Group #: _____   Name: _____

   Solving problems where the known information is not readily available is one of the reasons we learn mathematics. Instead of saying "oh I hate word problems," let's practice getting better at it using specific and practical strategies.

   To break down the problem, start by drawing pictures and labeling known/unknown quantities on the pictures. Write down what is known and what it is you are looking for to remind yourself what the end goal of the problem is. Translate words into mathematical symbols (e.g., w for width and V for volume.) and relations, i.e., equations that relate the variables (e.g., the sum of two numbers is 100 can be translated into $x + y = 100$.) The hardest part is then to intelligently manipulate (this takes practice) the equations and apply algebra to finish the problem. With an open heart ..., shall we?

1. (20 points) A rectangular building lot is three times as long as it is wide. Find a function that models its area A in terms of its width w.

2. (20 points) A rectangle has an area of 16m^2. Find a function that models its perimeter P in terms of the length x of ones of its sides.

3. (20 points) The height of a cylinder is four times its radius. Find a function that models the volume V of the cylinder in terms of its radius r.

4. (20 points) A rectangular box with a volume of 60 ft^3 has a square base. Find a function that models its surface area S in terms of the length x of one side of its base.

5. (20 points) Consider the following problem: Find two numbers whose **sum is 19** (this is known information) and whose **product is as large as possible** (this is what you are trying to maximize).

   (a) Experiment the problem by making a table like the one following, showing the product of different pairs of numbers that add up to 19. On the basis of the evidence in your table, estimate the answer to the problem. (This process of trial-and-error is a great way to familiarize yourself with the problem; however, we want to be able to solve problems in a more systematic way using algebra and other relevant mathematics such as Calculus in general.)

First number	Second number	Product
1		18
2		34
3		
⋮	⋮	⋮

   (b) Find a function that models the product in terms of one of the two numbers.

   (c) Use your model to solve the problem, and compare with your answer to part (a).