

# Understand Fractions

**FAST FACT • SCIENCE** There are thousands of different kinds of insects in the world. Some are very large. Others are so small that we can't even see them.

**PROBLEM SOLVING** The table shows some insects and their sizes. Which insect is the smallest? Which is the largest?

SIZES OF INSECTS	
Insect	Length
Ant	$\frac{1}{4}$ inch
Mosquito	$\frac{1}{8}$ inch
Grasshopper	2 inches
Goliath beetle	$4\frac{1}{2}$ inches



African Goliath beetle

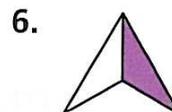
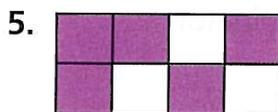
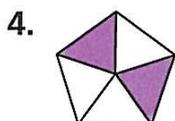
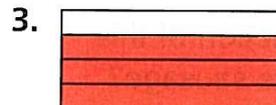
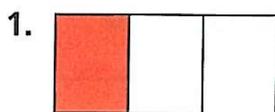
## CHECK WHAT YOU KNOW



Use this page to help you review and remember important skills needed for Chapter 25.

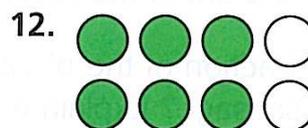
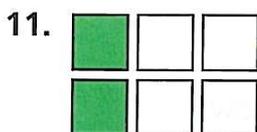
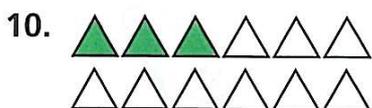
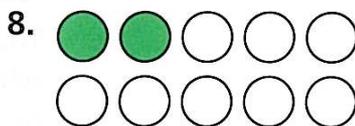
### ✓ MODEL PARTS OF A WHOLE

Write how many equal parts make up the whole figure. Then write how many parts are shaded.



### ✓ MODEL PARTS OF A GROUP

Write the number in each group. Then write the number in each group that is green.



## VOCABULARY POWER



### REVIEW

**fourth** [fôrth] *noun*

When there are four equal-sized pieces in one whole, each piece is called one *fourth*. List some things that could be divided into fourths.

### PREVIEW

**fraction**

**numerator**

**denominator**

**equivalent fractions**

**mixed number**



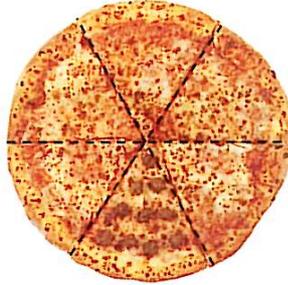
[www.harcourtschool.com/mathglossary](http://www.harcourtschool.com/mathglossary)

# Parts of a Whole

## Learn

### ALL TOGETHER

A number that names part of a whole or part of a group is called a **fraction**.



What fraction of this pizza has sausage?

1 part sausage →  $\frac{1}{6}$  ← numerator  
 6 equal parts in all →  $\frac{1}{6}$  ← denominator

Read: one sixth      Write:  $\frac{1}{6}$   
 one part out of six equal parts  
 1 divided by 6

So,  $\frac{1}{6}$  of the pizza has sausage.

The **numerator** tells how many parts are being counted.

The **denominator** tells how many equal parts are in the whole.

- What fraction of the pizza does *not* have sausage? Explain how you know.

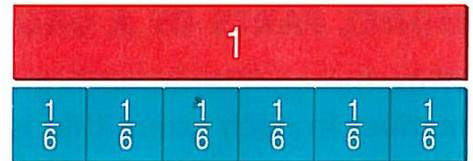
### Quick Review

Find a rule and the next number in the pattern.

- 2, 4, 6, 8, ■
- 12, 11, 10, 9, ■
- 3, 6, 9, 12, ■
- 11, 9, 7, 5, ■
- 4, 8, 12, 16, ■

### VOCABULARY

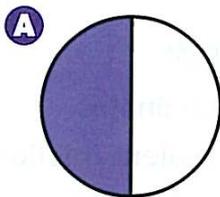
**fraction**  
**numerator**  
**denominator**



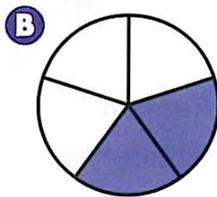
These fraction bars show how a whole can be divided into sixths, or six equal parts.



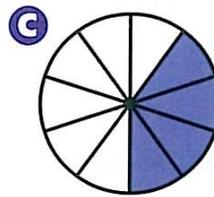
### Examples



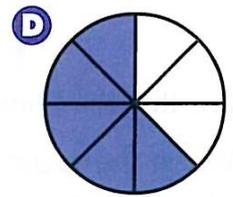
$\frac{1}{2}$   
one half



$\frac{2}{5}$   
two fifths



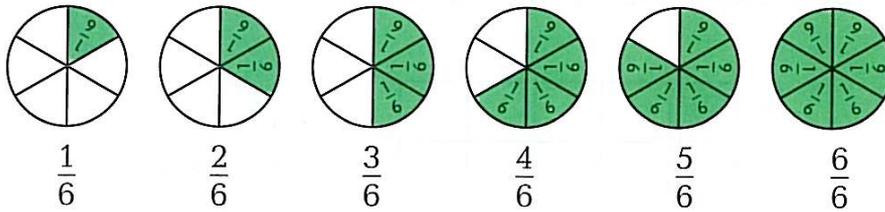
$\frac{4}{10}$   
four tenths



$\frac{5}{8}$   
five eighths

## Counting Equal Parts

You can count equal parts, such as sixths, to make one whole.



$$\frac{6}{6} = \text{one whole, or } 1$$

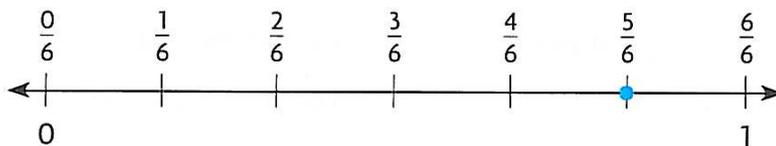


**MATH IDEA** A number line can show parts of one whole.

The part on a number line from 0 to 1 shows one whole.

The line can be divided into any number of equal parts.

This number line is divided into sixths.



The point shows the location of  $\frac{5}{6}$ .

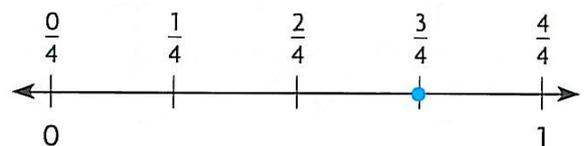
### Examples

**A** This number line is divided into thirds.



The point shows the location of  $\frac{1}{3}$ .

**B** This number line is divided into fourths.

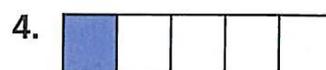


The point shows the location of  $\frac{3}{4}$ .

### Check

1. Write how to count by eighths to make one whole.

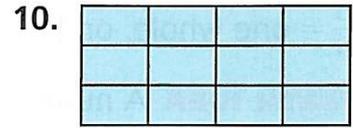
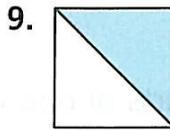
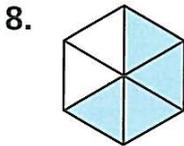
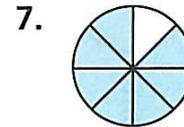
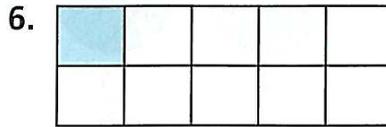
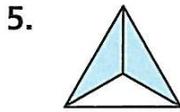
Write a fraction in numbers and in words that names the shaded part.



LESSON CONTINUES

**Practice and Problem Solving** Extra Practice, page 534, Set A

Write a fraction in numbers and in words that names the shaded part.



Make a model of each, using fraction circle pieces. Then write the fraction, using numbers.

11. one fourth

12. two out of two

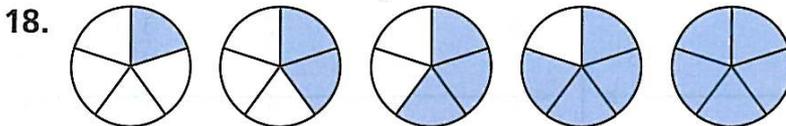
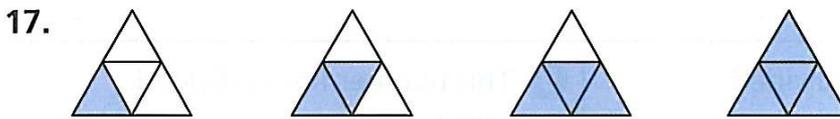
13. six eighths

14. one divided by three

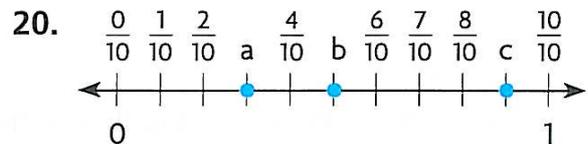
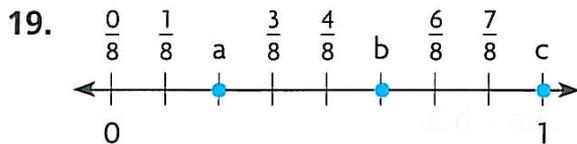
15. three fifths

16. five out of ten

Write a fraction to describe the part of each figure that is shaded.

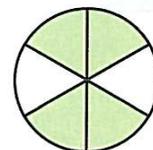


**ALGEBRA** Write a fraction that names the point for each letter on the number line.



21. **REASONING** There are two pizzas the same size. One is cut into 6 equal pieces. The other is cut into 8 equal pieces. Which pizza has smaller pieces? Explain.

22. **What's the Error?** Lydia said that the fraction  $\frac{6}{4}$  names the shaded part of the circle. Explain her error.



23. Suppose you and 4 friends shared equal pieces of a pie. Use fraction circle pieces to model the amount of pie for two people.

24. **REASONING** Mrs. Thomas wants to give  $\frac{1}{6}$  of a pie to each visitor. How many whole pies will she need for 6 visitors? 12 visitors?

### Mixed Review and Test Prep

Find each difference. (pp. 92, 96)

25.  $245 - 152 = \blacksquare$

26.  $736 - 379 = \blacksquare$

27.  $400 - 118 = \blacksquare$

Find each product.

28.  $4 \times 8 = \blacksquare$  (p. 178)

29.  $6 \times 6 = \blacksquare$  (p. 194)

30.  $7 \times 9 = \blacksquare$  (p. 200)

31. **TEST PREP** Which polygon has 4 sides and 4 angles? (p. 390)

- A triangle            C pentagon  
B quadrilateral    D hexagon

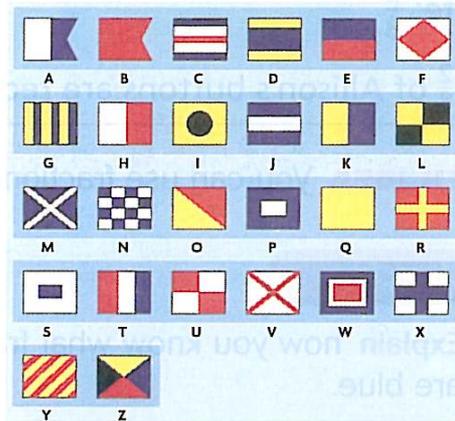
32. **TEST PREP** Which is the best unit of measure to find the distance between two towns? (p. 342)

- F inch                    H yard  
G foot                    J mile

### Problem Solving

### LINKUP ... to Social Studies

These alphabet flags are used on ships to send messages in code. For example, if a ship flies the flag for the letter P, that ship is about to sail out of the harbor. Ships carry books that explain the codes in different languages.



**USE DATA** For 1–4, use the flags.

- Look at the flag for the letter G. What fraction names the part of the flag that is yellow?
- Look at all of the flags. Which of them are divided into four equal parts, or fourths?
- Look at the flag for the letter N. Into how many equal parts is the flag divided?
- Write a fraction that names one part of each of these flags: L, O, and T.

## Parts of a Group

## Learn

**BUYING BUTTONS** Allison and Marsha each bought some buttons at the craft store.

What fraction of Allison's buttons are red?

What fraction of Marsha's buttons are red?

## Quick Review

Write the next fraction in the counting pattern.

- $\frac{0}{3}, \frac{1}{3}, \frac{2}{3}$  ■
- $\frac{1}{5}, \frac{2}{5}, \frac{3}{5}$  ■
- $\frac{2}{6}, \frac{3}{6}, \frac{4}{6}$  ■
- $\frac{3}{8}, \frac{4}{8}, \frac{5}{8}$  ■
- $\frac{3}{10}, \frac{4}{10}, \frac{5}{10}$  ■

## Allison's buttons



number of  
red buttons  $\rightarrow \frac{2}{8}$  ← numerator  
total buttons  $\rightarrow \frac{2}{8}$  ← denominator

**Read:** two eighths, or two out of eight

**Write:**  $\frac{2}{8}$

So,  $\frac{2}{8}$  of Allison's buttons are red.

## Marsha's buttons



sets of red  
buttons  $\rightarrow \frac{1}{3}$  ← numerator  
total number  $\rightarrow \frac{1}{3}$  ← denominator  
of sets

**Read:** one third, or one out of three

**Write:**  $\frac{1}{3}$

So,  $\frac{1}{3}$  of Marsha's buttons are red.

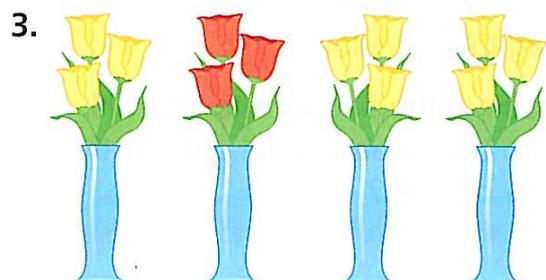


**MATH IDEA** You can use fractions to show parts of a group.

## Check

- Explain** how you know what fraction of Allison's buttons are blue.

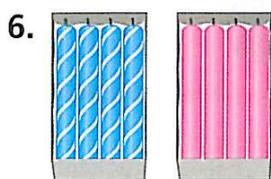
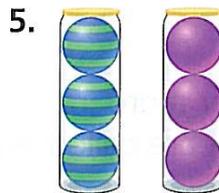
Write a fraction that names the part of each group that is yellow.



## Practice and Problem Solving

Extra Practice, page 534, Set B

For 4–7, write a fraction that names the part of each group that is striped.



8. Draw 8 squares. Circle  $\frac{2}{8}$  of them.

9. Draw 6 triangles. Circle  $\frac{5}{6}$  of them.

10. Draw 10 rectangles. Circle  $\frac{3}{10}$  of them.

Use a pattern to complete the table.

11. Model						
12. Total number of parts	5		5	5	5	5
13. Number of green parts	0	1	2		4	5
14. Fraction of green parts	$\frac{0}{5}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	

15. Debra has 12 ribbons. Of those ribbons,  $\frac{1}{12}$  are red and  $\frac{2}{12}$  are blue. The rest are yellow. How many yellow ribbons does she have?

16. **What's the Question?** Jonas has 4 blue tiles, 3 green tiles, and 1 yellow tile. The answer is  $\frac{7}{8}$ .

17. **Write a problem** in which a fraction is used to name part of a group. Tell what the numerator and denominator mean.

## Mixed Review and Test Prep

Find each quotient. (p. 262)

18.  $4 \div 4 = \square$

19.  $9 \div 1 = \square$

20.  $0 \div 7 = \square$

21.  $8 \div 8 = \square$

22. **TEST PREP** Find the number that the variable stands for. (p. 242)

$$n \times 7 = 21$$

A 2

B 3

C 4

D 14

# Equivalent Fractions

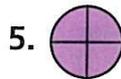
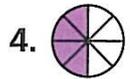
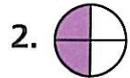
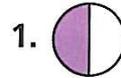
**Learn**

**EQUAL PARTS** Two or more fractions that name the same amount are called **equivalent fractions**.

What other fractions name  $\frac{1}{2}$ ?

**Quick Review**

Name the fraction for the shaded part.



**VOCABULARY**

**equivalent fractions**

**HANDS ON**

**Activity 1**

**MATERIALS:** sheet of paper, red crayon

**STEP 1**

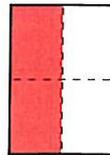
Fold a sheet of paper in half. Shade one half of the paper red.



1 out of 2 equal parts is red.  
 $\frac{1}{2}$  of the paper is red.

**STEP 2**

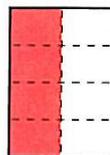
Fold the paper in half again.



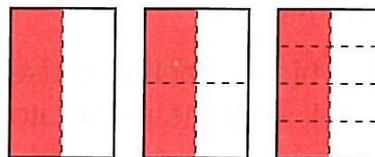
2 out of 4 equal parts are red.  
 $\frac{2}{4}$  of the paper is red.

**STEP 3**

Fold the paper in half a third time.



4 out of 8 equal parts are red.  
 $\frac{4}{8}$  of the paper is red.



$$\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$$

So,  $\frac{1}{2}$ ,  $\frac{2}{4}$ , and  $\frac{4}{8}$  are all names for  $\frac{1}{2}$ .  
They are equivalent fractions.



**REASONING** What pattern do you see in the fractions  $\frac{1}{2}$ ,  $\frac{2}{4}$ ,  $\frac{4}{8}$ ?

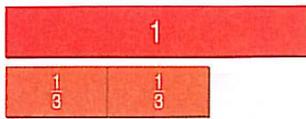


### Activity 2 What fraction is equivalent to $\frac{2}{3}$ ?

**MATERIALS:** fraction bars

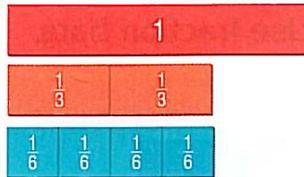
#### STEP 1

Start with the bar for 1 whole. Line up two  $\frac{1}{3}$  bars for  $\frac{2}{3}$ .



#### STEP 2

Use  $\frac{1}{6}$  bars to match the length of the bars for  $\frac{2}{3}$ .



#### STEP 3

Count the number of  $\frac{1}{6}$  bars that make up  $\frac{2}{3}$ . Write the equivalent fraction.

Count:  $\frac{1}{6}$   $\frac{2}{6}$   $\frac{3}{6}$   $\frac{4}{6}$

Write:  $\frac{2}{3} = \frac{4}{6}$

- How can you tell that the fraction bars show equivalent fractions?
- Use sixths, eighths, and tenths fraction bars. Find fractions that are equivalent to  $\frac{1}{2}$ .

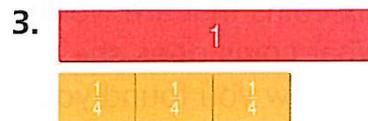
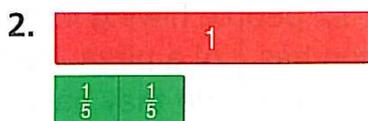
### Examples Find equivalent fractions.

<p><b>A</b></p> <p style="text-align: center;"><math>\frac{1}{3} = \frac{2}{6}</math></p>	<p><b>B</b></p> <p style="text-align: center;"><math>\frac{1}{4} = \frac{2}{8}</math></p>	<p><b>C</b></p> <p style="text-align: center;"><math>\frac{5}{5} = \frac{10}{10}</math>, or 1</p>
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### Check

1. **Explain** how to use fraction bars to decide if  $\frac{2}{4}$  and  $\frac{2}{3}$  are equivalent.

Find an equivalent fraction. Use fraction bars.

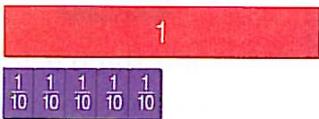


LESSON CONTINUES

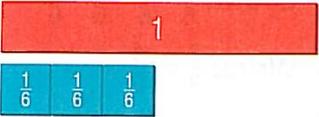
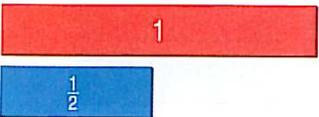
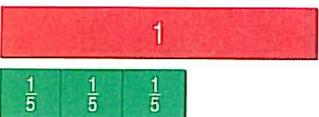
## Practice and Problem Solving

Extra Practice, page 534, Set C

Find an equivalent fraction. Use fraction bars.

4.  5.  6. 

Find the missing numerator. Use fraction bars.

7.  8.  9. 

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

$$\frac{1}{2} = \frac{\square}{8}$$

$$\frac{3}{5} = \frac{\square}{10}$$

$$10. \frac{3}{9} = \frac{\square}{3}$$

$$11. \frac{1}{2} = \frac{\square}{10}$$

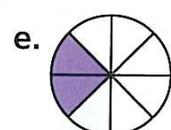
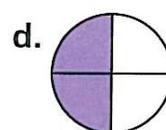
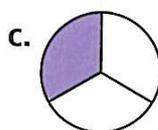
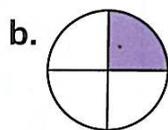
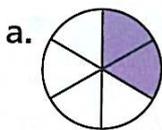
$$12. \frac{2}{4} = \frac{\square}{12}$$

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

$$14. \frac{2}{6} = \frac{\square}{3}$$

$$15. \frac{3}{5} = \frac{\square}{10}$$

16. Write the fraction that names the shaded part of each. Then tell which fractions are equivalent.



17. Amy's age is an even number between 20 and 29. Her age is a multiple of 3. How old is Amy?

19.  **ALGEBRA** In his yard, Mr. York has a 42-foot-tall pine tree. The pine tree is 15 feet taller than his oak tree. How tall is his oak tree?

21. Jessie has six coins that are worth 71¢ in all. What coins does she have? Explain how you found your answer.

18. **REASONING** Linda used 6 of one kind of fraction bar to show  $\frac{1}{2}$ . What kind of fraction bars did she use?

20. There are 8 granola bars in a box. If Lito ate  $\frac{1}{4}$  of the granola bars, how many granola bars did he eat? Draw a picture to solve.

22. There are 12 people having lunch. Each person has  $\frac{1}{4}$  of a pizza. How many whole pizzas do they have? Make a model or picture to solve.

## Mixed Review and Test Prep

Round to the nearest thousand. (p. 52)

23. 833

24. 2,497

25. 5,555

26. 39,670

Find the quotient. (p. 280)

27.  $90 \div 9$

28.  $56 \div 8$

29.  $49 \div 7$

30.  $72 \div 9$

**31. TEST PREP** Emma left at 11:15 A.M. and returned at 12:35 P.M. For how long was she gone? (p. 134)

- A 1 hour 10 minutes
- B 1 hour 20 minutes
- C 1 hour 40 minutes
- D 1 hour 50 minutes

**32. TEST PREP** Which set is equivalent to 3 quarters? (p. 110)

- F 7 nickels, 25 pennies
- G 6 dimes, 5 pennies
- H 1 quarter, 9 nickels
- J 5 dimes, 5 nickels

## Problem Solving

## LINKUP ... to Science

Did you know that there are *thousands* of different kinds of ants in the world?

Not all ants are alike. Different species of ants live in different places, eat different foods, and are different colors and sizes. Here are some interesting facts about three kinds of ants.

Use fraction bars and the information about the ants to solve.

1. Find an equivalent fraction for the length of:
  - a. the fire ant
  - b. the bulldog ant
2. Find how many odorous house ants it would take to equal the length of one bulldog ant. Write the equivalent fractions.

### Fire ants

- are red in color
- will sting
- are about  $\frac{1}{4}$  inch long



### Bulldog ants

- eat meat
- are found in Australia
- are about  $\frac{4}{5}$  inch long



### Odorous house ants

- are brown or black in color
- smell bad when crushed
- are about  $\frac{1}{10}$  inch long



# Compare and Order Fractions

**Learn**

**SIZE IT UP** Fraction bars can help you compare parts of a whole.

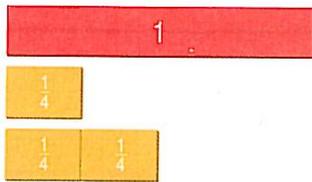
**Quick Review**

Compare. Write  $<$ ,  $>$ , or  $=$  for each  $\bullet$ .

1.  $27 \bullet 37$
2.  $398 \bullet 399$
3.  $241 \bullet 214$
4.  $4,012 \bullet 4,012$
5.  $5,431 \bullet 5,341$

**Examples**

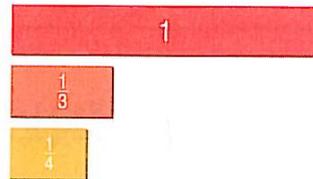
**A** Compare  $\frac{1}{4}$  and  $\frac{2}{4}$ .



The bar for  $\frac{1}{4}$  is shorter than the bars for  $\frac{2}{4}$ .

So,  $\frac{1}{4} < \frac{2}{4}$  or  $\frac{2}{4} > \frac{1}{4}$ .

**B** Compare  $\frac{1}{3}$  and  $\frac{1}{4}$ .



The bar for  $\frac{1}{4}$  is shorter than the bar for  $\frac{1}{3}$ .

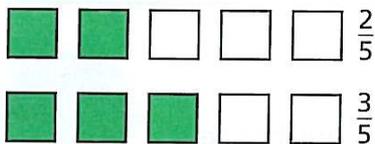
So,  $\frac{1}{4} < \frac{1}{3}$  or  $\frac{1}{3} > \frac{1}{4}$ .

**REASONING** When the denominator is greater, is the fraction bar longer or shorter? Why?

Tiles can help you compare parts of a group.

**Examples**

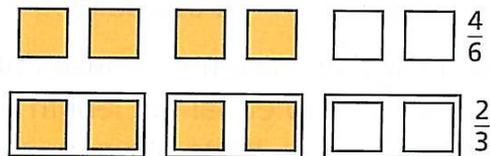
**A** Compare  $\frac{2}{5}$  and  $\frac{3}{5}$ .



3 green tiles are more than 2 green tiles.

So,  $\frac{3}{5} > \frac{2}{5}$  or  $\frac{2}{5} < \frac{3}{5}$ .

**B** Compare  $\frac{4}{6}$  and  $\frac{2}{3}$ .



4 orange tiles are the same as 4 orange tiles.

So,  $\frac{4}{6} = \frac{2}{3}$ .

## Ordering Fractions

You can order three or more fractions from least to greatest or from greatest to least.

Cassie needs  $\frac{3}{8}$  cup raisins,  $\frac{1}{4}$  cup chocolate chips, and  $\frac{2}{3}$  cup peanuts to make a trail mix. She wants to know which ingredient she needs the most of. Use fraction bars to order the fractions from greatest to least.

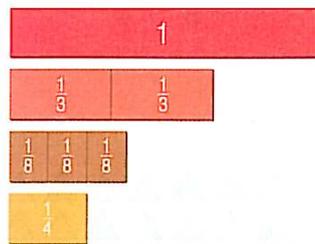


### Activity

**MATERIALS:** fraction bars

#### STEP 1

Compare the fractions.



$$\frac{2}{3} > \frac{3}{8}$$

$$\frac{3}{8} > \frac{1}{4}$$

#### STEP 2

Order the fractions from greatest to least.

**Think:**  $\frac{2}{3} > \frac{3}{8} > \frac{1}{4}$

**Write:**  $\frac{2}{3}, \frac{3}{8}, \frac{1}{4}$

- Use your models to order the fractions from least to greatest.

### Check

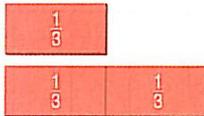
- Describe** what happens to the size of fraction bars when the denominators become greater, as in  $\frac{1}{2}$ ,  $\frac{1}{3}$ , and  $\frac{1}{4}$ .
- Describe** what happens to the size of fraction bars when the denominators become smaller, as in  $\frac{1}{8}$ ,  $\frac{1}{6}$ , and  $\frac{1}{4}$ .



### Technology Link

More Practice:  
Harcourt Mega Math  
Fraction Action,  
*Fraction Flare Up*,  
Level F

Compare. Write  $<$ ,  $>$ , or  $=$  for each ●.

3.   
 $\frac{1}{3} \bullet \frac{2}{3}$

4.   
 $\frac{3}{5} \bullet \frac{2}{5}$

5.   
 $\frac{3}{6} \bullet \frac{3}{4}$



LESSON CONTINUES

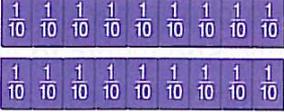


## Practice and Problem Solving

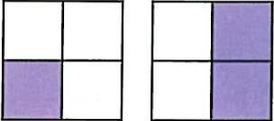
Extra Practice, page 534, Set D

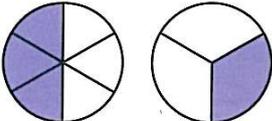
Compare. Write  $<$ ,  $>$ , or  $=$  for each  $\bullet$ .

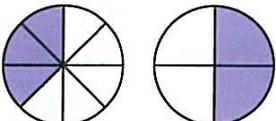
6.   
 $\frac{1}{2} \bullet \frac{1}{4}$

7.   
 $\frac{9}{10} \bullet \frac{9}{10}$

8.   
 $\frac{3}{12} \bullet \frac{5}{8}$

9.   
 $\frac{1}{4} \bullet \frac{2}{4}$

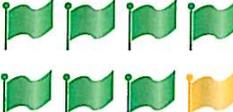
10.   
 $\frac{3}{6} \bullet \frac{1}{3}$

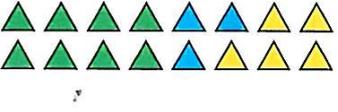
11.   
 $\frac{3}{8} \bullet \frac{2}{4}$

Compare the part of each group that is green.

Write  $<$ ,  $>$ , or  $=$  for each  $\bullet$ .

12.   
 $\frac{2}{6} \bullet \frac{3}{6}$

13.   
 $\frac{4}{4} \bullet \frac{3}{4}$

14.   
 $\frac{4}{8} \bullet \frac{4}{8}$

Use fraction bars to compare. Write  $<$ ,  $>$ , or  $=$  for each  $\bullet$ .

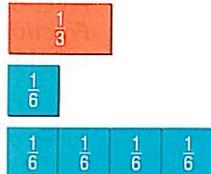
15.  $\frac{2}{2} \bullet 1$

16.  $\frac{3}{4} \bullet \frac{1}{2}$

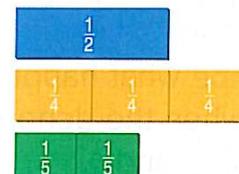
17.  $\frac{1}{2} \bullet 1$

18.  $1 \bullet \frac{4}{4}$

19. Order  $\frac{1}{3}$ ,  $\frac{1}{6}$ , and  $\frac{4}{6}$  from greatest to least.



20. Order  $\frac{1}{2}$ ,  $\frac{3}{4}$ , and  $\frac{2}{5}$  from least to greatest.

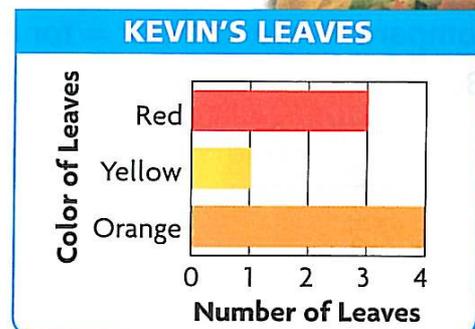


**USE DATA** For 21–23, use the bar graph.

21. How many leaves did Kevin collect in all?

22. What fraction of the leaves are red? yellow? orange?

23. Order the fractions of leaves from the greatest to the least amount.



24. **FAST FACT • SCIENCE** In a honeybee colony, the queen bee is about  $\frac{3}{4}$  inch long. A worker bee is about  $\frac{1}{2}$  inch long. Which bee is longer? Explain how you know.



25. **REASONING** Tom knows that  $\frac{2}{4}$  and  $\frac{3}{6}$  are equivalent to  $\frac{1}{2}$ . How can he use  $\frac{1}{2}$  as a benchmark to write  $\frac{4}{6}$ ,  $\frac{1}{4}$ , and  $\frac{1}{2}$  in order from least to greatest?

### Mixed Review and Test Prep

Order each set of numbers from least to greatest. (p. 46)

26. 110, 111, 101

27. 199, 89, 98

28. 455, 555, 545

Find the number that the variable stands for. (p. 242)

29.  $4 \times s = 36$

30.  $9 \times r = 45$

31. **TEST PREP** Cheryl bought two markers for \$0.55 each and a notebook for \$1.79. How much did she spend in all? (p. 120)

A \$1.89

C \$2.79

B \$2.34

D \$2.89

32. **TEST PREP** How many feet are in 4 yards? (p. 348)

F 20 feet

H 9 feet

G 12 feet

J 6 feet

### Problem Solving

### LINKUP... to Social Studies

At the end of December, some African Americans celebrate Kwanzaa, a 7-day festival that ends with a feast, or "karumu," of healthful foods on December 31. They put a straw mat, called a "mkeka," in the middle of the table. Fresh fruit on the mat represents African harvest festivals.



- Of the 7 Kwanzaa candles, 3 are red, 1 is black, and the rest are green. What fraction names the part that is green?
- Clarence takes  $\frac{3}{4}$  cup grapes,  $\frac{1}{2}$  cup strawberries, and  $\frac{1}{4}$  cup blueberries from the mkeka. Use fraction bars to model the amounts of fruit. Write in order from least to greatest.

# Problem Solving Strategy

## Make a Model

**PROBLEM** Three classmates ran a relay in the Spring Sports Day race. George ran  $\frac{2}{3}$  mile, Rosa ran  $\frac{7}{8}$  mile, and Ben ran  $\frac{5}{6}$  mile. Who ran the farthest?

### Quick Review

Compare. Write  $<$ ,  $>$ , or  $=$  for each  $\bullet$ .

1.  $\frac{2}{3} \bullet \frac{2}{3}$
2.  $\frac{4}{6} \bullet \frac{3}{6}$
3.  $\frac{1}{4} \bullet \frac{2}{4}$
4.  $\frac{4}{8} \bullet \frac{3}{8}$
5.  $\frac{2}{6} \bullet \frac{1}{6}$

### UNDERSTAND

- What are you asked to find?
- What information will you use?
- Is there information you will not use? If so, what?

### PLAN

- What strategy can you use to solve the problem?
- Make a model to show what part of a mile each person ran.*



### SOLVE

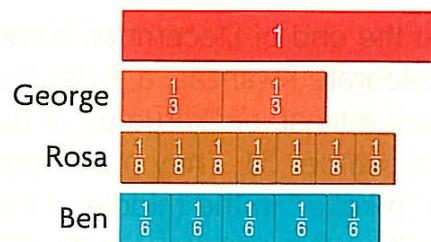
- How can you use the strategy to solve the problem?

Model the problem by using fraction bars.

Line up the fraction bars for  $\frac{2}{3}$ ,  $\frac{7}{8}$ , and  $\frac{5}{6}$ .

Compare the lengths of the fraction bars.

Since  $\frac{7}{8} > \frac{5}{6} > \frac{2}{3}$ , Rosa ran the farthest.



### CHECK

- What other strategy could you use to solve the problem?

## Problem Solving Practice

For 1–4, use *make a model* to solve.

1. **What if** George had run  $\frac{9}{10}$  mile? Who would have run the farthest?
2. Tina used  $\frac{2}{3}$  cup of milk,  $\frac{1}{4}$  cup of sugar, and  $\frac{1}{2}$  cup of nuts in a recipe. Of which ingredient did she use the most?

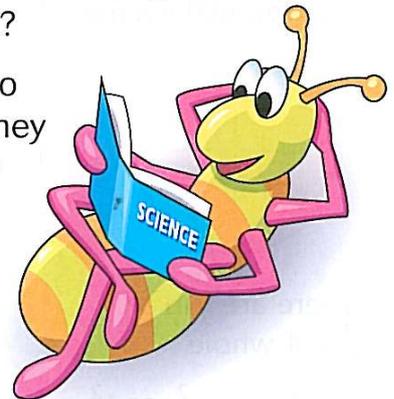
Mr. Collins asked his science class to read a book on insects. By Friday, Alfredo had read  $\frac{1}{2}$  of the book. Courtney had read  $\frac{2}{5}$  of the book. Sandy had read  $\frac{2}{8}$  of the book.

3. Which statement is true?

- A  $\frac{2}{8} > \frac{2}{5} > \frac{1}{2}$
- B  $\frac{1}{2} > \frac{2}{5} > \frac{2}{8}$
- C  $\frac{1}{2} > \frac{2}{8} > \frac{2}{5}$
- D  $\frac{2}{5} > \frac{2}{8} > \frac{1}{2}$

4. Who had read the greatest part of the book?

- F Alfredo
- G Courtney
- H Sandy



## Strategies

- Draw a Diagram or Picture
- Make a Model or Act It Out
- Make an Organized List
- Find a Pattern
- Make a Table or Graph
- Predict and Test
- Work Backward
- Solve a Simpler Problem
- Write a Number Sentence
- Use Logical Reasoning

## Mixed Strategy Practice

5. **REASONING** Mohammed folded a sheet of notebook paper in half and then folded it in half again. He unfolded the paper and shaded one of the equal parts red. What fraction shows how many parts are red?
7. Arlo has basketball practice from 3:30 P.M. to 5:00 P.M. It takes him a half hour to get home and one hour to do his homework before dinner. At what time does he eat dinner?
6. Eric had 74 baseball cards. He traded 26 of his cards for 12 of Paul's cards. How many cards does he have now?
8. **REASONING** Kathy is cutting a pie into 8 equal slices. Julie is cutting a pie into 6 equal slices. Kathy says her slices will be larger because 8 is greater than 6. Do you agree? Explain.

# Mixed Numbers

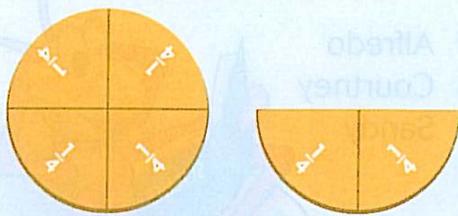
## Learn

**APPLE FRACTIONS** Miss Nell has 6 children in her after-school group. She gave each child  $\frac{1}{4}$  of an apple. How many apples did she give to the children in all?

Here are two ways to find the total number of apples.

### One Way

You can make a model.

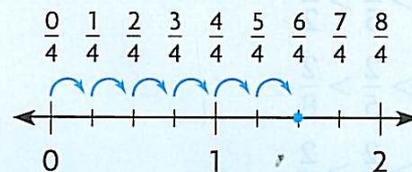


There are  $\frac{6}{4}$  in all.  
 $\frac{4}{4} = 1$  whole

So,  $\frac{6}{4} = 1 + \frac{2}{4}$ , or  $1\frac{2}{4}$ .

### Another Way

You can use a number line.



Show one jump for each  $\frac{1}{4}$ . Six jumps on the number line is two fourths more than 1.

So,  $\frac{6}{4} = 1 + \frac{2}{4}$ , or  $1\frac{2}{4}$ .

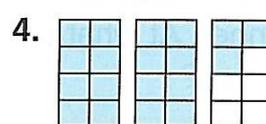
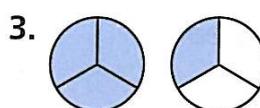
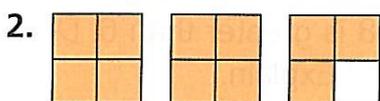
**Read:** one and two fourths      **Write:**  $1\frac{2}{4}$   
 So, Miss Nell gave the children  $1\frac{2}{4}$  apples in all.

The number  $1\frac{2}{4}$  is a mixed number. A **mixed number** is made up of a whole number and a fraction.

## Check

1. **Explain** how to write  $\frac{3}{2}$  as a mixed number.

Write a mixed number for the parts that are shaded.



## Quick Review

Write a fraction for the shaded part.

- 
- 
- 
- 
- 

## VOCABULARY

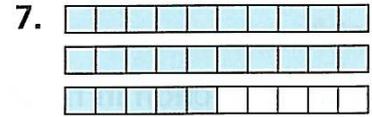
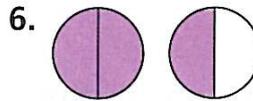
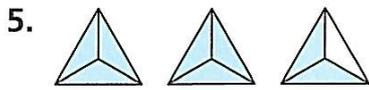
**mixed number**



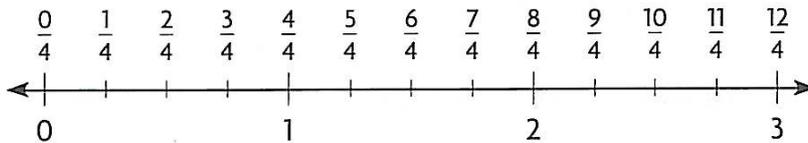
## Practice and Problem Solving

Extra Practice, page 534, Set E

Write a mixed number for the parts that are shaded.



For 8–12, use the number line to write the mixed number.



8.  $\frac{5}{4}$

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

10.  $\frac{11}{4}$

11.  $\frac{10}{4}$

12.  $\frac{9}{4}$

For 13–17, make a model to show the mixed number.

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

14.  $2\frac{1}{2}$

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

16.  $3\frac{3}{4}$

17.  $1\frac{3}{10}$

18. Oren said that there were  $2\frac{1}{2}$  pizzas. If all of the pieces were eighths, how many pieces of pizza were there?

20. Each cake has 10 equal slices. If each person eats one slice, how many cakes will 28 people eat? Draw a picture to explain.

22. Chris is making a model to show  $2\frac{3}{6}$ . How many sixths will he need for his model?

19. **Vocabulary Power** The word *equivalent* means “equal in value.” Write a mixed number that is equivalent to  $2\frac{4}{6}$ .

21. **Write About It** Explain why a fraction is equal to 1 when the numerator and denominator are equal.

23. **REASONING** Since  $\frac{2}{2}$  equals 1, what does  $\frac{6}{2}$  equal?

## Mixed Review and Test Prep

Find the number that the variable stands for. (p. 242)

24.  $7 \times r = 35$   
 $r = ?$

25.  $s \times 4 = 36$   
 $s = ?$

26.  $24 \div t = 6$   
 $t = ?$

27.  $u \div 8 = 2$   
 $u = ?$

28. **TEST PREP** Jenna has 12 tomato plants in 4 equal rows. Which expression tells how many plants are in each row? (p. 264)

A  $12 + 4$

C  $12 \div 4$

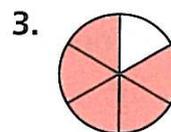
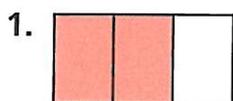
B  $12 - 4$

D  $12 \times 4$

# Extra Practice

## Set A (pp. 516–519)

Write a fraction in numbers and in words that names the shaded part.



Make a model of each, using fraction circle pieces. Then write the fraction, using numbers.

4. one eighth

5. four out of six

6. two divided by five

## Set B (pp. 520–521)

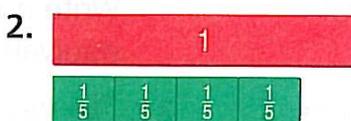
1. Draw 4 nickels. Circle  $\frac{3}{4}$  of them.

2. Draw 5 rectangles. Circle  $\frac{1}{5}$  of them.

3. Draw 8 triangles. Circle  $\frac{5}{8}$  of them.

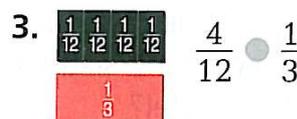
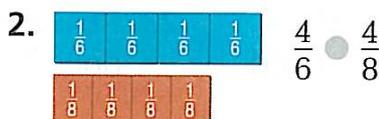
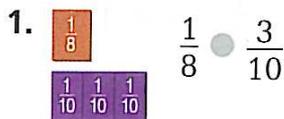
## Set C (pp. 522–525)

Find an equivalent fraction. Use fraction bars.



## Set D (pp. 526–529)

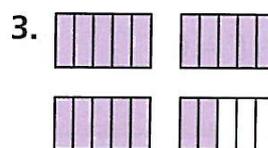
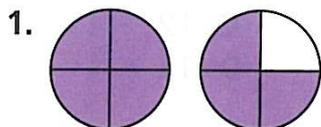
Compare. Write  $<$ ,  $>$ , or  $=$  for each  $\bullet$ .



4. Use fraction bars to order  $\frac{1}{2}$ ,  $\frac{3}{10}$ , and  $\frac{2}{3}$  from greatest to least.

## Set E (pp. 532–533)

Write a mixed number for the parts that are shaded.



# Review/Test

## ✓ CHECK VOCABULARY AND CONCEPTS

Choose the best term from the box.

- In the fraction  $\frac{3}{8}$ , the 3 is called the ?. (p. 516)
- A number that names part of a whole or part of a group is a ?. (p. 516)
- A number that is made up of a whole number and a fraction is called a ?. (p. 532)

fraction  
numerator  
denominator  
mixed number

Find the missing numerator. Use fraction bars. (pp. 522–525)



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



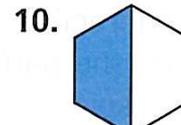
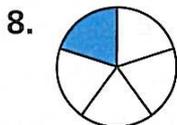
$$\frac{8}{10} = \frac{\square}{5}$$



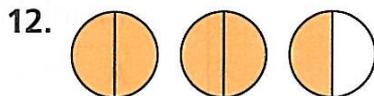
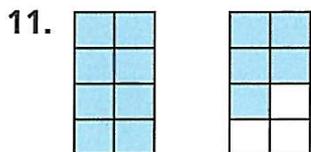
$$\frac{2}{3} = \frac{\square}{6}$$

## ✓ CHECK SKILLS

Write a fraction in numbers and in words that names the shaded part. (pp. 516–519)



Write a mixed number for the parts that are shaded. (pp. 532–533)



## ✓ CHECK PROBLEM SOLVING

Use *make a model* to solve. (pp. 530–531)

14. Luke walks  $\frac{1}{2}$  mile, Karen walks  $\frac{4}{5}$  mile, and Darius walks  $\frac{1}{3}$  mile. Who walks the farthest?

15. Katherine has 3 yellow pins, 4 blue pins, and 2 red pins. What fraction of the pins are red?