Preparation for Problem Solving III
Problem Analysis

Problem analysis is different from problem solving. In problem analysis you do NOT try to solve the problem but rather to have a clear understanding of the problem. Hence, logically, problem analysis is a process that you need to go through before attempting to solve the problem.

Problem analysis consists of a set of steps (guidelines) you need to follow in order to have a clear "picture" of the problem. You should follow these steps for the problems given in this handout. The steps are general so you can apply them to future problems in this course or any future physics course you take.

Here are the steps:

(1) Read the problem from start to finish. You will refer back to the problem as necessary.

(2) Draw a picture or diagram of the problem, if possible.

(3) Ask yourself two questions:
What quantities are given or implied? (What are the knowns?)
What is it that the problem wants you to find? (What are the unknowns?)

(4) Assign a symbol (letter) to each quantity. Make sure different symbols are assigned to different quantities. If you have a diagram, label the quantities in your diagram with the symbols.

(5) Think about what principles, definitions and/or concepts are important in the problem and list them. Things like: "the area of a triangle" or "the definition of average velocity".

Now you should have a clear understanding of the problem.

Once more

DO NOT TRY TO SOLVE THE PROBLEM!!!

Example 1 will be done as in-class exercises. Each of the exercises should be done on a separate sheet of paper.

Example 1. A right triangle has a hypotenuse that is 1 cm more than twice one of its legs. The triangle has an area of 60 cm^2. What are the lengths of each side of the triangle?

Draw a diagram of the situation described in the problem.

What is the problem asking you to find?

What are the given (or implied) quantities?

Assign a symbol to each quantity above and label all the quantities in your diagram which can be labeled with these symbols.

List the names of the principles, definitions and/or concepts that are important in the problem.

Exercise 1. A 20-foot ladder leans against a vertical wall with the foot of the ladder 12 feet from the wall. A monkey hangs from the middle of the ladder. The monkey is 3.8 feet tall and his arms can reach 2.5 feet above his head. Can the monkey's feet touch the ground while he is hanging from the ladder?

Draw a diagram of the situation described in the problem.

What is the problem asking you to find?

What are the given (or implied) quantities?

Assign a symbol to each quantity above and label all the quantities in your diagram which can be labeled with these symbols.

List the names of the principles, definitions and/or concepts that are important in the problem.

Exercise 2. A rectangle has an area of 588 in^2 and a perimeter of 112 in. What are the length and width of the rectangle?

Draw a diagram of the situation described in the problem.

What is the problem asking you to find?

What are the given (or implied) quantities?

Assign a symbol to each quantity above and label all the quantities in your diagram which can be labeled with these symbols.

List the names of the principles, definitions and/or concepts that are important in the problem.

Exercise 3. On January 1, 2020 at 12:00 noon Eastern Standard Time, the people of the world will gather at the equator of the earth and form a line. They will tie a rope around the earth at the equator tightly and then loosen it by 20 feet. As a symbol of unity, they will try to crawl under the rope going from the northern hemisphere to the southern hemisphere, all at once. Assuming that the Earth is a perfect sphere with a radius of 4000 miles, will they be able to perform this ceremony?

Draw a diagram of the situation described in the problem.

What is the problem asking you to find?

What are the given (or implied) quantities?

Assign a symbol to each quantity above and label all the quantities in your diagram which can be labeled with these symbols.

List the names of the principles, definitions and/or concepts that are important in the problem.