

# Using an Equation to Find a Number When a Percent Is Known

## 1 Here's How

An algebraic equation can help you find a number when a percent is known. Use a decimal for the percent.

The variable stands for the unknown whole.

Look at these examples.

$$\begin{array}{l} 20\% \text{ of } n \text{ is } 8 \\ \downarrow \quad \downarrow \quad \downarrow \\ 0.20 \cdot n = 8 \end{array}$$

$$0.2 \cdot n = 8$$

$$\begin{array}{l} \frac{0.2n}{0.2} = \frac{8}{0.2} \\ n = 40 \end{array}$$

$$\begin{array}{l} n = \frac{8}{0.2} \\ n = 8 \div 0.2 = 40 \end{array}$$

### Example 1

To find the number that 8 is 20% of, write an equation.

Write the percent as an equivalent decimal:  $20\% = 0.20 = 0.2$ .

Translate the statement into an equation:  $0.2 \cdot n = 8$ .

You can also write this as  $0.2n = 8$ .

Then solve the equation for  $n$ .

Isolate the variable by dividing both sides by 0.2:

$$0.2n \div 0.2 = 8 \div 0.2 \rightarrow n = 40.$$

So, 20% of 40 is 8.

### Example 2

A shortcut for this equation is to set the variable equal to the ratio of the part to the percent as a decimal. Then divide.

## 2 Try It

Complete each step.

15 is 60% of  $n$

Write an equation to find the number that 15 is 60% of.

$$n = \underline{25}$$

What is the decimal equivalent of 60%? 0.60

Translate the statement into an equation: 15 = 0.60  $\cdot n$ .

How can you isolate the variable? divide both sides by 0.60

Isolate the variable and solve for  $n$ :

$$\underline{15 \div 0.60 = 0.60 \cdot n \div 0.60 \rightarrow 25 = n}$$

Complete this statement: 15 is 60% of 25.

### 3 On Your Own

Write an equation to solve each problem.

1. 60% of  $n$  is 45

$$0.6 \cdot n = 45$$

$$n = 45 \div 0.6$$

$$n = 75$$

2. 4% of  $n = 12$

$$0.04 \cdot n = 12$$

$$n = 12 \div 0.04$$

$$n = 300$$

3. 24 is 75% of  $n$

$$24 = 0.75 \cdot n$$

$$24 \div 0.75 = n$$

$$n = 32$$

4. 7% of  $n$  is 49

$$0.07 \cdot n = 49$$

$$n = 49 \div 0.07$$

$$n = 700$$

5. 9 is 30% of  $n$

$$9 = 0.3 \cdot n$$

$$9 \div 0.3 = n$$

$$n = 30$$

6. 110% of  $n$  is 74.8

$$1.1 \cdot n = 74.8$$

$$n = 74.8 \div 1.1$$

$$n = 68$$

7. 42% of  $n$  is 50.4

$$0.42 \cdot n = 50.4$$

$$n = 50.4 \div 0.42$$

$$n = 120$$

8. 0.5% of  $n$  is 2.5

$$0.005 \cdot n = 2.5$$

$$n = 2.5 \div 0.005$$

$$n = 500$$

9. 45.92 is 56% of  $n$

$$45.92 = 0.56 \cdot n$$

$$45.92 \div 0.56 = n$$

$$n = 82$$

10. 200% of  $n$  is 16

$$2 \cdot n = 16$$

$$n = 16 \div 2$$

$$n = 8$$

11. \$1.25 is 2.5% of  $n$

$$1.25 = 0.025 \cdot n$$

$$1.25 \div 0.025 = n$$

$$n = \$50$$

12. 95% of  $n$  is 10.26

$$0.95 \cdot n = 10.26$$

$$n = 10.26 \div 0.95$$

$$n = 10.8$$

### 4 Think About It

Answer the question. Write your answer below.

13. Howard finds 0.25% of a number to be 6. Is the number greater than or less than 6? Explain.

*Explanations will vary; example:* The number is greater than 6 because 0.25% is only  $\frac{1}{4}$  of 1%. That means 1% would be 4 times 6, or 24, and the number itself, or 100%, would be 100 times 24, or 2,400.