

## • Drawing Pictures of Fractions

### Power Up

#### facts

Power Up F

#### count aloud

Count by 12s from 12 to 120.

#### mental math

a. **Time:** How many months are in 4 years? ... 5 years? ... 6 years?

b. **Estimation:** Round 890 to the nearest hundred. Then multiply by 4. What is the answer?

c. **Number Sense:**  $4 \times 89$

d. **Number Sense:**  $4 \times 90$  minus  $4 \times 1$

e. **Percent:** 50% of 60¢

f. **Percent:** 25% of 60¢

g. **Percent:** 10% of 60¢

h. **Calculation:**  $9 \times 9$ ,  $- 9$ ,  $\div 9$

#### problem solving

Choose an appropriate problem-solving strategy to solve this problem. The license plates of a certain state have three letters followed by three digits. One license plate reads “CAR 123.” How many different license plates from the state could begin with “CAR” and end with any arrangement of all the digits 1, 2, and 3? List the possible license plates.

### New Concept

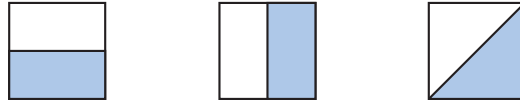
A picture can help us understand the meaning of a fraction.

### Example 1

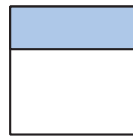
Draw three squares and shade  $\frac{1}{2}$  of each square a different way.

The denominator of  $\frac{1}{2}$  tells us to cut each square into two equal parts. The numerator of the fraction tells us to shade one of the parts.

There are many ways to do this. Here we show three different ways:



When drawing pictures of fractions, we must always be careful to divide the pictures into *equal* parts. The square below has been cut into two parts, but the parts are not equal. Therefore, the square has not been divided into halves.



This does not represent  $\frac{1}{2}$ .

#### Thinking Skill

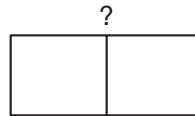
##### Model

How many different ways can you fold a piece of paper to show  $\frac{1}{4}$ ?

### Example 2

Draw a rectangle and shade  $\frac{1}{3}$  of it.

After we draw the rectangle, we must divide it into three equal parts. If we begin by dividing it in half, we will not be able to divide it into three equal parts.

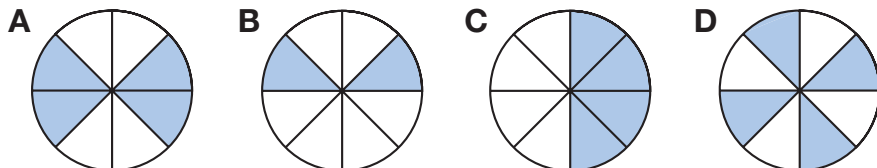


We must plan ahead. To form 3 parts, we draw 2 equally spaced segments. Here we show two different ways to shade  $\frac{1}{3}$  of a rectangle:



### Example 3

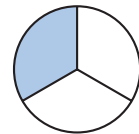
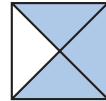
A circular courtyard is made of white stone and blue stone. If  $\frac{1}{2}$  of the courtyard is made of blue stone, which diagram could *not* represent the courtyard? Explain why.



We see that the circular courtyard is divided into eight equal parts. Since 4 is  $\frac{1}{2}$  of 8 and 4 parts are made of blue stone, then half of the courtyard is blue stone. Diagrams **A**, **C**, and **D** all show that half of the courtyard is blue. Diagram **B** could not represent the courtyard because only 2 of the 8 sections are blue.

## Lesson Practice

- Represent** Draw a circle and shade  $\frac{1}{4}$  of it.
- Represent** Draw a rectangle and shade  $\frac{2}{3}$  of it.
- Represent** The shaded portion of this square represents the fraction  $\frac{3}{4}$ . Show another way to shade  $\frac{3}{4}$  of a square.
- Represent** The shaded portion of this circle represents the fraction  $\frac{1}{3}$ . Draw a circle and shade  $\frac{2}{3}$  of it.



## Written Practice

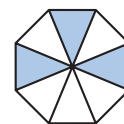
*Distributed and Integrated*

- \* **1. Represent** Draw a pair of horizontal parallel line segments. Make the lower segment longer than the upper segment.  
(12, 31)

- 2. Represent** Draw three rectangles and shade  $\frac{1}{2}$  of each rectangle a different way. What percent of each rectangle is shaded?  
(30, 37)

**Formulate** For problems **3–5**, write an equation and find the answer.

- 3.** When Ramon cleaned his room, he found 39 marbles, 20 baseball cards, a toothbrush, 4 pencils, and a sock. How many items did he find?  
(11)
- 4.** A foot is equal to 12 inches. How many inches does 3 feet equal?  
(17, 21)
- 5.** How many years were there from 1517 to 1620?  
(35)
- 6. List** Write the factors of 40.  
(25)
- \* **7.** What fraction of this octagon is not shaded? Is more than or less than 50% of the octagon not shaded? What percent of the octagon is shaded?  
(30)



8. Joleen awoke this morning at 6:37 a.m. and left for school 48 minutes later. What time did Joleen leave her home to go to school?

9. Round 46 to the nearest ten.

\*10. **Represent** Draw a right triangle.

11. 
$$\begin{array}{r} \$36.51 \\ \$74.15 \\ + \$25.94 \\ \hline \end{array}$$

12. 
$$\begin{array}{r} 3040 \\ - \quad w \\ \hline 2950 \end{array}$$

13. 
$$\begin{array}{r} \$90.00 \\ - \$20.30 \\ \hline \end{array}$$

14. 
$$\begin{array}{r} 592 \\ \times 90 \\ \hline \end{array}$$

15. 
$$\begin{array}{r} \$4.75 \\ \times 80 \\ \hline \end{array}$$

16. 
$$\begin{array}{r} 43 \\ c \\ 29 \\ 467 \\ + 94 \\ \hline 700 \end{array}$$

17. Compare:  $\frac{840}{8} \bigcirc \frac{460}{4}$

18.  $720 \times 400$

19.  $6w = \$12.24$

20.  $1000 \div (100 \div 10)$

21.  $60 \times (235 \div 5)$

22.  $42 \times 30 \times 7$

23.  $\$20 - (\$3.48 + \$12 + \$4.39)$

24. **Explain** Duncan fit one half of a circle, one fourth of a circle, and one tenth of a circle together. What percent of the circle was missing? Explain how you found your answer.

\*25. **Multiple Choice** Which two of these shapes are *not* polygons?

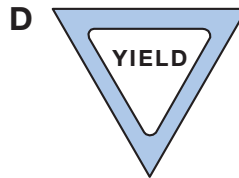
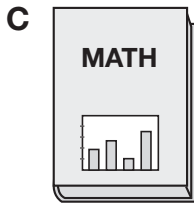
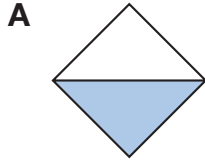


26. **Represent** Draw a rectangle and shade  $\frac{1}{3}$  of it.

27. What year was one decade before 1932?

- \*28. a. **Verify** An octagon has how many angles?  
(23, 32)
- b. **Verify** A quadrilateral has how many angles?
- c. Use the answers to parts **a** and **b** to write a fraction equal to  $\frac{1}{2}$ .

29. **Multiple Choice** Which of these shapes is *not* a quadrilateral?  
(32)



30. **Estimate** The highest-scoring All-Star game in the National Basketball Association happened in 1987 when the West team defeated the East team 154–149. About how many points were scored during that game altogether?  
(33)

## Early Finishers

Real-World Connection

Monique has 64 songs on her mp3 player. Three eighths of the songs are less than three minutes long.

- a. Draw a diagram to illustrate the problem.
- b. Use the diagram to find the number of songs that are less than three minutes long.