

Lesson 7

Using Rates to Solve Percent Problems

- 6.RP.3** Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
- 6.RP.3** c. Find a percent of a quantity as a rate per 100; solve problems involving finding the whole, given a part and the percent.



Understand the Standards

There are many real-world connections to percents. Some examples are sale prices, markups, interest, commission, raises, and tips.

Ann Marie needs to buy a pack of tube socks for softball. She finds a pack that costs \$8.00 and has a “25% off” sticker. She finds another pack that she likes a little better for the same price, but it is not on sale. How much money will Ann Marie save if she buys the tube socks that are on sale?

Words to Know

percent



To find a sale price, you need to know something about percents.

A **percent** (%) is a special type of ratio that compares a number to 100. The term *per cent* means “per hundred.”

To find the percent of a quantity, write the percent as a rate per hundred, and write the quantity as a fraction with a denominator of 1. Then multiply.

For example, 5% of 30 is $\frac{5}{100} \times \frac{30}{1} = \frac{150}{100} = 1.5$.

If you are given a part of a quantity and the percent, you can find the whole quantity by writing and solving a proportion that involves one ratio whose denominator is 100.

Use this strategy to write the proportion:

$$\frac{\%}{100} = \frac{\text{part}}{\text{whole}}$$

For example, if 40% of a quantity is 12, the proportion is $\frac{40}{100} = \frac{12}{?}$. Solve the proportion using cross products.



Guided Instruction

To find the percent of a quantity, follow some simple steps.

Step 1 Write the percent as a rate per hundred.

$$25\% = \frac{25}{100}$$



Step 2 Multiply the quantity by the rate. Remember that every whole number can be written as a fraction with a denominator of 1.

$$\frac{25}{100} \times \frac{8}{1} = \frac{200}{100} = 2$$

Step 3 Use your calculations to answer the question.

Since the pack of socks is 25% off and 25% of \$8.00 is \$2.00, Ann Marie will save \$2.00 if she buys the pack that is on sale.



On Your Own

Use the strategy above to find the percent of the given quantity.

1. 10% of 65

2. 25% of 48

3. 20% of 140

4. 75% of 200

5. 16% of 16

6. 1% of 500

7. 2.5% of 80

8. 150% of 36

9. 200% of 140

Use what you now know about percents to answer each question.

10. What is 45% of 120?

11. The Coopers' food bill at a restaurant came to \$76.00. How much should Mr. Cooper leave for a 15% tip?

12. Thirty percent of a number is 24. Write and solve a proportion to find the number.

13. A desk at a furniture store has been discounted 20% because it was slightly damaged. If the original price was \$290, what is the amount of the discount?

Answer each question. Show your work.

14. Francine has a collection of 25 dolls. If 12% of the dolls are China dolls, how many of the dolls are not China dolls? Explain how you found your answer.

15. Luke got 88% of the questions on his math test correct. The number of questions he got correct was 22. How many questions were on the test? Justify your answer by writing and solving a proportion.

16. Gerard earns 3% annual interest on his \$5,000 certificate of deposit. How much interest does he earn in 2 years?

A. \$15
C. \$150

B. \$30
D. \$300

17. Out of 100 customers, 36 made a purchase. What percent of the customers did not make a purchase?


A. 36%
C. 64%

B. 54%
D. 100%

18. Sixty percent of a number is 18. Write and solve a proportion to find the number. Show your work.

Elevate

19. How much more would a 20% tip on an \$82.00 food bill be than a 15% tip? Answer the question by finding each percent of \$82.00 and comparing the results.

-  **20.** Explain in detail a different method to solve question 19. Then check to make sure the result is the same.



**Critical
Thinking**

- 21.** Working with two or three partners, make up and play a game about percents. On a set of 20 cards, write percents: 5%, 10%, 15%, etc., to 100%. On another set of 20 cards, write the names of some items you would like to “buy.” On each card, write the name of the item and the price.

Now you get to make up the rules for the game! Will each player draw an item card and a percent card, or will the cards be dealt out? Will players find different percents for the same item, or the same percent for different items? What will be the goal—to see which player saves the most money?