

Phys 151 Chapter 1: Introduction

January 27, 2025

Welcome!

What is Physics?

- ▶ A fundamental science, concerned with matter, energy, and fundamental interactions. A strong basis for many other subjects.
- ▶ A presumptive science. It attempts to describe everything from the smallest sub-atomic particles to the ultimate fate of the entire universe.
- ▶ An experimentally-based science.
 - ▶ Not arbitrary proclamations from authority
 - ▶ Able to be independently verified (at least in principle). *If it's wrong, it's wrong!*
- ▶ A problem-solving discipline. Physicists solve problems. The processes you'll use in this class are similar to those that a wide variety of professionals use.
- ▶ *NOT* just a collection of facts and principles, but also the *framework* within which we organize those facts, and the *process* by which we study the physical universe.

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- ▶ *It's fun!*

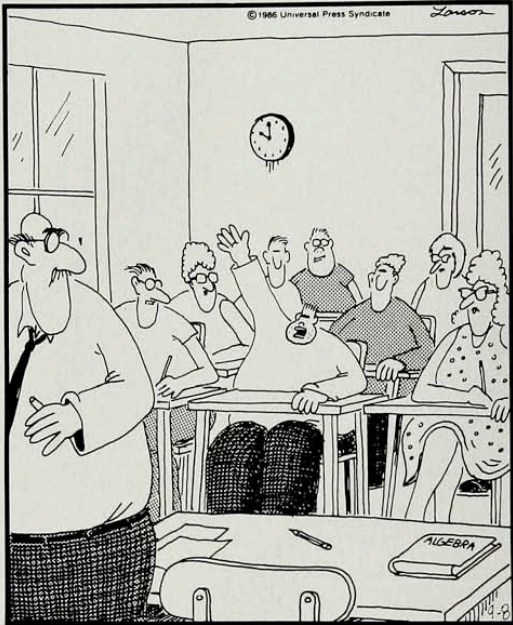
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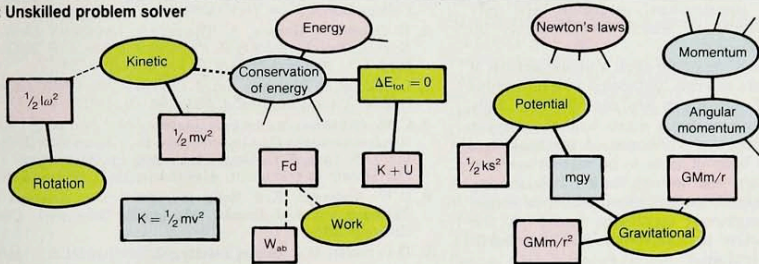


"Mr. Osborne, may I be excused? My brain is full."

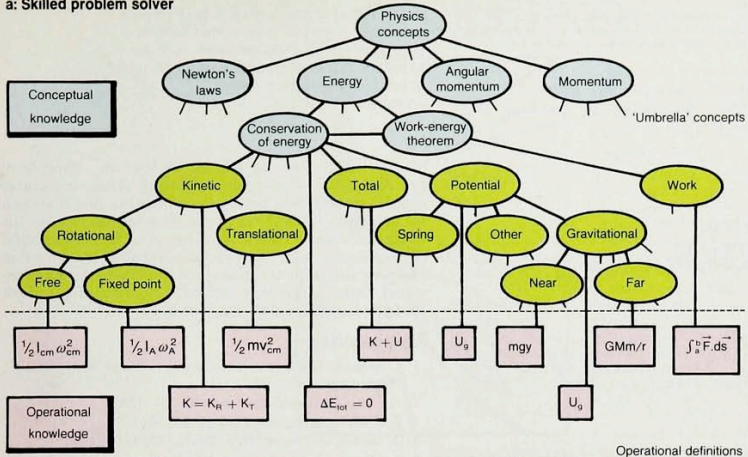
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- ▶ *Not* just memorization
- ▶ Developing an organized narrative

b: Unskilled problem solver



a: Skilled problem solver



Ch. 1:1–3

These first 3 sections are worth a quick read.

- ▶ Section 1.1: The Nature of Physics
- ▶ Section 1.2: Solving Physics Problems
- ▶ Section 1.3: Standards and Units.

Ch. 1:4: Using and Converting Units

- ▶ Review scientific notation.
- ▶ Review unit conversions. We won't do a lot of these, but you should be comfortable using the various metric prefixes.

Ch. 1:5 Uncertainty and Significant Figures

- ▶ All measurements have limitations and uncertainty. We can only evaluate a theoretical prediction if we know how certain the measurements are. This is the theme of our first lab.
- ▶ Also, it's important to know whether all of our underlying assumptions behind the measurements are valid. This too will be relevant in our first lab.

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- ▶ Avoid reckless rounding—don't throw away information.
- ▶ Don't give silly or misleading answers with meaningless digits, such as 123.4567890123.
- ▶ Final answer: Aim for better than 1% accuracy (*i.e.* about 3 digits, typically.) For intermediate results, keep 4 or 5 digits—or store them in your calculator memory.

Ch. 1:6: Estimates and Orders of Magnitude

This is just a quick discussion. We will encounter such ideas in various contexts throughout the semester. It's worthwhile to read of Example 1.4 to get a sense of the sort of problem being considered.

Ch. 1:6–1.10: Vectors

We will come back to these sections when we do Ch. 3.

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Next time, we will start Ch. 2, where we begin to study accelerated motion in earnest.

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- ▶ Lab starts this week – exploring uncertainty in physical measurements.