How to Solve Physics Problems:

1. Turn your calculator off.
2. Read the problem trying to picture the situation.
3. Ask yourself: "What is the physics phenomenon that this problem is dealing with?" (e.g. constant acceleration motion).
4. *State the problem*, preferably in your own words. Fill in the blank: "*I want to find* _____." What is the answer supposed to be? A mass? An energy? A distance?
5. Read the problem once again paying attention to the data you are given.
6. Always sketch a diagram of the problem so that you visualize what is occurring (additionally, draw a free-body diagram, or the position of the object as a function of time, etc...):
    a. Make sure to set up your coordinate system: set *x* and *y* directions and the origin of coordinates (0,0); e.g., if y is pointing downward, that explains why a_y=g and not a_y=-g.
    b. Use vectors to show forces, velocity, acceleration, etc;
    c. Use algebraic notation in your diagram (e.g. v_0 for initial velocity, not 15m/s)
7. Next to your diagram list the quantities that you are given and any other information that you have about the problem
    a. Use the same notation as in your diagram (e.g. v_0=15m/s);
    b. Write down the constants that you might need (e.g. g=9.8m/s^2);
    c. Good housekeeping: Make sure your data is in a consistent set of units (e.g. km, hours), if not convert now, don't wait until you need to plug it into your equations;
    d. Write down what you need to find and what are the units for your answer (e.g. *a-? m/s*^{2})
8. Find or derive equations that let you *solve* the problem. Look for an equation (or combination of equations) that contains the quantity you are looking for and the quantities that you know. Ask yourself if these equations are applicable for your situation (e.g. is energy really conserved in this problem?)
9. Use *words and sentences* to explain what you are doing, and why you chose these equations. State where you found the starting equations.
10. Solve the equation(s), using algebra and variables only: **no numbers yet!**. Get the variable you are looking for on the left side of the equals sign, and everything else on the right side.
11. Write down your final equation again: Now, and only now put in the numbers and the units.
12. You may now turn on your calculator. Do the arithmetic to get your final answer.
13. Write down the final answer, *with units*. Draw a box around it. Use an appropriate number of significant digits.
14. You're not finished. Read the problem once again. Did you answer the question in the problem? Did you answer all of them?
15. Check your final answer. Does the number make sense? (Is it ridiculously large or small?) Are the units right? It is not enough that your answer matches the one in the book. Does your answer make sense to *you*? Think about your result.
16. If you can't solve the problem, explain your thinking process, and why you got stuck. If you can't get the answer, formulate a question or two. Write these questions on your homework paper. Ask these questions during workshop.