

# Physics



## Guidelines for Study

### Understanding the Concepts of Physics

#### Before Class:

- Pre-read the chapter to give you an idea of what will be covered in the lecture.
  - Pay attention to the general concepts and theories, don't worry about specific equations or numbers.
- Write down questions to ask during class.
- Read the chapter again, paying careful attention to equations and sample problems. Many students find it useful to do this after the instructor's lecture.
- Try to work through the practice problems and note any difficulties you come across.

#### Warning! Physics terms have specific meanings!

When first learning the different terms and concepts introduced in physics, it is important to realize that they have definitions that are unique to the field of physics. The idea of "work," for example, has many meanings in everyday life, but in physics only refers to "force multiplied by distance." It is also important to draw distinctions between terms that seem to be the same, such as "speed" and "velocity" (velocity is speed with direction).

#### Math was made for physics

Mathematics is the language of physics. In order to understand physics well, it is important to have a firm grasp on the fundamentals of math. For most of the basic concepts of physics, a thorough knowledge of trigonometry and algebra is sufficient. However, another very important mathematical tool used in physics is that of the derivative. The derivative, rate of change, and slope of the tangent line are all basically the same and represent a necessary building block for advanced concepts.

### Working Through Physics Problems

#### Setting up the problem

- Ask yourself: What is the question? AND What do I know?
- You need to understand exactly what the problem is asking you to solve for. It may help to write this down, even in the simple form 'v=?' (to remind you that you're looking for velocity).
- Next, write down all the information that is given in the problem and outside information (such as formulas and constants) that might be useful.

#### A picture is worth a thousand words...

Draw a diagram of the problem whenever possible. This often comes in the form of a "free body diagram", in which all the forces acting on an object are displayed. Drawing a picture of the problem, along with asking "What is the question?" and "What do I know?" should help give you a clearer idea of how to solve the problem.

### **Dimensional Analysis (a fancy term for changing units)**

One of the most important skills to acquire in physics is that of changing between different units. This seems to present a lot of trouble for many beginning physics students. Two important tips may help you avoid some of the more common pitfalls.

1. Make sure your units cancel
2. Make sure you are converting necessary number of times for area and volume

Example:

$$10\text{m}^2 * \frac{1000\text{mm}}{1\text{m}} * \frac{1000\text{mm}}{1\text{m}} = 1 * 10^7 \text{mm}^2$$

### **Be Careful About Assumptions!**

In physics, we make many assumptions that are not always obvious. For example, a “smooth surface” is completely frictionless, a force is always applied at an object’s center of mass, and a “light pulley” is completely massless. These assumptions will help you simplify problems, but if you don’t read the questions carefully, it could actually make the problems more difficult or impossible.

### **Work together!**

This is very important! Almost every professor not only allows group study, but encourages it. Be careful, however, to not become dependent on others for help on how to do problems. Working in groups can be very helpful, but make sure you can also work through the problems on your own.

### **Use your resources**

- Ask your professor for help— office hours exist to help you!
- Use the **Academic Assistance Center** and its tutors as resources. Academic Assistance is here to help all students, regardless of how they are doing in the class. It is a service provided by PLU, free of charge, to help you do your best academically. You can sign up for individual tutoring in the AAC (Library room 124) or visit the drop-in labs where no appointments are needed. See [www.plu.edu/aac](http://www.plu.edu/aac) for schedules.