How to Solve Word Problems

The most difficult homework assignment for most math students is working story/word problems. Solving word problems requires excellent reading comprehension and translating skills.

Students often have difficulty substituting English terms for algebraic symbols and equations. But once an equation is written, it is usually easily solved. To help you solve word problems follow these 8 steps:

Step 1 – Plan to read the problem two times. Read the problem quickly the first time to answer some basic questions. As you are reading the problem the first time, answer these three questions:
   a) What is the problem about? (Distance = Rate x Time? Average of several numbers? Etc.)
   b) Are there any units (kilometers, gallons, etc.)?
   c) What is the problem asking me to find? (Usually at the end of the problem)

Underline or put a block around the item the problem is asking you to find. You'll want to refer back to it. Also, this item is usually one of the variables.

Step 2 – Read the problem a second time, more slowly. Break the problem up into "chunks." Each chunk could be a) an entire sentence or b) a portion of the sentence if the sentence is longer. For each chunk:
   a) Cross out unneeded information that does not give any values or equations.
   b) Write mathematical equations for each remaining part.

Identify any information you don't know or are asked to find. Specify a variable for each unknown item. When using more than one unknown, use a letter that reminds you of that unknown (e.g., L = length). Then write down what your unknown represents. You'll have to create as many separate equations as you have unknowns.

Translate the English terms into an algebraic equation using the list of terms in "Translating English Terms into Algebraic Symbols", and "Translating English Words into Algebraic Expressions". Remember that the English terms are sometimes stated in a different order than the algebraic terms.

Step 3 – If needed, draw a simple picture of the problem (e.g., an arrow can represent travel in any form - by train, by boat, by plane, by car, or by foot).

Step 4 – If useful, make a table of information and leave a blank space for information you are not told.

Step 5 - Review the equation to see if it is similar to equations that you already know. Some formulas dealing with specific word problems may need to be rewritten. Distance problems, for example, may need to be rewritten to solve for one of the other variables in the formula. For example, Distance = Rate x Time implies that Time = Distance/Rate, and Rate = Distance/Time. Usually, a distance problem will identify the specific variable to be solved.

Step 6 - Solve the equation using the rules of algebra.

Remember: whatever is done to one side of the equation must be done to the other side of the equation. The unknown must end up on one side of the equation, by itself. If you have more than one unknown, then use the substitution or elimination method to solve the equations.

Step 7 - Look at your answer to see if it makes common sense.

Example: If tax was added to an item, it should cost more or if a discount was applied to an item it should cost less. Is there more than one answer? Does your answer match the original question? Does your answer, have the correct units?

Step 8 - Put your answer back into the original equation to see if it is correct. If one side of the equation equals the other side of the equation, then you have the correct answer. If you do not have the correct answer, go back to Step 2.

Translating English Terms Into Algebraic Symbols

Sum	+
Add	+
In addition	+
More than	+
Increased	+
In excess	+
Greater	+
Decreased by	−
Less than	−
Subtract	−
Difference	−
Diminished or Reduced	−
Remainder	−
Times as much	x
Percent of	x
Product	x
Interest on	x
Per or "for each"	/
Divide	/
Quotient	/
Quantity	( )
Is	=
Was	=
Equal	=
Will be	=
Results	=
Greater than	>
Greater than or equal to	≥
Less than	<
Less than or equal to	≤

Translating English Words Into Algebraic Expressions

Ten more than x	x + 10
5 added to a number	5 + x
A number increased by 13	x + 13
5 less than a number	x – 5
A number decreased by 7	x – 7
Difference between x and 3	x – 3
Difference between 3 and x	3 – x
Twice a number	2x
Ten percent of x	0.10x
Ten times x	10x
Quotient of x and 3	x/3
Quotient of 3 and x	3/x
Five is three more than a number	5 = x + 3
The product of 2 times a number is 10	2x = 10
One half a number is 10	x/2 = 10
Five times the sum of x and 2	5(x + 2)
Seven is greater than x	7 > x
Five times the difference of a number and 4	5(x - 4)
Ten subtracted from 10 times a number is that number plus 5	10x - 10 = x + 5
The sum of 5x and 10 is equal to the product of x and 15	5x + 10 = 15x
The sum of two consecutive integers	(x) + (x + 1)
The sum of two consecutive even integers	(x) + (x + 2)
The sum of two consecutive odd integers	(x) + (x + 2)