

RECIPE FOR SOLVING A PHYSICS PROBLEM

It can be very helpful to have a standard approach to solving problems in physics. Often following the steps listed below will help you better understand what the problem is asking, and how to solve it. I will not *require* you to follow these steps, but a somewhat structured approach to problem solving will help you get better grades!

1. **Write down the problem!** Unless the text of a problem is written on the page (as they are in a quiz), write the problem or at least a summary of the problem on your solutions page.
2. **Write any given constants or quantities!** Make sure to also write *both* the numerical value *and* its associated unit.
3. **Draw a picture!** Not all problems have a meaningful associated sketch, but *very* many do, and the sketch can make the meaning of the question much clearer. Your sketch need not be extremely detailed or artistic. It will be helpful anyway.
4. **Write down equations!** Write down equations that involve the given quantities or constants to the desired values.
5. **Manipulate the equations!** Using algebra, rewrite or combine the equations until you have a single expression with the desired quantity alone on one side, and known or given quantities on the other.
6. **Convert quantities to compatible units!** BEFORE PLUGGING IN ANY NUMBERS make sure that physical quantities are expressed in compatible units. This means all dimensions of length in the same unit (i.e. use only meters, don't mix meters and centimeters; use only kilograms, don't mix kilograms and grams)
7. **Write the expression with values "plugged in!"** Don't grab a calculator yet! Now is a good time to check the units of the expression. Remember you can do algebra on units the same way you do with variables like x , y or t_{whatever} .
8. **Calculate the numeric answer!** Write the calculation (keeping in mind scientific notation and significant figures) along with its associated unit.
9. **Check the units!** If you are calculating a length and your answer is in kilograms, something went wrong!! Check your math, etc. If you are calculating volume and you get $1/\text{cm}^3$ something went wrong!! You can not simply write the correct unit and go about your business...
10. **Check the order-of-magnitude!** THINK about your answer. Is it extremely large or extremely small, and if so was it *supposed* to be? It is pretty easy to accidentally drop a negative sign in scientific notation and calculate that the mass of the sun is 2×10^{-30} kg, etc. A moment's thought can save embarrassment!
11. **Check the units!** then, **Check the units!** and then finally **Check the units!** Did I mention you should **check the units**?