3}{5}$ ?
- 27.** The tail of an alligator is  $\frac{1}{2}$  of its total length. The longest recorded length for an alligator is  $19\frac{1}{6}$  feet. How long was the tail of this alligator?
- 28.** The Akashi Kaikyo Bridge in Japan is about  $1\frac{4}{9}$  as long as the Golden Gate Bridge. The Golden Gate Bridge is about 9,000 feet long. About how long is the Akashi Kaikyo Bridge?
- 29.** Patty spent  $3\frac{1}{2}$  times as much as Sandy on their shopping trip. If Sandy spent \$20.50, how much did Patty spend?
- A** \$71.75                      **C** \$100.25  
**B** \$92.20                      **D** \$143.50

Lesson  
**12-7**



**NS 2.4** Understand the concept of multiplication and division of fractions. Also **NS 2.5**.

# Dividing Mixed Numbers

How do you find the quotient of two mixed numbers?

Henry has  $12\frac{1}{2}$  feet of lumber. How many birdhouses can he build?

**Choose an Operation** Use division to find how many groups of  $3\frac{3}{4}$  are in  $12\frac{1}{2}$ .

Estimate:  $12\frac{1}{2} \div 3\frac{3}{4}$  is about  $12 \div 4$  or 3.

$3\frac{3}{4}$  feet of lumber for each birdhouse



## Guided Practice\*

### Do you know HOW?

In **1** through **6**, find each quotient. Simplify, if possible.

1.  $1\frac{3}{4} \div 4\frac{2}{3}$

2.  $3 \div 2\frac{1}{4}$

3.  $3\frac{3}{4} \div 1\frac{1}{2}$

4.  $5\frac{1}{6} \div 1\frac{2}{3}$

5.  $2\frac{1}{5} \div 1\frac{1}{4}$

6.  $4 \div 1\frac{1}{4}$

### Do you UNDERSTAND?

7. Explain how to estimate and then find  $7\frac{4}{5} \div 4$ .

8. Why do you change mixed numbers to improper fractions before you divide?

9. How many birdhouses can Henry build if he starts with 15 feet of lumber?

## Independent Practice

In **10** through **28**, find each quotient. Simplify, if possible.

10.  $6\frac{1}{2} \div 1\frac{4}{9}$

11.  $3\frac{1}{3} \div 1\frac{1}{6}$

12.  $3 \div 5\frac{1}{5}$

13.  $2\frac{5}{8} \div 3$

14.  $5\frac{1}{2} \div 4\frac{2}{3}$

15.  $5\frac{1}{4} \div 1\frac{5}{8}$

16.  $4\frac{4}{5} \div 1\frac{7}{8}$

17.  $3\frac{2}{3} \div 1\frac{5}{6}$

18.  $4\frac{1}{2} \div 1\frac{1}{3}$

19.  $8 \div 1\frac{2}{5}$

20.  $3\frac{1}{5} \div 1\frac{2}{5}$

21.  $2\frac{1}{6} \div 1\frac{5}{8}$

22.  $2\frac{1}{3} \div 1\frac{1}{8}$

23.  $5\frac{1}{4} \div 1\frac{3}{4}$

24.  $7\frac{1}{5} \div 4\frac{1}{2}$

25.  $8\frac{1}{4} \div 3\frac{2}{3}$

26.  $(6\frac{2}{3} - 3\frac{1}{2}) \div 1\frac{1}{2}$

27.  $(3\frac{3}{4} - \frac{1}{2}) \div 2\frac{1}{2}$

28.  $(3\frac{3}{4} - 2\frac{1}{2}) \div 5$

**Step 1**

Write each mixed number as an improper fraction.

$$12\frac{1}{2} \div 3\frac{3}{4} = \frac{25}{2} \div \frac{15}{4}$$

**Step 2**

Find the reciprocal of the divisor.

Rewrite as a multiplication problem.

$$\frac{25}{2} \times \frac{4}{15}$$

**Step 3**

Look for common factors. Simplify and then multiply.

Convert the improper fraction to a mixed number, if necessary.

$$\frac{\overset{5}{\cancel{25}}}{\underset{1}{\cancel{2}}} \times \frac{\overset{2}{\cancel{4}}}{15} = \frac{5 \times 2}{1 \times 3} = \frac{10}{3} = 3\frac{1}{3}$$

Henry can make 3 birdhouses.

**Problem Solving**

For 29 through 31, use the table at the right.

29. How many coffee tables can Brian make from an 8-foot board? Explain.
30. How many lamp bases can Brian build with the lumber needed for a coffee table? Explain.
31. If Brian makes 4 magazine holders from one 8-foot board, will he have enough lumber left to make any of the items shown? Explain.

The chart below identifies the amount of lumber needed for each item.

Item	Lumber
Lamp base	$1\frac{1}{4}$ ft
Patio table	$3\frac{3}{8}$ ft
Coffee table	$4\frac{2}{3}$ ft
Magazine holder	$1\frac{7}{8}$ ft

32. **Geometry** What kind of angle is shown below?



- A Acute                      C Obtuse  
 B Right                      D Straight
34. **Writing to Explain** Marcy and her friends are making ponchos for the band. Explain how to find the number of ponchos they could make from 26 yards of fabric if each poncho takes  $1\frac{1}{2}$  yards of fabric.

33. The bird-watching club is going to a national park this weekend. How many people are going on the trip?

- A 5  
 B 8  
 C 10  
 D 12



35. **Write a Problem** Write your own word problem that involves dividing with mixed numbers.

Lesson  
**12-8**

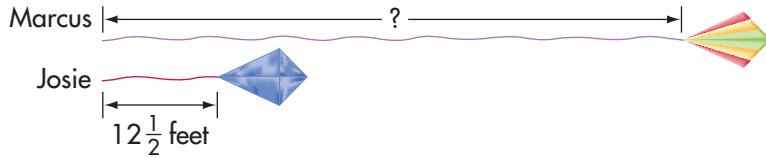


**AF 1.1, Grade 6** Write and solve one-step linear equations in one variable.  
Also **MR 2.3**.

**Problem Solving**

# Draw a Picture and Write an Equation

The string on Josie's kite is  $12\frac{1}{2}$  feet long. Marcus's kite string is 5 times as long as Josie's kite string. How long is the string on Marcus's kite?



## Guided Practice\*

### Do you know HOW?

Solve. Draw a picture and write an equation.

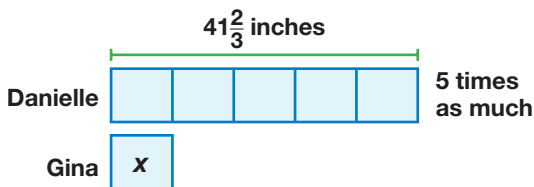
- If one bottle of yogurt contains  $6\frac{1}{4}$  ounces, how much yogurt is in a 4-pack of yogurt?

### Do you UNDERSTAND?

- How do you know your answer for Exercise 1 is reasonable?
- Write a Problem** Write a real-world problem that you can solve by using multiplication of fractions.

## Independent Practice

- Danielle has a board that is  $41\frac{2}{3}$  inches long. It is 5 times as long as the board Gina has. How long is Gina's board? Write an equation, then solve.



For 5 through 7, draw a picture, write an equation, then solve.

- Phil collected  $3\frac{1}{2}$  buckets of shells at the beach. Caleb collected three times as many buckets. How many buckets of shells did Caleb collect?

### Stuck? Try this....

- What do I know?
- What am I asked to find?
- What diagram can I use to help understand the problem?
- Can I use addition, subtraction, multiplication, or division?
- Is all of my work correct?
- Did I answer the right question?
- Is my answer reasonable?

## Read and Understand

What do I know?

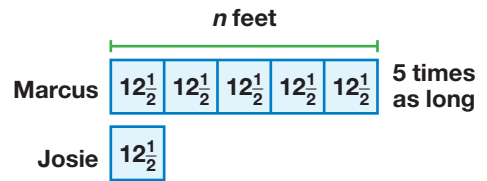
Josie's kite string is  $12\frac{1}{2}$  feet long. Marcus's kite string is 5 times as long.

What am I asked to find?

The length of the string on Marcus's kite

## Plan and Solve

Draw a Picture



Write an Equation

Let  $n$  = the length of Marcus's kite.

$$12\frac{1}{2} \times 5 = n$$

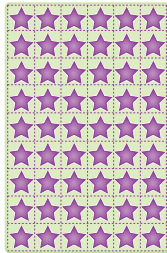
$$62\frac{1}{2} = n$$

Marcus's kite string is  $62\frac{1}{2}$  feet long.

6. Josh volunteered at the zoo for 14 hours in one month. This was  $3\frac{1}{2}$  times as many hours as Gina volunteered. How many hours did Gina volunteer?

8. Brown bats sleep for 20 hours each day. How many hours per week are they awake? How many hours per year are they awake?

10. Wanda needs to buy at least 50 stickers. Will 1 sheet of stickers be enough? How do you know?



12. **Think About the Process** A ticket to Los Angeles costs \$390, and a ticket to Hong Kong costs  $2\frac{1}{2}$  times as much. Which equation can you solve to show how much the ticket to Hong Kong costs?

A  $\$390 + \$390 = c$

B  $\$390 \times 2\frac{1}{2} = c$

C  $\$390 \div 2\frac{1}{2} = c$

D  $(2 \times \$390) + (2 \times \$390) = c$

7. Tina is making a sign to advertise the school play. The width of the sign is  $2\frac{2}{3}$  feet. If the length is  $4\frac{1}{2}$  times as much, then what is the length of the sign?

9. Brenda says a good estimate for  $50 \times 31\frac{3}{4}$  is 800. Is she correct? Explain.

11. Jin's friends collected 149 bottles of water for riders going on a bike trip. If each rider needs 4 bottles, how many riders can they supply with water?

13. **Think About the Process** Each shelf holds 24 books. There are 8 shelves. Which equation could you solve to find how many books there are in all?

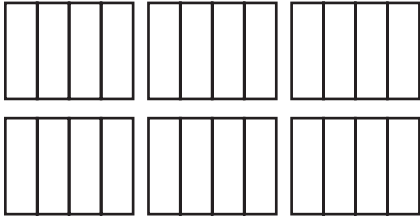
A  $24 + 8 = b$

B  $24 - 8 = b$

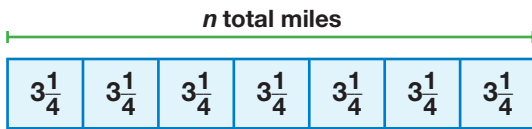
C  $24 \times 8 = b$

D  $24 \div 8 = b$

1. How many  $\frac{3}{4}$ s are in 6? (12-3)



- A  $4\frac{1}{2}$   
 B  $6\frac{3}{4}$   
 C 8  
 D 24
2. Alberto runs  $3\frac{1}{4}$  miles each day. Which of the following can be used to find  $n$ , the number of miles he will run in a week? (12-8)



- A  $3\frac{1}{4} \times n = 7$   
 B  $7 \times n = 3\frac{1}{4}$   
 C  $7 \times 3\frac{1}{4} = n$   
 D  $3\frac{1}{4} \div 7 = n$
3. If the diameter of a tree trunk is growing  $\frac{1}{4}$  inch each year, how many years will it take for the diameter to grow 8 inches? (12-3)
- A 2 years  
 B 8 years  
 C 24 years  
 D 32 years

4. Monica lives  $\frac{8}{10}$  of a mile from Wally and  $\frac{3}{4}$  of this distance from Adam. How far does Monica live from Adam? (12-2)

- A  $\frac{1}{2}$  mile  
 B  $\frac{3}{5}$  mile  
 C  $\frac{15}{16}$  mile  
 D  $1\frac{11}{20}$  miles

5. Mrs. Webster wants to divide the milk shown into 6 equal servings. What will be the size, in gallons, of each serving? (12-4)

- A  $\frac{1}{8}$  gallon  
 B  $\frac{2}{9}$  gallon  
 C  $\frac{1}{4}$  gallon  
 D  $4\frac{1}{2}$  gallons



6. Mary is making a window covering that is  $6\frac{1}{2}$  feet wide, divided into 5 equal sections. What is the width of each section? (12-7)

- A  $1\frac{3}{10}$  feet  
 B  $1\frac{1}{2}$  feet  
 C  $6\frac{1}{10}$  feet  
 D  $32\frac{1}{2}$  inches

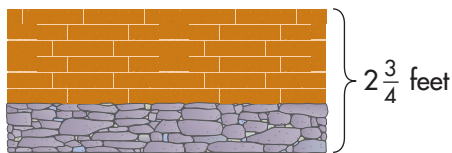
7. What is  $\frac{5}{6} \div \frac{5}{11}$ ? (12-4)

- A  $\frac{1}{66}$   
 B  $\frac{25}{66}$   
 C  $\frac{6}{11}$   
 D  $1\frac{5}{6}$

8. Tracy took a quiz containing 12 items. If she got  $\frac{5}{6}$  of the items correct, how many did she get correct? (12-1)

A 5  
B 6  
C 9  
D 10

9. A retaining wall on the playground is shown below. If  $\frac{2}{3}$  of the wall is made from brick, what is the height of the brick portion of the wall? (12-6)



A  $2\frac{1}{2}$  feet  
B  $1\frac{5}{6}$  feet  
C  $\frac{7}{12}$  foot  
D  $\frac{2}{9}$  foot

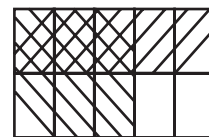
10. Which of the following is equal to  $\frac{2}{9} \div \frac{4}{7}$ ? (12-4)

A  $\frac{9}{2} \div \frac{4}{7}$   
B  $\frac{2}{9} \times \frac{7}{4}$   
C  $\frac{2}{9} \div \frac{7}{4}$   
D  $\frac{9}{2} \times \frac{4}{7}$

11. What is  $\frac{1}{4} \times \frac{1}{6}$ ? (12-2)

A  $\frac{1}{5}$   
B  $\frac{1}{10}$   
C  $\frac{1}{12}$   
D  $\frac{1}{24}$

12. What product does the diagram show? (12-2)



A  $\frac{1}{2} \times \frac{3}{5} = \frac{3}{10}$   
B  $\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$   
C  $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$   
D  $\frac{1}{3} \times \frac{3}{5} = \frac{1}{5}$

13. Which equals  $5\frac{4}{5} \div 3\frac{2}{3}$ ? (12-7)

A  $\frac{29}{5} \times \frac{11}{3}$   
B  $\frac{29}{5} \times \frac{3}{11}$   
C  $5\frac{4}{5} \times 3\frac{3}{2}$   
D  $\frac{5}{29} \times \frac{3}{11}$

14. What is  $2\frac{2}{5} \times 3\frac{1}{4}$ ? (12-6)

A  $7\frac{4}{5}$   
B  $7\frac{7}{10}$   
C  $6\frac{1}{10}$   
D  $3\frac{1}{5}$

15. Two-fifths of the students in Mrs. Navares' fifth grade class ride the bus to school. What other information is needed to find the number of students in her class that ride the bus? (12-5)

A The number of students who walk to school.  
B The number of students in the fifth grade.  
C The number of students in Mrs. Navares' class.  
D The number of different buses the students ride.

## Set A, pages 270–271

Find  $\frac{2}{3}$  of 6.**One Way** $\frac{1}{3}$  of 6 is 2. $\frac{2}{3}$  is twice as much as  $\frac{1}{3}$ .So,  $\frac{2}{3}$  of 6 is 4.**Another Way**

Multiply first, and then divide.

$$\frac{2}{3} \times 6 = \frac{12}{3} = 4$$

**Remember** that the fraction bar means to divide.

Find each product. Simplify if possible.

- |                            |                        |
|----------------------------|------------------------|
| 1. $4 \times \frac{1}{2}$  | 2. $\frac{3}{4}$ of 16 |
| 3. $24 \times \frac{1}{8}$ | 4. $\frac{4}{7}$ of 28 |
| 5. $10 \times \frac{1}{5}$ | 6. $\frac{5}{6}$ of 24 |
| 7. $16 \times \frac{1}{4}$ | 8. $\frac{7}{8}$ of 32 |

## Set B, pages 272–274

Find  $\frac{5}{6} \times \frac{2}{3}$ .

Multiply.

$$\frac{5}{6} \times \frac{2}{3} = \frac{5 \times 2}{6 \times 3} = \frac{10}{18}$$

Simplify, if possible.  $\frac{10}{18} = \frac{5}{9}$ **Remember** to multiply both the numerators and denominators.

Find each product. Simplify, if possible.

- |                                     |                                     |
|-------------------------------------|-------------------------------------|
| 1. $\frac{3}{5} \times \frac{1}{4}$ | 2. $\frac{6}{7} \times \frac{1}{2}$ |
| 3. $\frac{4}{9} \times \frac{2}{3}$ | 4. $\frac{3}{8} \times \frac{1}{3}$ |

## Set C, pages 276–277

Find  $6 \div \frac{2}{3}$ .What fraction in thirds is equivalent to 6?  $\frac{18}{3}$ Or, what number divided by 3 = 6?  $\frac{18}{3}$ 

$$\frac{18}{3} \div \frac{2}{3} = \frac{18 \div 2}{3 \div 3} = \frac{9}{1} = 9$$

**Remember** to change the whole number to its equivalent fraction.

Find each quotient. Simplify, if possible.

- |                         |                         |
|-------------------------|-------------------------|
| 1. $3 \div \frac{3}{8}$ | 2. $6 \div \frac{1}{6}$ |
| 3. $8 \div \frac{1}{2}$ | 4. $9 \div \frac{3}{4}$ |
| 5. $4 \div \frac{4}{5}$ | 6. $3 \div \frac{2}{3}$ |

## Set D, pages 278–280

Find  $\frac{2}{3} \div \frac{1}{8}$ .

Rewrite the division problem as a multiplication problem. Multiply by the reciprocal of the divisor.

$$\frac{2}{3} \div \frac{1}{8} = \frac{2}{3} \times \frac{8}{1} = \frac{16}{3} = 5\frac{1}{3}$$

$\uparrow$                      $\uparrow$   
 divisor    reciprocal

**Remember** to multiply by the reciprocal of the divisor.

Find each quotient. Simplify, if possible.

- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| 1. $\frac{1}{2} \div \frac{2}{7}$ | 2. $\frac{1}{3} \div \frac{1}{2}$ |
| 3. $\frac{2}{3} \div \frac{1}{8}$ | 4. $\frac{1}{4} \div \frac{1}{5}$ |
| 5. $\frac{3}{4} \div \frac{2}{9}$ | 6. $\frac{1}{6} \div \frac{8}{9}$ |
| 7. $\frac{7}{8} \div \frac{3}{4}$ | 8. $\frac{3}{4} \div \frac{5}{6}$ |



**Set E**, pages 282–283

Decide if the problem has extra or missing information. Then solve if you can.

Chris has 7 bowls. Each bowl has 4 types of fruit. How many apples does Chris have?

**Identify what you know:** 7 bowls, 4 types of fruit.

**Identify the question:** How many apples does Chris have?

**Can you solve?** No, it does not tell how many apples are in each bowl.

**Remember** that some problems have too much information.

1. Anna has \$35.65. She went to the store and bought 3 items. How much change did she get back?
2. Donna bought one pair of shoes for \$29.50 and another for half that price. She paid with a \$50 bill. How much did the other pair of shoes cost?

**Set F**, pages 284–285

Find  $3\frac{1}{2} \times 2\frac{7}{8}$ .

Estimate.  $3\frac{1}{2} \times 2\frac{7}{8}$  is about  $4 \times 3$  or 12.

Change mixed numbers to improper fractions and multiply.

$$\frac{7}{2} \times \frac{23}{8} = \frac{161}{16} = 10\frac{1}{16}$$

**Remember** to check your answer against your original estimate to be sure your answer is reasonable.

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| 1. $2\frac{1}{3} \times 4\frac{1}{5}$ | 2. $4\frac{1}{2} \times 6\frac{2}{3}$ |
| 3. $5\frac{1}{2} \times 3\frac{1}{3}$ | 4. $2\frac{1}{8} \times 2\frac{2}{7}$ |

**Set G**, pages 286–287

Find  $9\frac{1}{2} \div 2\frac{2}{3}$ .

Change mixed numbers to improper fractions. Then multiply by the reciprocal of the divisor.

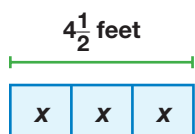
$$\frac{19}{2} \div \frac{8}{3} = \frac{19}{2} \times \frac{3}{8} = \frac{57}{16} = 3\frac{9}{16}$$

**Remember** to change your divisor to an improper fraction **before** finding its reciprocal.

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| 1. $3\frac{2}{3} \div 1\frac{1}{2}$  | 2. $6\frac{1}{2} \div 2\frac{3}{4}$ |
| 3. $1\frac{3}{16} \div 1\frac{3}{8}$ | 4. $8\frac{1}{4} \div 3\frac{1}{3}$ |

**Set H**, pages 288–289

A  $4\frac{1}{2}$ -foot board is cut into 3 equal pieces. How long is each piece?



$$\begin{aligned} x &= 4\frac{1}{2} \div 3 \\ &= \frac{9}{2} \times \frac{1}{3} = 1\frac{1}{2} \end{aligned}$$

Each piece is  $1\frac{1}{2}$  feet.

**Remember** to draw a picture to help write an equation.

1. A total of 60 students are being separated into 5 equal teams. How many students are on each team?