

How to do Homework Problems

1. Restate the problem in your own words. Write it down on your paper! Fill in the blank: "I want to find _____." What is the answer supposed to be? A time? A distance? An energy? What are its units?
2. If appropriate, sketch a diagram of the situation.
3. List known quantities, their symbols, numerical values and units. Label them on the diagram, too.
4. What other information (or *keyword*) is given in the question, that might relate your unknown to the known quantities? Think what physics concept(s) might have to be applied. Maybe the physics concept is *implied* rather than stated explicitly. Is there constant acceleration? Is there energy conservation? Is there momentum conservation? Do you need to use one of the Laws of Mechanics, or Laws of Thermodynamics, etc.
5. The needed concepts should translate into equations involving your knowns and unknown. If you can, write these equations down. Write the name of the physics concept you are using on your paper, next to its equation. If stuck, think again how your known information is related to what you are seeking. Do the knowns seem related to some important Law, Principle or Rule? That's what you need! Without that, you can't proceed. (Example: A question involving forces should lead you to consider Newton's Laws.)
6. Use words and sentences to explain what you are doing, and what the equations mean. Check that these really apply to your problem.
7. Check your equations. Can you solve for the desired quantity? Do so using algebra. Get the desired symbol on the left hand side of the equals sign, and all other symbols on the right hand side.
8. Now substitute the symbols on the right hand side of your solution expression, with their numerical values and units (write this on your paper)! Check that the units will combine to give the units you were looking for. Now you can punch in the numbers in your calculator. [Look to see if some prefixes can be cancelled, it could speed up your calculation. Using all SI units also may help.]
9. Round off the answer to the correct number of significant figures, then write it down, with units, and draw a box around it. [You might also like to use a prefix instead of a power of 10 on the units to make it simpler, like 68.0 MJ instead of 68.0×10^6 J.]
10. You're almost done! Check again that you really answered the stated question. Look at your answer, and think whether it makes sense. Does the size seem reasonable? Or is it ridiculously large or small? Is it negative when you were expecting a positive number, or *vice-versa*? Or is negative OK, if you interpret the result correctly?
11. If you couldn't solve the problem, try to understand why you got stuck. You were probably missing some important concept (see steps 4 and 5 above). If you can't get anywhere, formulate a question or two. Write them on your paper. Ask these during recitation.

Grading of recitation quizzes and homework:

You will gain points for:

- Stating the problem, identifying the quantity you are looking for with its symbol and units.
- Identifying each known quantity with a symbol, its numerical value and units.
- Showing a clear diagram of the situation, if applicable.
- Explaining what physics concepts (Law, Principle, or Rule) are being applied.
- Showing and explaining how you solved for the unknown quantity (symbol on the left hand side of the equation, everything else to the right), using words as well as equations.
- Solving the problem correctly, getting a numerical result with correct units and significant figures.
- Checking that the answer makes sense, not too large or too small or wrong sign.
- Asking a good question if you can't solve the problem.

You can lose points for:

- Not identifying what you know and what you are looking for.
- Not making a sketch or diagram, if applicable.
- Not explaining what physics concepts are being used.
- Not explaining your solution using words as well as equations.
- Not including units on the results.
- Not rounding off to the appropriate number of significant figures.
- Not checking if the answer makes sense.