this example, that might be, say, x = corn and y = beans. Such definitions are meaningless.

Almost always, symbol definitions are either (1) number or quantity of something *specific* (dimes in a coins problem, a particular person's age in an age problem), or (2) a *specific* term or quantity with units such as length of a field in feet, or gallons of the 9% mixture added.

If problems involve *only* numbers (e.g., What are the numbers whose sum is twelve and difference is twenty?), then symbol definitions must identify the number clearly in some way. For example, let x = *smaller* number.

- Equations. Often the problem statement will include verbal statements or phrases that can be translated into equations in terms of the defined symbols. Sometimes you have to read the problem yet again to find the equation or equations hidden there.

Comment: When equations in the word statements are not obvious, it is sometimes helpful to ask, What is the problem *about?* It might be areas, dollars, numbers of coins, etc. Look for an equation in these terms. Or ask, What are the given terms or quantities that *can* be equated to something? Can areas be the basis for equations (as in this bean/corn field example)? Or perhaps distances or lengths, or times, or weights, or volumes, or dollars, or rates (e.g., miles per hour or dollars per square foot), or densities, or ages, or just numbers. Sometimes the units can help find the basis for an equation because all terms in an equation must have the same units. See Appendix A.

In this example, even though the symbols are lengths, there are no length equations given. There is, however, information about areas that provides the basis for an equation. (A good look at the diagram also suggests this.)

In words, the equation is:

The area for corn (10,000 ft^2) plus the area for the beans (1500 ft^2) is equal to the whole area of the field (which is x times 2x, or $2x^2$).

In symbols: $10,000 + 1500 = 2\,x^2$.

- Graphs and/or Tables: At this point, there appears no need for graphs or tables of given data or functions. We can always come back, though.

Phase 3 - Application Application means the application of mathematics and/or physics to find a solution to the problem that has now been translated. Sometimes, of course, the math and/or physics add additional equations or symbols to the problem.

- State the math problem or exercise clearly. The exercise here is to solve the one-variable equation for x:

$$11,500 = 2\,x^2.$$

Easier it doesn't get:

- Solving gives x = 75.8 ft and 2x = 151.6 ft

Phase 4 - Checking All solutions required checking. The checks should, if at all possible, be independent of the solution method and computation.

In this example, 75.8 times 151.6 = 11,491 ft^2

This checks since the total area is 10,000 + 1500 = 11,500 ft^2. The small difference can be attributed to round-off.

The example above is fairly typical of analysis problems, though it's perhaps on the easy side. It happens to require knowledge of perimeters and areas, but the analysis solution *process* is quite general.

Suggestion: Use A Cover!!

If you are learning to do these kinds of problems, it will help you a great deal to cover the solutions with a card you can easily make. Otherwise, it is just too easy to see a solution and say "Oh, yeah, I see that.' — but still not be able to do it by yourself or teach it.