

Please get your clickers, calculators/devices and notebooks ready.

We are continuing our study of percents, and will focus on percent problems in equation form today.

Get ready for the warm-up questions.



Solve:  $3n = 51$

**A** 153

**B** 18

**C** 106

**D** 17



**Solve:  $x/4=12$**

**A** 3

**B** 48

**C** not given

**Helpful hints to remember for today's lesson:**

**The word "is" is represented by an equals sign.**

**The word "of" means to multiply.**

# Solving Percent Problems Using Equations

## What You'll Learn

To use equations to solve problems involving percent

7.RP.3

## Why Learn This?

Suppose a ski resort reports that 60% of its trails are open. If you know how many trails are open, you can solve an equation to find the total number of trails in the park.

You can translate percent problems into equations to find parts, wholes, or percents.



You can translate percent problems into equations to find parts, wholes, or percents.

## EXAMPLE Finding a Whole

- 1 Multiple Choice** A ski resort in New Hampshire begins the season with 60% of its trails open. There are 27 trails open. How many trails does the ski resort have?

(A) 5                      (B) 16                      (C) 22                      (D) 45

**Words** 60% of the number of trails is 27



Let  $x$  = the number of trails at this ski resort.

**Equation**  $0.60 \cdot x = 27$

$$0.60x = 27 \quad \leftarrow \text{Write the equation.}$$

$$\frac{0.60x}{0.60} = \frac{27}{0.60} \quad \leftarrow \text{Divide each side by 0.60.}$$

$$x = 45 \quad \leftarrow \text{Simplify.}$$

The ski resort has 45 trails. The correct answer is choice D.

**1 EXAMPLE** Use an equation to solve: 18% of what number is 81?

**Words** 18% of a number is 81.



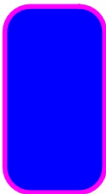
Let  $n$  = the number.

**Equation**  $0.18 \cdot n = 81$

$$\frac{0.18n}{0.18} = \frac{81}{0.18} \quad \leftarrow \text{Divide each side by 0.18.}$$

$$n = 450 \quad \leftarrow \text{Simplify.}$$

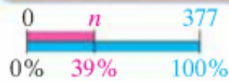
Table talk about this, then enter your answer in your clickers.



1. A plane flies with 54% if its seats empty. If 81 seats are empty, what is the total number of seats on the plane?
  - A. 98 seats
  - B. 150 seats
  - C. 41 seats
  - D. 135 seats

You can use an equation to find a whole, a part, or a percent.

**Test Prep Tip**



Remember that you can draw a model to help you. This model shows that  $n$  is 39% of 377.

**EXAMPLE Finding a Part**

2 What number is 39% of 377?

**Words** A number is 39% of 377

Let  $n$  = the number.

**Equation**  $n = 0.39 \cdot 377$

$$n = 0.39 \cdot 377 = 147.03 \leftarrow \text{Simplify.}$$

2 **EXAMPLE** Use an equation to solve: 32% of 40 is what number?

**Words** A number is 32% of 40.



Let  $n$  = the number.

**Equation**  $n = 0.32 \cdot 40$

$$n = 0.32 \cdot 40 = 12.8 \leftarrow \text{Simplify.}$$

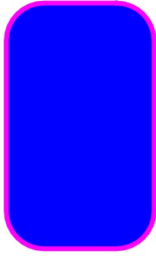


Table talk about this, then enter your answer in your clickers

1. 27% of 60 is what number?
  - A. 162
  - B. 87
  - C. 16.2
  - D. 0.162



### EXAMPLE Finding a Percent

- 3 Recreation** Of 3,072 teens surveyed, 2,212 say they read for fun. What percent of the teens surveyed say they read for fun?

**Estimate** About 2,000 of 3,000 teens read for fun.

$$\frac{2,000}{3,000} = \frac{2}{3} \approx 0.67 = 67\%$$

$$3,072p = 2,212 \quad \leftarrow \text{Write an equation. Let } p = \text{ the percent of teens who read for fun.}$$

$$\frac{3,072p}{3,072} = \frac{2,212}{3,072} \quad \leftarrow \text{Divide each side by 3,072.}$$

$$p \approx 0.7200520833 \quad \leftarrow \text{Use a calculator.}$$

$$p \approx 72\% \quad \leftarrow \text{Write the decimal as a percent.}$$

About 72% of the teens surveyed say they read for fun.

**Check for Reasonableness** 72% is close to the estimate 67%.

**3 EXAMPLE**

Use an equation to solve: What percent of 200 is 45?

**Words**      A percent of 200 is 45.



Let  $p$  = the percent.

**Equation**       $p \cdot 200 = 45$

$$p \cdot 200 = 45$$

$$200p = 45 \quad \leftarrow \text{Simplify.}$$

$$\frac{200p}{200} = \frac{45}{200} \quad \leftarrow \text{Divide each side by 200.}$$

$$p = 0.225 \quad \leftarrow \text{Use a calculator.}$$

$$p = 22.5\% \quad \leftarrow \text{Write the decimal as a percent.}$$

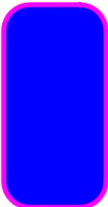


Table talk about this, then enter your answer in your clickers.

1. It rained 75 days last year. About what percent of the year was it raining?
  - A. about 486.6%
  - B. about 75%
  - C. about 52%
  - D. about 20.5%

Copy these three patterns into your notes please.

**KEY CONCEPTS** Percents and Equations

**Finding a Percent**

What percent of 25 is 5?

$$\begin{aligned}n \cdot 25 &= 5 \\ n &= 0.2\end{aligned}$$

5 is 20% of 25.

**Finding a Part**

What is 20% of 25?

$$\begin{aligned}n &= 0.2 \cdot 25 \\ n &= 5\end{aligned}$$

5 is 20% of 25.

**Finding a Whole**

20% of what is 5?

$$\begin{aligned}0.2 \cdot n &= 5 \\ n &= 25\end{aligned}$$

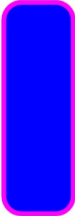
20% of 25 is 5.

Answer the remaining clicker questions on your own.

1. The questions: "What is 20% of 40?", "20 is what percent of 40?", and "20 is 40% of what number?" all mean the same thing.
  - A. True
  - B. False



**Match each question with the equation you could use to answer it.**



2. What is 16% of 200?

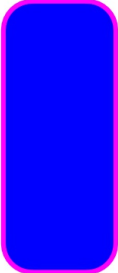
A.  $200 \times 16 = n$

B.  $n = 0.16(200)$

C.  $16 = 200n$

D.  $0.16n = 200$

**Match each question with the equation you could use to answer it.**



3. 16 is what percent of 200?

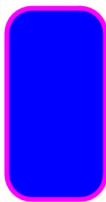
A.  $16 = 200n$

B.  $200 \times 16 = n$

C.  $n = 0.16(200)$

D.  $0.16n = 200$

**Match each question with the equation you could use to answer it.**



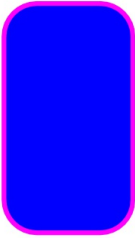
4. 16% of what number is 200?
- A.  $0.16n = 200$
  - B.  $200 \times 16 = n$
  - C.  $n = 0.16(200)$
  - D.  $16 = 200n$

**Write an equation for each question. Then answer the question.**



5. What percent of 625 is 500?
- A.  $625p = 500$ ; 95%
  - B.  $p = 500 \times 625$ ; 62.5%
  - C.  $625p = 500$ ; 80%
  - D.  $p = 500 + 625$ ; 80%

**Write an equation for each question. Then answer the question.**



6. What number is 5% of 520?
- A.  $n = 0.05 \times 520$ ; 26
  - B.  $5n = 520$ ; 104
  - C.  $n = 5 \times 520$ ; 2600
  - D.  $0.05n = 520$ ; 260



**Power down your clickers and put them away. Your assignment is a worksheet.**

**Practice 5-3** Solving Percent Problems Using Equations

Write and solve an equation. Round answers to the nearest tenth.

- |   |   |
|---|---|
| <p>1. What percent of 64 is 48?<br/>_____</p> <p>3. 25% of what number is 24?<br/>_____</p> <p>5. 48% of 83 is what number?<br/>_____</p> <p>7. What percent of 530 is 107?<br/>_____</p> <p>9. 62% of what number is 84?<br/>_____</p> <p>11. 37% of 245 is what number?<br/>_____</p> | <p>2. 16% of 130 is what number?<br/>_____</p> <p>4. What percent of 18 is 12?<br/>_____</p> <p>6. 40% of what number is 136?<br/>_____</p> <p>8. 74% of 643 is what number?<br/>_____</p> <p>10. What percent of 84 is 50?<br/>_____</p> <p>12. 12% of what number is 105?<br/>_____</p> |
|---|---|

**Solve.**

13. A cafe offers senior citizens a 15% discount off its regular price of \$8.95 for the dinner buffet.
- What percent of the regular price is the price for senior citizens? \_\_\_\_\_
  - What is the price for senior citizens? \_\_\_\_\_
14. According to a recent government study, the average 15-year-old male gets 11.4% of his daily caloric intake from sugar drinks. If that 15-year-old consumes 2,400 calories each day, how many calories come from sugar drinks? \_\_\_\_\_