

Proportions and Word Problems

Proportions can be used to solve any kind of word problem that involves multiplication or division. The great thing about them is that as long as you set up your proportion correctly, you won't have to worry about figuring out which operation you need, and that's the part that gives most people the most trouble. Setting a proportion up correctly is not very difficult as long as you label your rates.

Remember, a proportion is set up in the form $\frac{A}{B} = \frac{C}{D}$.

Example 1: If a car can travel 325 miles on 15 gallons of gasoline, how many gallons will it take to drive 800 miles?

To set up this proportion, the first fraction should be the information that we know and that is directly related to each other. In this case, it's "325 miles on 15 gallons". I usually put the first number on top and the second one on the bottom, but it doesn't matter. What's important is that if we put miles on top in the first fraction, we **must** put miles on top in the second fraction as well. This is why the labeling is important.

So, where does the 800 go? _____

$$\frac{325 \text{ miles}}{15 \text{ gallons}} = \frac{\text{miles}}{\text{gallons}}$$

Since the problem asks "how many gallons", then the "gallons" is our variable. You can use any variable you want, but mathematicians usually just use "x". Again, notice that since "gallons" is on the bottom in the first fraction, it must be on the bottom in the second fraction. So, here's what we should have:

$$\frac{325 \text{ miles}}{15 \text{ gallons}} = \frac{800 \text{ miles}}{x \text{ gallons}}$$

Once we have our numbers, we can drop the labels for the actual work of solving for "x":

$$\frac{325}{15} = \frac{800}{x} \quad \leftarrow \text{Cross multiply!}$$

So our answer should be around _____ gallons.

Example 2: One gallon of paint can cover 350 ft². How many gallons of paint will we need to buy to cover 1100 ft² of wall space? (Remember, we're going to buy whole gallons of paint!)

$$\frac{1 \text{ gallon}}{350 \text{ ft}^2} = \underline{\hspace{2cm}}$$

Example 3: If there are 2.54 centimeters in one inch, how many centimeters are there in 36 inches?

$$\frac{2.54 \text{ cm}}{1 \text{ inch}} = \underline{\hspace{2cm}}$$

Example 4: How many centimeters tall is a person who is 5-ft 8.5-inches tall?

On this one, we will first have to change our "5-ft 8.5-inches" completely into inches. We'll use the fact that there are 12 inches in 1 foot to change our 5 feet into inches, and then add that to our 8.5 inches to get our total inches.

$$\frac{12 \text{ inches}}{1 \text{ foot}} = \underline{\hspace{2cm}}$$

So, 5 feet = _____ inches and therefore 5-ft 8.5-inches = _____ inches. Now we can change those inches into centimeters like in Example 3.

$$\frac{2.54 \text{ cm}}{1 \text{ inch}} = \underline{\hspace{2cm}}$$