

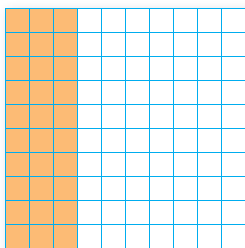
4.2 Percents and Decimals

Essential Question How does the decimal point move when you rewrite a percent as a decimal and when you rewrite a decimal as a percent?

1 ACTIVITY: Writing Percents as Decimals

Work with a partner. Write the percent shown by the model. Write the percent as a decimal.

a. Sample:



$$30\% = \frac{30}{100}$$

30 ←
per ←
cent ←

$$= \frac{\cancel{30}^3}{\cancel{100}^{10}}$$

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

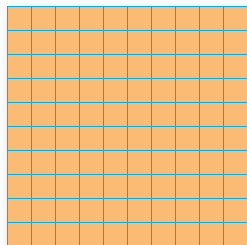
Divide out common factor of 10.

Simplify.

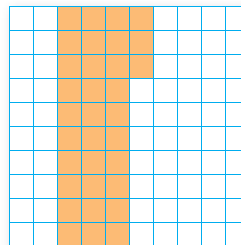
$$= 0.3$$

Write fraction as a decimal.

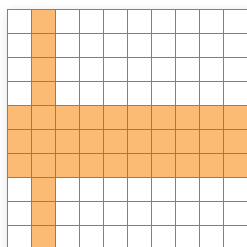
b.



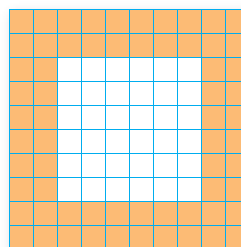
c.



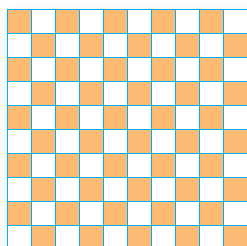
d.



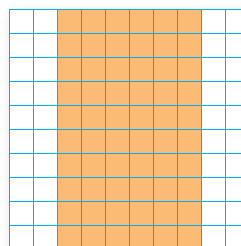
e.



f.



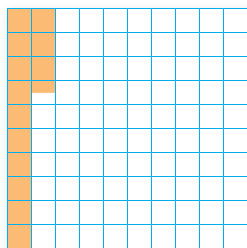
g.



2 ACTIVITY: Writing Percents as Decimals

Work with a partner. Write the percent as a decimal.

a. Sample: 13.5%



$$13.5\% = \frac{13.5}{100}$$

13.5
per
cent

$$= \frac{13.5 \cdot 10}{100 \cdot 10}$$

Multiply numerator and denominator by 10.

$$= \frac{135}{1000}$$

One hundred thirty-five thousandths

$$= 0.135$$

Write fraction as a decimal.

b. 12.5%

c. 3.8%

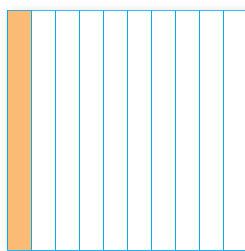
d. 0.5%

3 ACTIVITY: Writing Decimals as Percents

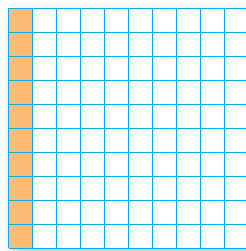
Work with a partner. Draw a model to represent the decimal. Write the decimal as a percent.

a. Sample: 0.1

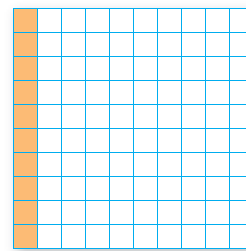
$$0.1 = 0.10 = \frac{10}{100} = 10\%$$



One Tenth



Ten Hundredths



Ten Percent

b. 0.24

c. 0.58

d. 0.05

What Is Your Answer?

4. **IN YOUR OWN WORDS** How does the decimal point move when you rewrite a percent as a decimal and when you rewrite a decimal as a percent?

Practice

Use what you learned about percents and decimals to complete Exercises 7–12 and 19–24 on page 158.

Key Idea

Writing Percents as Decimals

Words Remove the percent symbol. Then divide by 100, or just move the decimal point two places to the left.

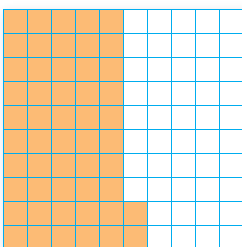
Numbers $23\% = 23.\% = 0.23$

EXAMPLE 1 Writing Percents as Decimals

- a. Write 52% as a decimal.

$$52\% = 52.\% = 0.52$$

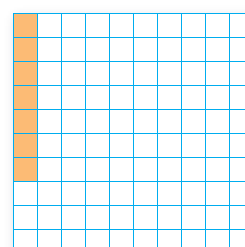
Check



- b. Write 7% as a decimal.

$$7\% = 07.\% = 0.07$$

Check



Study Tip

When moving the decimal point, you may need to place one or more zeros in the number.

On Your Own

Write the percent as a decimal. Use a model to check your answer.

1. 24%

2. 3%

3. 107%

4. 92.7%

Now You're Ready
Exercises 7–18

Key Idea

Writing Decimals as Percents

Words Multiply by 100, or just move the decimal point two places to the right. Then add a percent symbol.

Numbers $0.36 = 0.36 = 36\%$

EXAMPLE 2 Writing Decimals as Percents

- a. Write 0.47 as a percent.

$$0.47 = 0.47 = 47\%$$

- b. Write 0.663 as a percent.

$$0.663 = 0.663 = 66.3\%$$

- c. Write 1.8 as a percent.

$$1.8 = 1.80 = 180\%$$

On Your Own

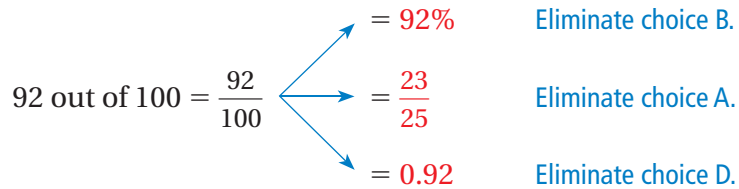
Write the decimal as a percent. Use a model to check your answer.

5. 0.94 6. 1.2 7. 0.316 8. 0.005

EXAMPLE 3 Standardized Test Practice

On a math test, you get 92 out of a possible 100 points. Which of the following is *not* another way of expressing 92 out of 100?

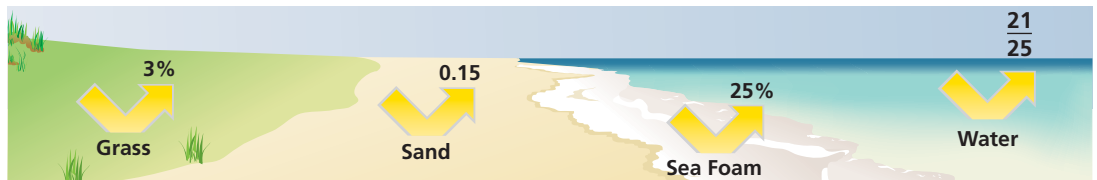
- (A) $\frac{23}{25}$ (B) 92% (C) $\frac{17}{20}$ (D) 0.92



∴ The correct answer is (C).

EXAMPLE 4 Real-Life Application

The figure shows the portions of ultraviolet (UV) rays reflected by four different surfaces. How many times more UV rays are reflected by water than by sea foam?



Write 25% and $\frac{21}{25}$ as decimals.

Sea Foam: $25\% = \underbrace{25.}_{\text{red}}\% = 0.25$ **Water:** $\frac{21}{25} = \frac{84}{100} = 0.84$

Divide 0.84 by 0.25: $0.25 \overline{)0.84} \rightarrow 25 \overline{)84.00}$ $\begin{array}{r} 3.36 \\ 25 \overline{)84.00} \end{array}$

∴ So, water reflects about 3.4 times more UV rays than sea foam.

On Your Own

9. Write “18 out of 100” as a percent, fraction, and decimal.
10. In Example 4, how many times more UV rays are reflected by water than by sand?

Vocabulary and Concept Check

MATCHING Match the decimal with its equivalent percent.

1. 0.42 2. 4.02 3. 0.042 4. 0.0402
 A. 4.02% B. 42% C. 4.2% D. 402%

5. **OPEN-ENDED** Write three different decimals that are between 10% and 20%.
 6. **WHICH ONE DOESN'T BELONG?** Which one does *not* belong with the other three? Explain your reasoning.

70%

0.7

$\frac{7}{10}$

0.07

Practice and Problem Solving


Write the percent as a decimal.

1. 78% 8. 55% 9. 18.5%
 10. 57.4% 11. 33% 12. 9%
 13. 47.63% 14. 91.25% 15. 166%
 16. 217% 17. 0.06% 18. 0.034%


Write the decimal as a percent.

2. 19. 0.74 20. 0.52 21. 0.89
 22. 0.768 23. 0.99 24. 0.49
 25. 0.487 26. 0.128 27. 3.68
 28. 5.12 29. 0.0371 30. 0.046

31. **ERROR ANALYSIS** Describe and correct the error in writing 0.86 as a percent.

 $0.86 = 00.86 = 0.0086\%$

32. **MUSIC** Thirty-six percent of the songs on your MP3 player are pop songs. Write this percent as a decimal.
 33. **CAT** About 0.34 of the length of a cat is its tail. Write this decimal as a percent.
 34. **COMPUTER** Write the percent of free space on the computer as a decimal.

Volume	Capacity	Free Space	% Free Space
 (C:)	149 GB	133 GB	89 %

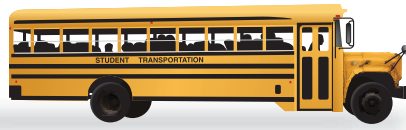
Write each percent as a fraction in simplest form and as a decimal.

35. 36% 36. 23.5% 37. 16.24%

38. **SCHOOL** The percent of students that travel to school by car, bus, and bicycle is shown for a school of 825 students.



Car 20%



School bus 48%

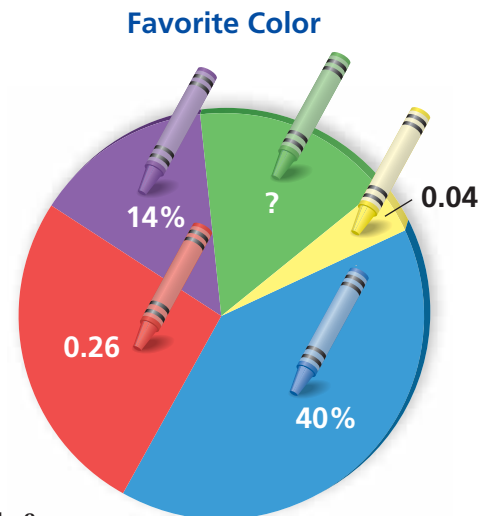


Bicycle 8%

- a. Write the percents as decimals.
 b. Write the percents as fractions.
 c. What percent of students use another method to travel to school?
 d. **RESEARCH** Make a bar graph that represents how the students in your class travel to school.
39. **ELECTIONS** In an election, the winning candidate received 60% of the votes. What percent of the votes did the other candidate receive?

40. **COLORS** Students in a class were asked to tell their favorite color.

- a. What percent said red, blue, or yellow?
 b. How many times more students said red than yellow?
 c. What percent of students said green? Write this percent as a decimal.



41. **Number Sense** In the first 42 Super Bowls, $0.1\bar{6}$ of the MVPs (most valuable players) were running backs.
- a. What percent of the MVPs were running backs?
 b. What fraction of the MVPs were *not* running backs?



Fair Game Review What you learned in previous grades & lessons

Write the decimal as a fraction or mixed number in simplest form. (Section 2.7)

42. 0.46 43. 0.31 44. 2.2 45. 4.32

Simplify the expression. Explain each step. (Section 1.3)

46. $9 + (4 + x)$ 47. $(7 + y) + 14$
 48. $7(8w)$ 49. $6 \cdot c \cdot 5$

50. **MULTIPLE CHOICE** Ham costs \$4.48 per pound. Cheese costs \$6.36 per pound. You buy 1.5 pounds of ham and 0.75 pound of cheese. How much more do you pay for the ham? (Section 3.3)

- (A) \$1.41 (B) \$1.95 (C) \$4.77 (D) \$6.18