Problem Solving

Steps for Doing Problems

1. Read the question carefully.
2. Draw the appropriate diagram and label it.
3. Write down the given information.
4. Write down what you are trying to find.
5. Write down your starting equations.

Draw the diagram

After you read the question you might not remember how to solve the problem. Never mind – just start writing. A blank sheet of paper is not very inspiring – fill it up. Go on to step 2 and start drawing and labeling the diagram – this will start your mind going and you will build up some momentum and the paper won't be blank anymore.

Think about the entire problem

- What is going on?
- Is the velocity constant?
- Is there friction?
- If yes. Then assume a direction of the motion.

Think it through, starting from the end.

Say you're looking for the time Δt. Why can't you just calculate it NOW? Answer: The acceleration is missing. Then what do you need to find the acceleration? For that I need a change in velocity. Do I have that? …..

Steps to remember once you get rolling

6. Solve the equations.
7. Write big so your work can be read easily.
8. Maintain the equality - write each step on a new line.
9. Show all your work – don't skip steps.
10. Make sure you have answered the question.
11. Don't forget the SI units.
12. Round off answers to three significant figures and use proper scientific notation.
13. Draw a box around the answer(s).

The systematic approach

By systematically approaching the solution of the homework problems you are furthering your understanding of the material. Solving the problem algebraically, prior to substituting the numbers, will show you that there is only ONE incline problem. This is the best way to ensure success in this course.

Solving Problems in Physics

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http://www.oberlin.edu/physics/dstyer/SolvingProblems.html;

Summary
The problems in your physics course can be fun and exciting. Approach them in the spirit of exploration and they will not disappoint you!

1. Strategy design
    1. Classify the problem by its method of solution.
    2. Summarize the situation with a diagram.
    3. Keep the goal in sight (perhaps by writing it down).
2. Execution tactics
    1. Work with symbols.
    2. Keep packets of related variables together.
    3. Be neat and organized.
    4. Keep it simple.
3. Answer checking
    1. Dimensionally consistent?
    2. Numerically reasonable (including sign)?
    3. Algebraically possible? (Example: no imaginary or infinite answers.)
    4. Functionally reasonable? (Example: greater range with greater initial speed.)
    5. Check special cases and symmetry.
    6. Report numbers with units specified and with reasonable significant figures.

Work with symbols
Depending on the problem statement, the final answer might be a formula or a number. In either case, however, it's usually easier to work the problem with symbols and plug in numbers, if requested, only at the very end.
There are three reasons for this:

- First, it's easier to perform algebraic manipulations on a symbol like "m" than on a value like "2.59 kg".
- Second, it often happens that intermediate quantities cancel out in the final result.
- Most important, expressing the result as an equation enables you to examine and understand it in a way that a number alone does not permit.

Working with symbols instead of numbers can lead to confusion as to which symbols represent given information and which represent unknown desired answers. You can resolve this difficulty by remembering--as recommended above--to "keep the goal in sight".