

Percent Problems: The Proportion Method

A percent is a ratio of the number to 100. The second number of the ratio form of a percent is always 100.

EXAMPLES:

$$5\% \text{ is } \frac{5}{100} \text{ or } 5:100 \text{ or } 5 \text{ to } 100$$

$$33\% \text{ is } \frac{33\frac{1}{3}}{100} \text{ or } 33\frac{1}{3}:100 \text{ or } 33\frac{1}{3} \text{ to } 100$$

A percent equation can be solved using proportions. You may wish to review proportions in your text. The proportion must have two equal ratios. One of the ratios will be determined by the percent. The other ratio will be the Amount to the Base, written $\frac{\text{amount}}{\text{base}}$.

You may recall the form of the basic percent equation

$$\text{Percent} \times \text{Base} = \text{Amount}$$

or

$$\text{Amount} = \text{Percent} \times \text{Base}$$

If you choose the proportion method to solve percent problems, you must be able to identify the base and the amount, but you will not have to find fraction, decimal and percent equivalents, since the percent number itself is written over 100 for one ratio. You will use a letter such as n for the unknown number.

Most students prefer mastering only one method at first. If you choose the proportion method, you may have a little trouble with interest problems later. Therefore, method II is preferred.

EXAMPLES: Each problem has been solved in two ways. In part 1, proportions were used and in part 2, the percent equation was used.

I. Using Proportions:

$$\frac{\text{Percent}}{100} = \frac{\text{Amount}}{\text{Base}}$$

II. Translating percent to fraction or decimal; “of” to \times and “is” to $=$.

1. Find 3.7% of 24.

24 is the Base.

The amount is not known.

$$\frac{3.7}{100} = \frac{n}{24}$$

Find the cross products:

$$\begin{aligned} 100 \times n &= 3.7 \times 24 \\ 100n &= 88.8 \\ n &= 88.8 \div 100 \\ n &= 0.888 \end{aligned}$$

Find 3.7% of 24, THINK: What is 3.7% of 24? The first step is to convert the % to a decimal: .037

$$\begin{aligned} n &= .037 \times 24 \\ n &= 0.888 \end{aligned}$$

2. What percent of 180 is 54?

The percentage number is not known. The base is 180. The amount is 54.

$$\frac{n}{100} = \frac{54}{180}$$

$$\begin{aligned} 180 \times n &= 54 \times 100 \\ 180 \times n &= 5400 \\ 180 \times n &= 5400 \\ \frac{180 \times n}{180} &= \frac{5400}{180} \end{aligned}$$

$$n = 30$$

The percent is 30%. (Notice n is the percent number. The decimal point is not moved in this method!)

What percent of 180 is 54?

$$\begin{aligned} n \times 180 &= 54n \\ &= 54 \div 180 \end{aligned}$$

3. 52% of what is 26?
26 is the amount.
The base is not known.

$$\frac{52}{100} = \frac{26}{n}$$

$$\begin{aligned}52 \times n &= 100 \times 26 \\52 \times n &= 2600 \\52n &= 2600\end{aligned}$$

$$n = 50$$

(or use algebra, dividing each side by 52)

This is the decimal value. Now write it as a percent.

52% of what is 26?

$$\begin{aligned}.52 \times n &= 26 \\n &= 26 \div 0.52 \\n &= 50\end{aligned}$$

Practice using whichever method you prefer. You may want to learn both methods; but if you're having trouble, it's better to learn one way well!

1. Find 87 % of 640.
2. What percent of 12 is 15?
3. 16 % of what is 84?
4. 45.92 is what percent of 574?
5. Find $\frac{1}{2}$ % of 600.
6. 300 is what percent of 180?

To solve the following applications, first write the percent equation. Then use either method to solve it!

7. Thirty-seven wells in Tallahassee were tested in July 1989. Thirteen of these wells were contaminated. What percent of the wells were contaminated? (Answer to the nearest tenth of a percent.)

8. 115 members of high school band marched in the parade. This was 83 % of the band. How many total members were there in the band?

9. Laura got 84% of the 150 test questions right. How many correct answers did she have?

10. Twelve thousand people played a lottery game. Eighteen people won some money on the game. What percentage of the players won money in this game?

Answers: Get help if you miss any of these!

1. 560
2. 125%
3. 504
4. 8%
5. 3
6. $166\frac{2}{3}\%$

7. 35.1%
8. 138 members are in the band
9. 126 questions were answered correctly.

10. 0.15%