Outline

– How the class works (continued)
– Class syllabus & pedagogy
– Last term’s results
– Main Foothold ideas from 131
  ➢ Newton’s Laws
  ➢ Random motion
  ➢ Energy

Review from WED: How does our brain tackle new problems?

■ Memory is not simply based on recall of information (computer memory is...) but based on partial recall of pieces connected by “plausible” links.

■ Our brain appears wired to link any new task to our existing knowledge
Aim of Pedagogy: Building a web of knowledge

- How do we build a reliable web of knowledge?
  - **Knowledge of Foothold ideas**: Build experience with physics concepts we can count on in a wide variety of circumstances
  - **Experience in how to connect to multiple foothold ideas**: Finding coherence

Scientific discourse

- The best (and most professional) way to learn science is to discuss it with someone who knows about as much as you do – but not exactly the same foothold principles and connections.
How we’re going to do things (Pedagogy)

- Read first (on wiki)
- Summarize and ask a good question
  (in Mastering Physics, MP)
- In class
  - I’ll give a brief summary and answer one or two of the questions. (many others answered online in MP)
  - We’ll do clicker questions and group problem solving. (Recitation, too)
- Out of class
  - Homework both as a group discussion and individual

Weekly Homework

- MP HW
  - 0-3 tutorial exercises: do until you get right (1 pt)
  - 2-4 problems: work out first – one shot (2-3 pts)
- Paper HW
  - 1-2 problems: write up as a report with equations, figures, tables, etc. (5 pts)
- Work together on problems!
  (But don’t write up together.)
  - Course center to get together and get guidance.
  - Wed afternoon?
Electronic info

- Our home page is where you can get all of the information about the class.
  
  \url{http://www.physics.umd.edu/courses/Phys132/}

- Non-public info (such as HW solutions) appear on the course Canvas site.
  
  \url{http://elms.umd.edu}

- MasteringPhysics – online HW environment. Sign up. Coursename
  
  P132S13Losert

Grading

- Midterm exams (2 @ 100 pts) 200
- Quizzes (~10 @ 10 pts) 100
- Final exam (200 pts) 200
- Homework (scaled to) 200
- Lab (scaled to) 150
- Reading (scaled to) 75
- Participation (about) 75
- Total ~1000

In 131: A~770, B~660, C~550, D~400
Exams

- Two midsemester exams and one final.
- Midsemester exams
  - Given on Friday
  - Returned on Monday and gone over in class
- Written regrade requests encouraged
- Makeup exams the following Thursday (out of class) for anyone who wants
- You will be expected to think, not just recall information

On exams: $A \geq 75\%$, $B \geq 60\%$, $C \geq 45\%$, $D \geq 30\%$
Class average $\sim 65\%$.

WHAT DID WE LEARN LAST TERM?

Do the next 4 problems on your own.
LET'S TRY AGAIN, USING THE PEDAGOGY OF THIS CLASS

Foothold Ideas: For each problem, refer to the “Foothold Ideas” handout and be certain that your answer is consistent with them.

Discussion: Discuss the problem with the members of your group

Foothold Ideas: Newton’s Laws

- Newton 0:
  - An object responds to the forces it feels when it feels them.

- Newton 1:
  - An object that feels a net force of 0 keeps moving with the same velocity (which may = 0).

- Newton 2:
  - An object that is acted upon by other objects changes its velocity according to the rule

\[ \vec{a}_A = \frac{\vec{F}_{net}}{m_A} \]

- Newton 3:
  - When two objects interact the forces they exert on each other are equal and opposite.

\[ \vec{F}_{type_{A \rightarrow B}} = -\vec{F}_{type_{B \rightarrow A}} \]
Kinds of Forces

- Forces are what objects do to each other when they interact.

- Types of forces
  - Normal Force $N$
  - Weight Force $W$
  - Tension Force $T$
  - Electric Force $F_E$
  - Resistive Forces $f$
  - Magnetic Force $F_M$

- Notation convention.

\[ \vec{F} \text{ type of force} \]
\[ (\text{object causing force}) \rightarrow (\text{object feeling force}) \]

Does this pedagogy work?

-> Standardized test

- Figure of merit = fraction of the possible gain.

\[ \langle \text{gain} \rangle = \frac{\text{post} - \text{pre}}{100 - \text{pre}} \]

<table>
<thead>
<tr>
<th></th>
<th>Phys131 (no tutorials)</th>
<th>Trad. 121 (with Tutorials)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\langle \text{gain} \rangle$ – force and motion</td>
<td>0.36</td>
<td>0.26</td>
</tr>
<tr>
<td>$\langle \text{gain} \rangle$ - energy</td>
<td>0.74</td>
<td>0.22</td>
</tr>
</tbody>
</table>