

Section 3 – 1: Basic Word Problems Introduction

Why we solve word problems.

Word problems come in several types. You will find several basic types of word problems in every algebra book. Each different type has a slightly different set up but they all have many things in common. Many of these basic types are not exactly like the word problems you will encounter in nursing, electronics, business or even in your daily life. The basic types of word problems that we use in this chapter have been selected to help teach you the **basic procedures and concepts** which can be used in almost all word problems you may encounter in other areas of study. If you master these you will often be able to solve other problems that differ from the types you have learned in this course. This unit will show you step by step what to do to set up and solve the types of word problems that we will cover.

How do you start to set up a word problem?

1. Read the problem **all the way through** once to see what **type** of problem it is.
2. Determine the two (or three) unknown quantities that you are being asked to find the values for. Look for a sentence that asks you to find something or for a sentence with a question mark ?
3. Look for a sentence that compares the first two unknowns. The sentence that does this will state things like “the numbers of **dogs** is **5 more than** the number of **cats**”
4. Start the problem with Let “something” = x . We let the quantity that is being used as the basis for comparison equal x . **The quantity mentioned second** in the sentence is almost always the quantity the the other quantities are compared to. This means that the **quantity mentioned second is set equal to x** and the first quantity will be an expression expression with x in it.
4. Express the second unknown as a let statement with the unknown written in terms of x by using the translation page on the next page.
5. Go back and read the problem again. A second sentence will help you **set up an equation**. It is very common for that sentence to state what value the total of the two unknowns is.
6. Solve the equation for the unknown variable.
7. Use the value you found for x to find the value of all of the other unknowns.
8. State the solution by listing each unknown and its value.
9. Check your solution in the original problem to see to see if the solution works.

Translating Word Problems

How to translate English Statements into Algebraic Expressions

Listed below are examples of some of the most common statements found in word problems. Each English statement has been translated into an algebra statement with x as the unknown. You should study the order of the unknown term and the constant term. It is a common mistake to reverse the order.

English Statement

is, was, will be

times, of, product

twice a number or two times a number *

three times a number *

four times a number *

more than, increased by, sum

6 more than a number *

7 more than twice a number *

4 more than 3 times a number *

a number increased by 10

the sum of a number and 7

less than, decreased by

5 less than a number *

4 less than twice a number *

7 less than three times a number *

8 less than two times a number *

a number decreased by 10

Ratio (quotient)

the ratio of Doctors to Nurses

the ratio of Cars to Trucks

the ratio of Miles to Gallons

Algebra Expression

=

multiply

$2x$

$3x$

$4x$

add

$x + 6$ (6 added **at the end**)

$2x + 7$ (7 added **at the end**)

$3x + 4$ (4 added **at the end**)

$x + 10$

$x + 7$

subtract: order is very important

$x - 5$ (5 subtracted **at the end**)

$2x - 4$ (4 subtracted **at the end**)

$3x - 7$ (7 subtracted **at the end**)

$2x - 8$ (4 subtracted **at the end**)

$x - 10$

division

$\frac{D}{N}$

$\frac{C}{T}$

$\frac{M}{G}$