

# HOW TO WORK WORD PROBLEMS IN ALGEBRA: PART I

Learning to solve word problems is like learning to play the piano. First you are shown how; then, you must practice and practice and practice. Just reading this handout will not help unless you work the problems. The more you practice, the more confident you will become.

Basic types of word problems are in almost every algebra book. You can't go out and use them in daily life, or in electronics, or in nursing, but they teach you basic procedures which you will be able to use elsewhere. This handout will show you step-by-step procedures for each type of problem. Learn how it's done!

## How do you start to work a word problem?

1. Quickly read the problem all the way through to see what kind of word problem it is, and what it is asking.
2. Look for a question at the end of the problem. What you are trying to find is usually stated in the question at the end of the problem. Sometimes two or three things need to be found.
3. Start every problem with "Let  $x$  = something." Let  $x$  equal what you are trying to find—the unknown. (Generally,  $x$  is used for the unknown.) Show and label what  $x$  stands for in the problem, or your equation has no meaning. In each solved problem on this handout,  $x$  is always labeled with the unit of measure designated in the problem (inch, mph, pounds, etc.). Then, the unit of measure label is not needed for the answer line.
4. If you have to find more than one quantity or unknown, try to determine the smallest unknown. Often this unknown will equal  $x$ .
5. Go back and read the problem over again. This time translate the problem from words to symbols a piece at a time. Simple problems generally have two statements. One statement helps you set up the unknowns, and the other gives you equation information.

## Statements translated into algebraic language using $x$ as the unknown:

(Refer to these examples from time to time to refresh your memory as you work the problems.)

1. Twice as much as the unknown  
 $x(2)$  or  $2x$
2. Two less than the unknown  
 $x - 2$
3. Five more than the unknown  
 $x + 5$
4. Three more than twice the unknown  
 $2x + 3$
5. A number decreased by 7  
 $x - 7$
6. Ten decreased by the unknown  
 $10 - x$
7. Sum of a number and 20  
 $x + 20$
8. Product of a number and 3  
 $x(3)$  or  $3x$
9. Quotient of a number and 8  
 $x / 8$



3. Represent two numbers whose sum is 72.
  
4. A man invested \$10,000, part at 5% and part at 7%. Represent interest (income).
  
5. A mixture contains 5% sulfuric acid. Represent the amount of acid (in quarts).
  
6. A woman drove for 5 hours at a uniform rate per hour. Represent her distance traveled.
  
7. A girl had 2 more dimes than nickels. Represent how much money she had in cents.

**Answers:**

1. Let  $x$  = smaller number  
 $2x$  = larger number
  
2. Let  $x$  = son's age  
 $2x + 3$  = man's age
  
3. Let  $x$  = one number  
 $72 - x$  = the other number
  
4. Let  $x$  = amount invested at 5%  
 $\$10,000 - x$  = amount invested at 7%  
  
Then  $0.05x$  = interest on 1st investment  
 $0.07(10,000 - x)$  = interest on 2nd investment  
  
**Note:** When money is invested, rate of interest times principal equals amount of interest per year.
  
5. Let  $x$  = number of quarts in the mixture  
 $0.05x$  = number of quarts of sulfuric acid
  
6. Let  $x$  = rate in miles per hour  
 $5x$  = number of miles traveled
  
7. Let  $x$  = number of nickels  
 $x + 2$  = number of dimes  
  
 $5x$  = number of cents in nickels (5 cents in each nickel)  
 $10(x + 2)$  = number of cents in dimes (10 cents in each dime)

