Applications of Proportions

Objective 1

Set up and Solve Proportion Problems

Proportions can be used to solve many different types of problems. Be sure to read the problem carefully and try to estimate what a reasonable answer is.

Remember, a proportion is an equation of two ratios and we should always write in our units when we set up the problem. Additionally, make sure the units mirror each other on both sides of the equation.

Example 1: Suppose Tache's car can travel 72 miles on 3 gallons of gas. How many miles can Tache's car travel on 12 gallons?

We first begin by setting up the proportion. Notice how the units mirror each other on both sides of the equation.

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

Since we are being asked to find out how many **miles** Tache's car can travel, we let our variable **x** represent these unknown miles. Because these unknown miles correspond with 12 gallons, we can set up our first ratio on the left side of the proportion.

$$\frac{x \text{ miles}}{12 \text{ gallons}} = \frac{\text{miles}}{\text{gallons}}$$

On the right hand side of the equation we will write in our given ratio. Notice that the problem tells us that the car can travel 72 miles on 3 gallons of gas. This is our given ratio. Writing these quantities on the right side of the equation completes the setup of our proportion.

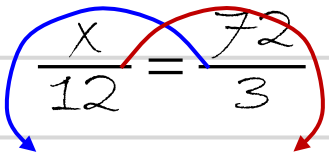
$$\frac{x \text{ miles}}{12 \text{ gallons}} = \frac{72 \text{ miles}}{3 \text{ gallons}}$$

We now solve the proportion for x.

$$\frac{x}{12} = \frac{72}{3}$$

We begin by first cross-multiplying.

$$\frac{x}{12} = \frac{72}{3}$$



$$3x = 864$$

$$\frac{3x}{3} = \frac{864}{3}$$

$$x = 288$$

Recall that we let represent the unknown quantity in units of miles.

We finally answer the question with a complete sentence!

Answer: Tache's car can travel 288 miles on 12 gallons of gas.

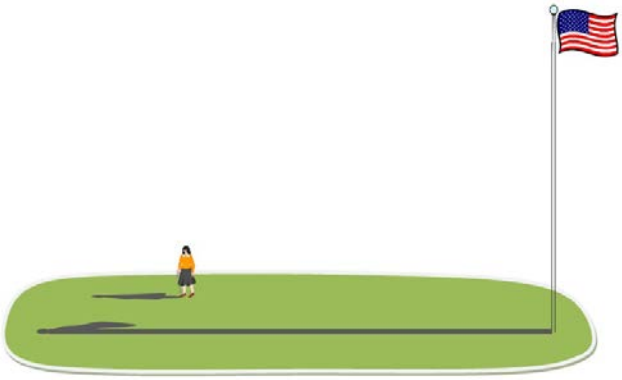
Example 2: A recipe calls for 5 cups of sugar for 30 servings. How many cups of sugar are needed to make 8 servings?

$$\frac{x \text{ cups}}{30 \text{ servings}} = \frac{\text{cups}}{\text{servings}}$$

Example 3: On a travel map, 1 inch represents 75 kilometers. If the measured distance between two cities is 4.5 inches on the map, what is the actual distance between the two cities in kilometers?

$$\frac{4.5 \text{ inches}}{x \text{ kilometers}} = \frac{1 \text{ inches}}{75 \text{ kilometers}}$$

Example 4: At 2 PM. Maria's shadow is 8 ft long and she is 5 ft tall. If at this same time, the flag pole casts a shadow that is 8.4 feet long, how tall is the flag pole?



Example 5: The standard wide screen wide ratio is 16:9, width to height. A new movie theatre is being constructed with 4 different screen sizes. Fill in the missing dimensions in the table below. Use proportions to find the missing lengths.

16:9 wide screen format dimensions

Width in feet	Height in feet
32	
40	
	36
	45