Physics 207, Sections: 301/601 – 314/614
General Physics I
Michael Winokur & Pupa Gilbert
Lecture 1

Agenda for Today

- Course Introduction
  - ❖ General Announcements
  - ❖ Structure of the course
  - ❖ Scope of the course
  - ❖ Begin chapter 1

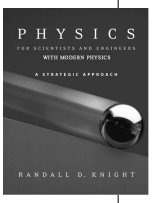
  Homepage:
  http://romano.physics.wisc.edu/phys207_Fall2007

Announcements

- **Assignments:**
  - ❖ Text: Randall Knight, Physics for Scientists and Engineers with Modern Physics
  - ❖ Read: Chapters 1 & 2 (sections 2.1-2.6) Position, Time, Change (i.e. motion), Vectors, Units, Assessment
  - ❖ HW0 and HW1: Due Wednesday 9/12 (HW0: Mastering Physics Practice Problem Set) See www.masteringphysics.com
  - ❖ Register for a Mastering Physics Account Instructions are posted: romano.physics.wisc.edu/winokur/phys207_Fall2007/HW.htm

  Typically Homework will be due by 11:59 PM on the stated day, usually **Wednesday**

  Note: No credit for late work



Announcements, cont'd

- **Labs**
  - ❖ http://romano.physics.wisc.edu/winokur/phys207_Fall2007/labs.htm
  - ❖ In room 4310 Chamberlin Hall
  - ❖ Begin on Monday of next week (Expt. 1a & c)
  - ❖ Few formal write-ups, mostly worksheets
- **Lectures**: (when in PowerPoint) will be available on the web
  - ❖ Clickers

  (Participation is the only requirement)

  Note: Will also be used in Physics 208

See:
http://romano.physics.wisc.edu/winokur/phys207_Fall2007/clickers.html

Announcements, cont'd

- **Honors students:** One Friday seminar per week (including exams weeks, may miss up to three) plus a project.

  More on Friday

- **Consultation:** In room 2131 Chamberlain (shared with Physics 201), See:

http://romano.physics.wisc.edu/winokur/phys207_Fall2007/consult.htm

- **Discussion Sections:** Start today, a short precourse assessment (does **not** affect your grade)

Grading Info

- **Course has several components:**
  - ❖ **Lecture:** (traditional lecture, demos and **Active** learning) 2%
  - ❖ **Homework Sets** (12%)
  - ❖ **Exams:** Three evening midterms (16%) and a final (20%)
  - ❖ **Discussion section:** (8%)
    - ➢ Review homework
    - ➢ Cooperative learning exercises
    - ➢ Occasional quizzes
  - ❖ **Labs:** (10%)
    - ➢ Mostly worksheets (possibly one formal write up) and a few quizzes
    - ➢ May miss up to one lab (with valid excuse)

Lecture Organization

- **Four main components:**
  - ❖ Discussion class material
    - » Selected topics from text
  - ❖ Demostrations/experiments of physical phenomenom
    - » Physics is an experimental science
  - ❖ Interactive exercise with conceptual "Active Learning" problems
    - » Up to five per lecture
    - » Critical thinking and problem solving (Little memorization required)
  - ❖ Interactive Applications
    - » To illustrate **concepts**

Learning Goals

- To begin to understand basic principles (e.g. Newton's Laws) and their consequences (e.g. conservation of momentum, etc.)
- To solve problems using both quantitative and qualitative applications of these physical principles
- To develop an intuition of the physical world

Note: Memorization is of little importance

A quick "quiz" on what not to do…

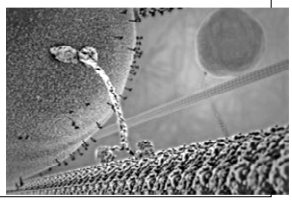
- Please read and study the following paragraph for a minute or so.
- "Last Fernday, George and Tony were in Donlon peppering gloopy saples and cleaming, burly greps. Suddenly, a ditty strezzle boofed into George's grep. Tony blaired, "Oh George, that ditty strezzle is boofing your grep!"
- After reading and studying the paragraph, and without referring to the paragraph, please answer the following questions:

Scope of Physics 207

- **Classical Mechanics:**
  - ❖ **Mechanics:** How and why things work.
    Motion (dynamics), balance (statics), energy, vibrations
    Classical:
    » Not too fast (v << c), c ≡ speed of light
    » Not too small (d >> atom), atoms ≅ 10^{-9} m
- Most everyday situations can be described in these terms.
  - ❖ Path of baseball (or a ping pong ball)
  - ❖ Path of rubber ball bouncing against a wall
  - ❖ Vibrations of an elastic string
    (These reflect Newton's Laws and forces)
  - ❖ A roll of the dice (thermodynamics)

Today and Monday's Topics:

- Position and Time (Chapter 1)
  - ❖ Position
  - ❖ Time
  - ❖ Displacement versus time (velocity)
  - ❖ Systems of units
  - ❖ Dimensional Analysis
  - ❖ Significant digits
- At right is the world's smallest biped: A single molecule of kinesin, walks along a cellular microtubule fiber, pulling along behind it a vesicle of nutrients

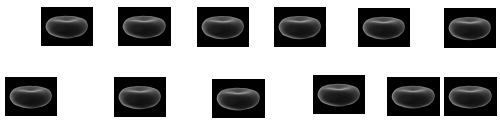


Position and Time

- An example below:

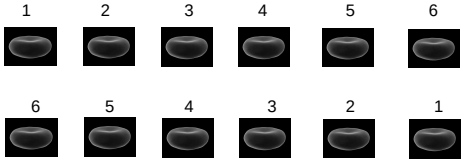
Question: What is happening in the two time elapse sequences shown below?

What construction could I use to quantify it?



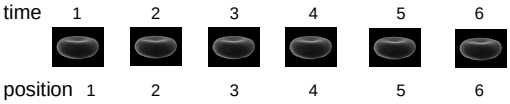
A preliminary step

- Predicated on the need to know **where** and **when**?
- **Where** requires a spatial reference frame and a system specifying position (magnitude, direction and units)
- **When** requires a temporal reference frame (magnitude, direction and units)

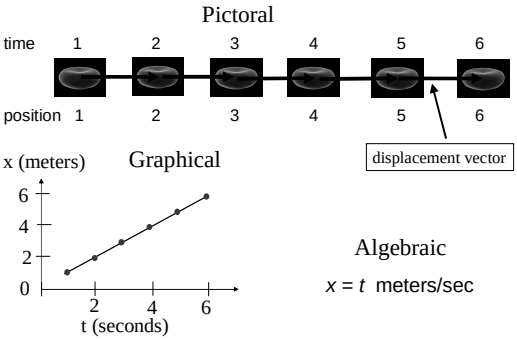


A preliminary step

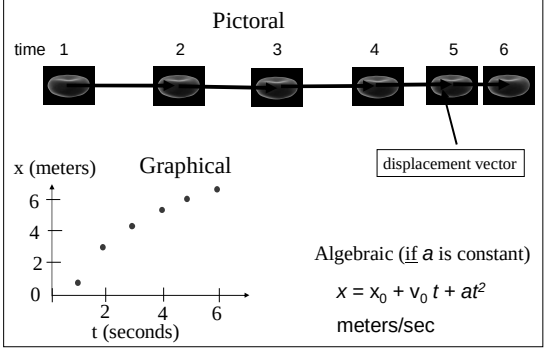
- Predicated on the need to know **where** and **when**?
- **Where** requires a spatial reference frame and a system specifying position (magnitude, direction and units)
- **When** requires a temporal reference frame (magnitude, direction and units)



Different representations



A slightly more complicated example



Standard Quantities

- Basic elements of substances and motion.
- All things in classical mechanics can be expressed in terms of the fundamental quantities:
  - ❖ Length L
  - ❖ Mass M
  - ❖ Time T
- Some examples of more complicated quantities:
  - ❖ Speed has the quantity of L / T (i.e. miles per hour)
  - ❖ Acceleration has the quantity of L/T^2 (Chapters 1 & 2)
  - ❖ Force has the quantity of ML / T^2 (Chapter 4)

Units

- **SI (Système International) Units:**
  - ❖ mks: L = meters (m), M = kilograms (kg), T = seconds (s)
- **British Units:**
  - ❖ L = inches, feet, miles, M = slugs (pounds), T = seconds
- We will use mostly SI units, but you may run across some problems using British units. You should know how to convert back & forth.
- Why do units matter?

Recap of today's lecture

- So far
  - ❖ General Announcements
  - ❖ Structure of the course
  - ❖ Scope of the course
  - ❖ Begin chapter 1
- For Monday's class
  - » Chapters 1 & 2 (through section 2.6)
  - » Mastering Physics (!!!)