

January 25, 2013

Physics 132

Prof. E. F. Redish

■ **Theme Music: Van Morrison**

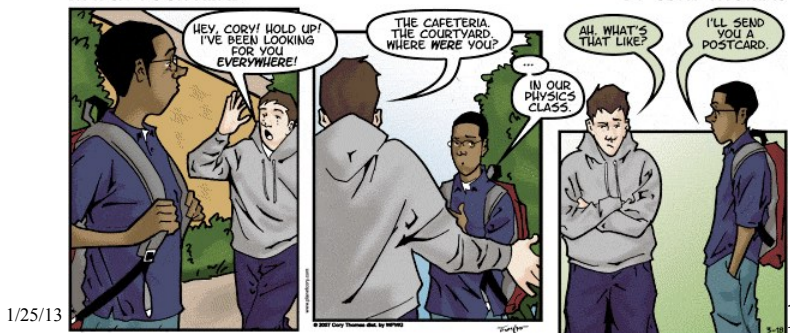
Checkin' it out

Cartoon: Corey Thomas

Watch your head

WATCH YOUR HEAD

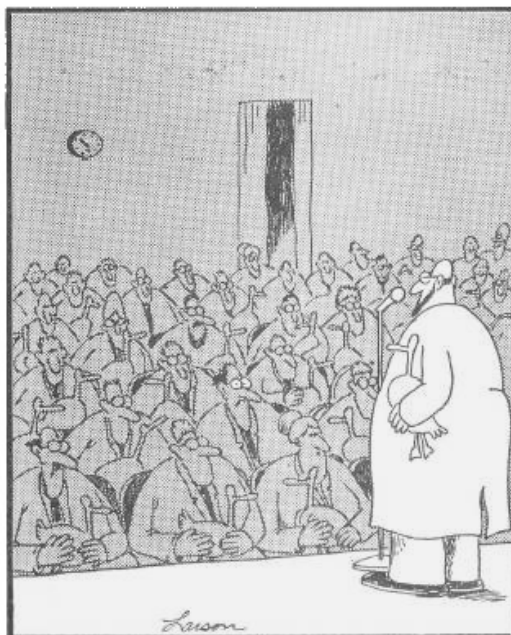
BY CORY THOMAS



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Did you bring your clicker today?

1. Yes
2. No



Suddenly, Professor Liebowitz realizes he has come to the seminar without his duck.

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How we're going to do things (Pedagogy)

- Read first (on web)
- Summarize and ask a good question.
- In class
 - I'll give a brief summary and answer one or two of the best questions.
 - We'll do clicker questions and group problem solving. (Recitation, too)
- Out of class
 - Homework is critical!

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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.

When?

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Science as discourse

- Science is much more than just a collection of facts and procedures. **Science is a way of holding a conversation to decide to agree that we know something.**
- 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 things.
- In solving hard problems in science, most students run into trouble not because they don't know what they need to know, but because they don't know how to ask the questions that will help them find that knowledge – either in their own heads or from elsewhere.

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Three mantras to keep in mind



- Beware one-step recall!
Look for coherence with what else you know.
- Build your understanding on a sense of the physical and integrate it with your equations!
- ***The physics we are learning in this class is simple - but seeing that it is simple is very difficult!***

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Discussion: Some complaints

- Reading assignments were sometimes posted the day they were due – which was VERY tough..
- Too much work required of the students every week.
- Instead of using the homework to reinforce what was taught in lecture, the homework was just used to teach ourselves.
- I come to class because I want the teacher to explain the concepts to me and go through problems....For like an entire week the power point will have the same slides as before, and we are spending precious class time going over exams or quizzes....The homework is the most effective element of the class.
- Seems like much more work than other similar level physics courses.



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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 our Blackboard site.

<http://elms.umd.edu>

- MasteringPhysics – online HW environment.
Sign up. Course name

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Grading

■ Hour exams (2 @ 100 pts)	200
■ Quizzes (~10 @ 10 pts)	100
■ Final exam (200 pts)	200
■ Homework (scaled to)	200
■ Lab (scaled to)	150
■ Readings	75
■ <u>Participation (about)</u>	<u>75</u>
■ <u>Total</u>	<u>1000</u>

In 131: A~800, B~700, C~600, D~500

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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, but...
- You will be expected to think (not just recall) on exams!

Story

On exams: A ≥ 75%, B ≥ 60%, C ≥ 45%, D ≥ 30%
Class average ~ 60-65%. NOT CURVED.

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Coming up

- This week:
 - Please do the online survey at <http://vote.physics.umd.edu>
- Next week:
 - Go to lab if you are new to this class and need to set up ImageJ.
- Following week:
 - Labs, recitations, HW, and quizzes start.

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Results from the final

- The class did extremely well
 - Average = 73% (50% A's!!)
 - Range: 50% - 90%

<u>SCALE</u>
$A \geq 75\%$
$75\% > B \geq 60\%$
$60\% > C \geq 45\%$
$45\% > D \geq 35\%$

#1	#2	#3	#4	#5	#6	I	II	III	IV	V
Motion graphs	Elec. force	Atomic inter.	Random walk	Ener. flow	N2	Diff.	Heat & Temp	Blood flow.	Estim.	Essay
57%	93%	70%	46%	55%	76%	81%	89%	68%	72%	85%

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FMCE Results

- Figure of merit = fraction of the possible gain.

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

	This class (no Tutorials)	Trad. 121 (with Tutorials)
<gain> – force and motion	0.34	0.26
<gain> - energy	0.76	0.22

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Foothold principles: Newton's Laws



- Newton 0:
 - An object responds **only** to the forces it feels and only at the instant 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 $\vec{a}_A = \vec{F}_A^{net} / m_A$
- Newton 3:
 - When two objects interact the forces they exert on each other are equal and opposite. $\vec{F}_{A \rightarrow B}^{type} = -\vec{F}_{B \rightarrow A}^{type}$

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Kinds of Forces

■ Types of Forces

- Normal Force N
- Tension Force T
- Friction Force f
- Weight Force W
- Electric Force F^E
- Magnetic Force F^M

■ Notation convention.

\vec{F} type of force
(object causing force) → (object feeling force)