January 23, 2013 Physics 132 Prof. W. Losert

Outline

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

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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**

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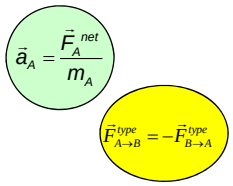
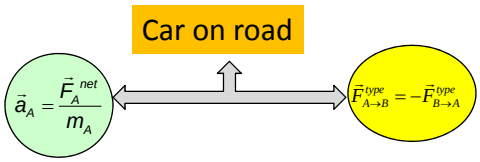
Aim of Pedagogy: Building a web of knowledge

- 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.

  http://www.physics.umd.edu/courses/Phys132/

- Non-public info (such as HW solutions) appear on the course Canvas site.

  http://elms.umd.edu

- MasteringPhysics – online HW environment. Sign up. Coursename

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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**

1/25/13 In 131: A~770, B~660, C~550, D~400 **8**

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 ≥ 75%, B ≥ 60%, C ≥ 45%, D ≥ 30%
Class average ~ 65%.

WHAT DID WE LEARN LAST TERM?

Do the next 4 problems on your own.

LETS 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

$$\vec{a}_A = \frac{\vec{F}_A^{\,net}}{m_A}$$

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

$$\vec{F}^{\,type}_{A\to B} = -\vec{F}^{\,type}_{B\to A}$$

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Kinds of Forces

- Forces are what objects do to each other when they interact.
- Types of forces
  - Normal Force N
  - Tension Force T
  - Resistive Forces f
  - Weight Force W
  - Electric Force F^E
  - Magnetic Force F^M
- Notation convention.

$$\vec{F}_{\text{(object causing force)}\rightarrow\text{(object feeling force)}}^{\text{type of force}}$$

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Does this pedagogy work? -> Standardized test

- Figure of merit = fraction of the possible gain.

$$\langle gain \rangle = \frac{post - pre}{100 - pre}$$

	Phys131 (no tutorials)	Trad. 121 (with Tutorials)
<gain> – force and motion	0.36	0.26
<gain> - energy	0.74	0.22

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