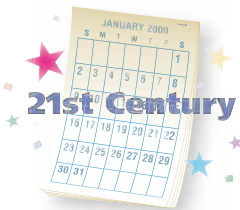# 4.1 Percents and Fractions

Essential Question How can you use a model to write a percent as a fraction or write a fraction as a percent?

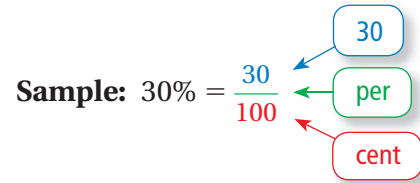## The Meaning of a Word ● Percent

A century is 100 years.

A cent is one hundredth of a dollar.
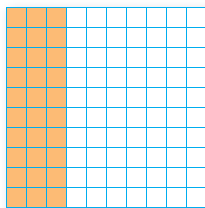
In Mexico, a centavo is one hundredth of a peso.

"Cent" means one hundred, so "percent" means per one hundred. The symbol for percent is **%.**

Sample: $30\% = \dfrac{30}{100}$

30 → per → cent

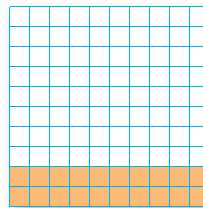## 1 ACTIVITY: Writing Percents as Fractions

Work with a partner. Write the percent shown by the model. Write the percent as a fraction with a denominator of 100. Simplify the fraction.
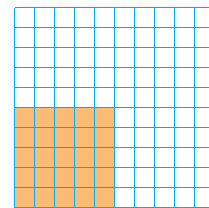
a. Sample:

$$30\% = \dfrac{30}{100} = \dfrac{3}{10}$$

b.

c.

2 ACTIVITY: Writing Percents as Fractions

Work with a partner. Draw a model to represent the percent. Write the percent as a fraction with a denominator of 100. Simplify the fraction.
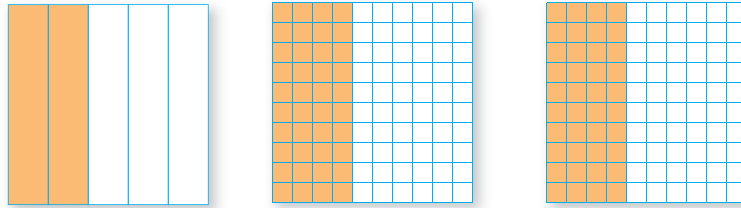
a. 60%   **b.** 5%   **c.** 85%   **d.** 28%

ACTIVITY: Writing Fractions as Percents

Work with a partner. Draw a model to represent the fraction. Rewrite the fraction with a denominator of 100. Write the fraction as a percent.

a. Sample: $\dfrac{2}{5}$ $=$ $\dfrac{40}{100}$ $=$ 40%

b. $\dfrac{7}{10}$ **c.** $\dfrac{3}{5}$ **d.** $\dfrac{3}{4}$ **e.** $\dfrac{3}{25}$

What Is Your Answer?

4. IN YOUR OWN WORDS How can you use a model to write a percent as a fraction or write a fraction as a percent? Give an example with your answer.

5. Fractions that are terminating decimals are easier to write as percents than fractions that are repeating decimals. Write the percent shown by the model as a fraction. Explain your reasoning.

$33\frac{1}{3}\%$		

6. One way to answer a question about a percent is to write the percent as a fraction.

   a. Write the following question using a fraction.

      "How much is 50% of $2.00?"

   b. Use what you know about fractions to answer the question.

Another suggestion for the round file!

"Dear Sir, you could save a letter in writing 50% OFF by simply writing 50% ON."

7. A notebook has an original price of $8.00. The notebook is on sale for 75% of the original price. Use a model to determine how much you will pay for the notebook.

Practice   Use what you learned about percents and fractions to complete Exercises 4–7 and 17–20 on page 152.

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Key Vocabulary 🔊
percent, *p. 150*

A **percent** is the number of parts per one hundred.

$$60\% = 60 \text{ out of } 100 = \frac{60}{100}$$

parts
per
one hundred

🔑 Key Idea
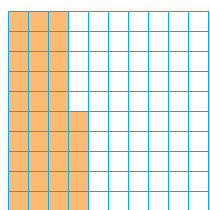
Writing Percents as Fractions

Words   Write the percent as a fraction with a denominator of 100.
Then simplify if possible.

Numbers $30\% = \dfrac{30}{100} = \dfrac{3}{10}$ **Algebra** $n\% = \dfrac{n}{100}$

EXAMPLE ①   **Writing Percents as Fractions**

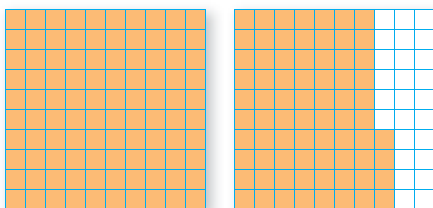**a.   Write 35% as a fraction in simplest form.**

$$35\% = \frac{35}{100}$$ Write as a fraction with a denominator of 100.

$$= \frac{7}{20}$$ Simplify.

b.   Write 174% as a mixed number in simplest form.

$$174\% = \frac{174}{100}$$ Write as a fraction with a denominator of 100.

$$= \frac{87}{50}, \text{ or } 1\frac{37}{50}$$ Simplify.

∴   So, $174\% = 1\dfrac{37}{50}$.

🔴 On Your Own

Now You're Ready
Exercises 4–15

Write the percent as a fraction or mixed number in simplest form.

1. 15%   **2.** 168%

3. 36%   **4.** 83%

🔑 Key Idea

Writing Fractions as Percents

Words Write an equivalent fraction with a denominator of 100.

Numbers

$$\overset{\times\,25}{\frac{1}{4} = \underset{\times\,25}{\frac{25}{100}} = 25\%}$$

EXAMPLE 2 **Writing a Fraction as a Percent**

Write $\dfrac{3}{50}$ as a percent.

$$\overset{\times\,2}{\frac{3}{50} = \underset{\times\,2}{\frac{6}{100}} = 6\%}$$

$50 \times 2 = 100$. So, multiply the numerator and denominator by 2. Write the numerator with a percent symbol.

EXAMPLE 3 **Real-Life Application**

You delete $\dfrac{7}{8}$ of the pictures on a digital camera. What percent of the pictures did you delete?

$$\frac{7}{8} = 0.875 \qquad \text{Write } \frac{7}{8} \text{ as a decimal.}$$

$$= \frac{875}{1000} \qquad 0.875 \text{ is } 875 \text{ thousandths.}$$

$$= \frac{87.5}{100} \qquad \boxed{\frac{875 \div 10}{1000 \div 10} = \frac{87.5}{100}}$$

$$= 87.5\% \qquad \text{Write the numerator with a percent symbol.}$$

⁙ So, you deleted 87.5% of your pictures.

🔴 On Your Own

Now You're Ready
Exercises 17–28

Write the fraction as a percent.

5. $\dfrac{31}{50}$ **6.** $\dfrac{7}{25}$ **7.** $\dfrac{19}{20}$ **8.** $\dfrac{9}{40}$

9. You delete $\dfrac{1}{8}$ of the messages in your email inbox. What percent of the messages did you delete?

✔ Vocabulary and Concept Check

1. **WHICH ONE DOESN'T BELONG?** Which one does *not* have the same value as the other three? Explain your reasoning.

$$\frac{4}{25} \qquad 16\% \qquad \frac{2}{12} \qquad \frac{16}{100}$$

2. **OPEN-ENDED** Write three different fractions that are less than 40%.

3. **NUMBER SENSE** Can $1\frac{1}{4}$ be written as a percent? Explain.

Practice and Problem Solving

Write the percent as a fraction or mixed number in simplest form.

① 4. 45%   5. 90%   6. 15%   7. 77.5%

8. 34%   9. 79%   10. 23.9%   11. 188%

12. 0.25%   13. 224%   14. 146.8%   15. 0.4%

16. **ERROR ANALYSIS** Describe and correct the error in writing 225% as a fraction.

✗ $225\% = \frac{225}{1000} = \frac{9}{40}$

**Write the fraction as a percent. Which method did you use?**

② ③ 17. $\frac{1}{10}$ 18. $\frac{1}{5}$ 19. $\frac{11}{20}$ 20. $\frac{2}{25}$

21. $\frac{27}{50}$ 22. $\frac{18}{25}$ 23. $\frac{3}{8}$ 24. $\frac{13}{16}$

25. $\frac{17}{20}$ 26. $\frac{9}{16}$ 27. $\frac{33}{40}$ 28. $\frac{3}{50}$

29. **ERROR ANALYSIS** Describe and correct the error in writing $\frac{14}{25}$ as a percent.

✗ $\frac{14}{25} = \frac{14 \times 4}{25 \times 4} = \frac{56}{100} = 0.56\%$
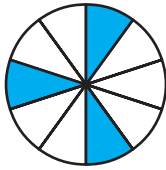
30. **LEFT-HANDED** Of the students in your class, 12% are left-handed. What *fraction* of the students are left-handed?

31. **BASKETBALL** A basketball player's made shots (•) and missed shots (✗) are shown. What percent of shots did the player make?
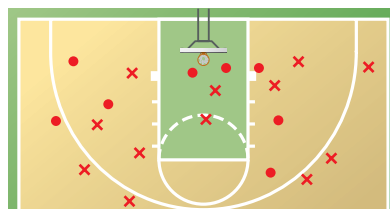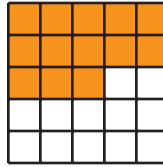
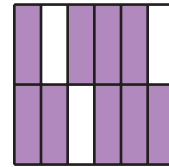**Write a fraction and a percent to represent the shaded portion of the model.**

32.

33.

34.

Write the mixed number as a percent.
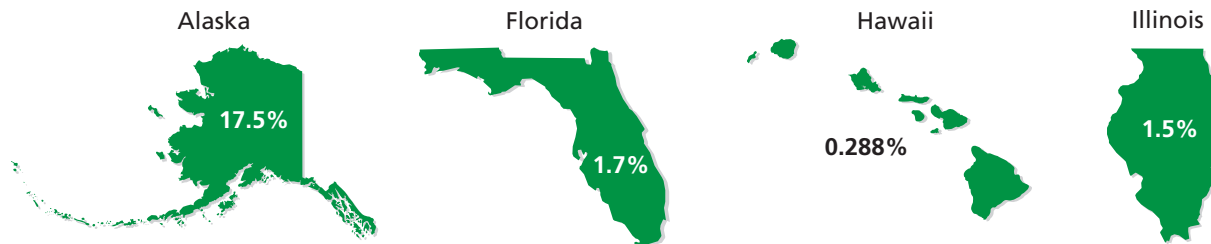
35. $2\dfrac{47}{50}$

36. $6\dfrac{3}{20}$

37. $3\dfrac{23}{25}$

38. $4\dfrac{9}{50}$

39. FUNDRAISER A school fundraiser raised 120% of its goal last year and 125% of its goal this year. Did the fundraiser raise more money this year? Explain your reasoning.

40. GEOGRAPHY The percent of the area of the United States that is in each of four states is shown.

Alaska

17.5%

Florida

1.7%

Hawaii

0.288%

Illinois

1.5%

    a. Write the percents as fractions in simplest form.

    b. How many times larger is Florida than Hawaii?

    c. Compared to the map of Florida, is the map of Alaska the correct size? Explain your reasoning.

    d. RESEARCH Which of the fifty states are larger than Florida?

41. **Reasoning** Write $\dfrac{1}{12}$ as a percent. Explain how you found your answer.

Fair Game Review *What you learned in previous grades & lessons*

Write the fraction as a decimal.

42. $\dfrac{17}{20}$

43. $\dfrac{9}{40}$

44. $\dfrac{7}{15}$

45. $\dfrac{15}{16}$

46. MULTIPLE CHOICE Twelve tickets to a concert cost $523.56. What is the cost of one ticket?

   Ⓐ $31.36   **Ⓑ** $43.51   **Ⓒ** $43.63   **Ⓓ** $44.38