

# How to Do Word Problems



## Basic Percent With Applications

## Using Direct Translation

When you have	Use
What, What Number	$x$
What Percent, $P\%$	$\frac{P}{100}$
What Percent of, $P\%$ of	$\frac{P}{100} \bullet$
is, get, become, equal, ...	$=$
$A$ of $B$	$\frac{A}{B}$

*Example:*

What is 8.5% of 1200?

**Solution:**

Using the translation table, we get

$$\begin{aligned}x &= \frac{8.5}{100} \cdot 1200 \\x &= 0.085 \cdot 1200 \\x &= 102\end{aligned}$$

8.5% of 1200 is 102.

*Example:*

2.5% of what number is 250?

**Solution:**

Using the translation table, we get

$$\frac{2.5}{100} \cdot x = 250$$

$$0.025x = 250$$

$$x = \frac{250}{0.025}$$

$$x = 10,000$$

2.5% of 10,000 is 250.

*Example:*

What percent of 750 is 900?

**Solution:**

Using the translation table, we get

$$\frac{P}{100} \cdot 750 = 900$$

$$7.5P = 900$$

$$P = \frac{900}{7.5}$$

$$P = 120$$

120% of 750 is 900.

*Example:*

What percent is 5 of 8?

**Solution:**

Using the translation table, we get

$$\frac{P}{100} = \frac{5}{8}$$

$$8P = 100(5)$$

$$P = \frac{500}{8}$$

$$P = 62.5$$

62.5% is 5 of 8.

## Using Proportion

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

**PERCENT** - the number with the percent sign (%).

**PART** - the number with the word is.

**WHOLE** - the number with the word of.

*Example:*

What is 0.25% of 1400?

**Solution:**

We first identify that percent is 0.25 and whole is 1400, we now can use the proportion method to solve.

$$\begin{aligned}\frac{\textit{Part}}{\textit{Whole}} &= \frac{P}{100} \\ \frac{x}{1400} &= \frac{0.25}{100} \\ 100x &= 0.25 \cdot 1400 \\ x &= 3.5\end{aligned}$$

0.25% of 1400 is 3.5.



*Example:*

125% of what number is 1000?

**Solution:**

We first identify that percent is 125 and part is 1000, we now can use the proportion method to solve.

$$\begin{aligned}\frac{\textit{Part}}{\textit{Whole}} &= \frac{P}{100} \\ \frac{1000}{x} &= \frac{125}{100} \\ 125x &= 1000(100) \\ x &= 800\end{aligned}$$

125% of 800 is 1000.

*Example:*

What percent of 920 is 138?

**Solution:**

We first identify that whole is 920 and part is 138, we now can use the proportion method to solve.

$$\begin{aligned}\frac{\textit{Part}}{\textit{Whole}} &= \frac{P}{100} \\ \frac{138}{920} &= \frac{P}{100} \\ 920P &= 138(100) \\ P &= \frac{13800}{920} = 15\end{aligned}$$

15% of 920 is 138.

*Example:*

Alicia got 21 correct answers on her written test at the DMV. The test had 24 questions. What was her percentage?

*Solution:*

We can rewrite this problem as 21 is what percent of 24 or what percent of 24 is 21. Now we can identify that whole is 24 and part is 21. we now can use the proportion method to solve.

$$\begin{aligned}\frac{\textit{Part}}{\textit{Whole}} &= \frac{P}{100} \\ \frac{21}{24} &= \frac{P}{100} \\ 24P &= 21(100) \\ P &= \frac{2100}{24} \\ P &= 87.5\end{aligned}$$

Solution(continued):

Her percentage was 87.5%.

*Example:*

Mark paid \$612 for a TV which was on sale at 20% discount. What was the actual price?



## Solution:

At 20% discount, customers pay 80% of the original price. So this problem can be translated to 80% of what number is 612? We now can use the direct translation method to solve.

$$\frac{80}{100} \cdot x = 612$$

$$0.8x = 612$$

$$x = \frac{612}{.8}$$

$$x = 765$$

The actual price was \$765.