

# Word Problems

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Last time we looked at phrases and saw how they translated to mathematics. We also discussed how to go about solving a word problem.

I can not stress enough how important it is for you to give your self a chance to be successful by reading and rereading the word problem in order to get the needed information.

Generally speaking, if you only read the problem once or twice, you won't get the information you need to setup and solve the problem.

Let's look at some word problems and see how to set them up. Remember, after we identify what we are looking for, determine the smallest value and call it  $x$ . The other unknowns will be described in terms of  $x$ .

## EXAMPLE

Henry solved a certain number of algebra problems in an hour, his older brother Frank solved four times as many. Together they solved 80. How many were solved by each?

I am looking for the number of problems solved by Henry (H) and Frank (F).

Who solved the least number of problems? Hopefully, you said Henry.

$$\text{So let } H = x$$

Frank solved four times as many, therefore

$$F = 4x$$

Read the problem again to find a relationship. Together they solved 80. That means that

$$\begin{array}{ll} H + F = 80 & \text{Substituting} \\ x + 4x = 80 & \text{Solving for } x \\ 5x = 80 & \\ x = 16 & \end{array}$$

Therefore Henry solved 16 and Frank solved 4 times 16 of 64 problems.

## EXAMPLE

The second of two numbers is two less than three times the first. Find the numbers if there sum is 26.

We are looking for two numbers.

$$\begin{array}{l} \#1 - x \\ \#2 - 3x - 2 \end{array}$$

The sum is 26.

Substituting

$$\begin{array}{l} \#1 + \#2 = 26 \\ x + 3x - 2 = 26 \\ 4x - 2 = 26 \\ 4x = 28 \\ x = 7 \end{array}$$

The first number is 7, the second number is two less than three times 7 or 19.

**EXAMPLE**

The second angle of a triangle is  $45^\circ$  more than the smallest angle. The third angle is three times the smallest. How many degrees are there in each angle?

We are looking for three angles.

$$\angle 1 - x$$

$$\angle 2 - x + 45$$

$$\angle 3 - 3x$$

You would not be able to solve this problem unless you knew that the sum of the interior angles of a triangle is  $180^\circ$ .

$$\angle 1 + \angle 2 + \angle 3 = 180^\circ$$

$$x + x + 45 + 3x = 180^\circ$$

$$5x + 45 = 180^\circ$$

$$5x = 135^\circ$$

$$x = 27^\circ$$

That means the first angle is  $27^\circ$ , the second angle is  $27 + 45$  or  $72^\circ$ , and the third angle is 3 times 27 or  $81^\circ$ .

Try this on your own. The length of a rectangle is three times the width and its perimeter is 48 ft. Find the length and width. The answers are length is 18 and the width is 6 ft.