

HOW TO GET TO KNOW 200 STUDENTS (ALMOST) OVERNIGHT

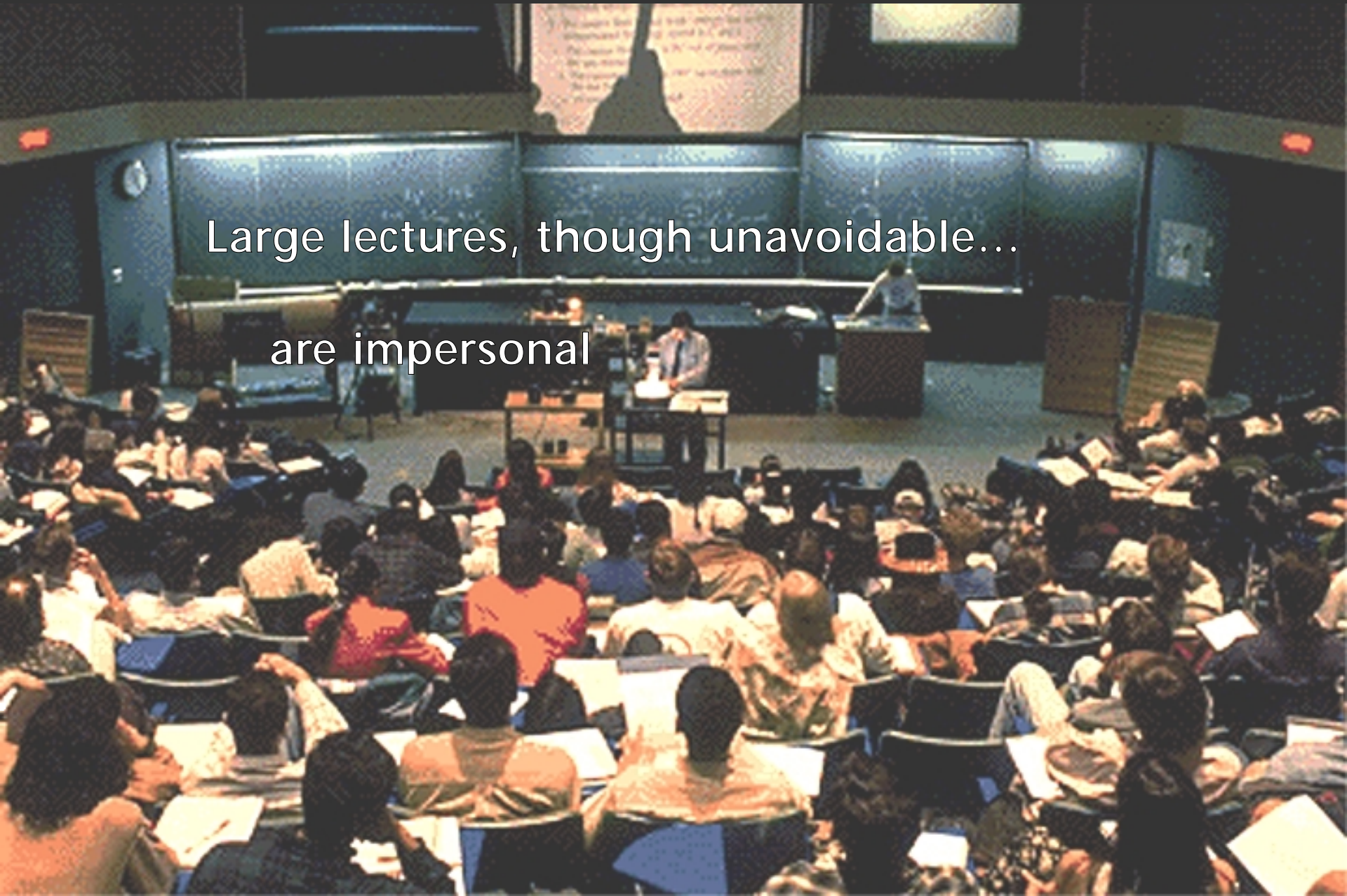
**Catherine H. Crouch
Eric Mazur**

**AAPT Winter Meeting
17 January 2000**



Challenge

Large lectures, though unavoidable...
are impersonal

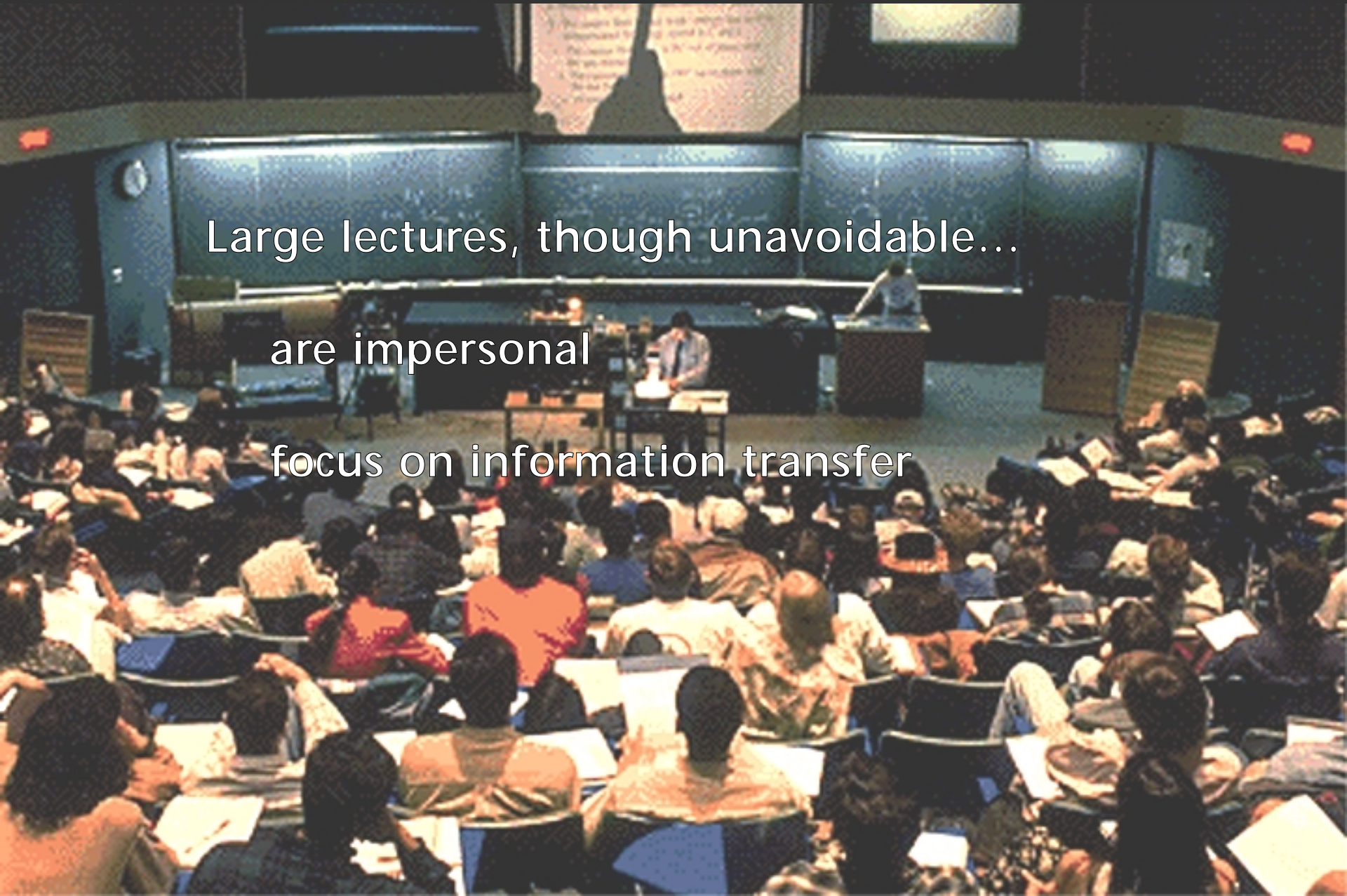


Challenge

Large lectures, though unavoidable...

are impersonal

focus on information transfer



Challenge

Large lectures, though unavoidable...

are impersonal

focus on information transfer

don't necessarily address students' needs



Strategy

- ▶ **Move some of the information transfer out of the classroom**

Strategy

- ▶ Move some of the information transfer out of the classroom: **assign reading**

Strategy

- ▶ Move some of the information transfer out of the classroom: **assign reading**
- ▶ Use a web-based reading assignment to help students **think** about what they read

Gregor M. Novak, Evelyn T. Patterson, Andrew D. Gavrin, and Wolfgang Christian, *Just-in-Time Teaching: Blending active learning with web technology* (Prentice Hall, 1999).

Strategy

Use these assignments to:

Strategy

Use these assignments to:

- ▶ find out what needs attention in class

Strategy

Use these assignments to:

- ▶ find out what needs attention in class
- ▶ get to know your students!

Strategy

Reading assignment:

Strategy

Reading assignment:

- ▶ 2 questions on content

Strategy

Reading assignment:

- ▶ **2 questions on content**
- ▶ **1 feedback question**

Strategy

Reading assignment:

- ▶ 2 questions on content
- ▶ 1 feedback question
- ▶ graded on effort (semi-automated)

Strategy

Sample reading assignment:

1. Suppose you observe an object that moves along a trajectory that is neither circular nor straight. Without determining the object's speed, can you tell if its acceleration is zero or nonzero? Explain briefly.
2. Explain in your own words the difference between inertia and rotational inertia.
3. Please tell us briefly what points of the reading you found most difficult or confusing. If you did not find any part of it difficult or confusing, please tell us what parts you found most interesting.

Problem (with a nice solution!)

What do you *do* with all this information?

Database-driven notebook

Instructor view of student responses

Physics Ia Reading Assignments
Process Feedback

Back Forward Stop Refresh Home Favorites History Search AutoFill Larger Smaller Print Mail Preferences

Address: <http://physics1.harvard.edu/assign.taf> Go

David Tam
11/03/98 11:03:07 PM
Total responses sent: 8

I was a little bit confused as to the relation between centripetal force and static frictional force (as in the case of the cube on the turntable). The answer in part B says that once the static frictional force reaches its maximum, the cube will fly off. Does this mean that the centripetal force is entirely contained in the static frictional force?

[NOTEBOOK](#) [E-MAIL](#) [ALL ANSWERS](#)

Andrew Ferrara
11/03/98 12:06:19 AM
Total responses sent: 0

The discussion of centripetal force was interesting. I guess "centrifugal force" does not exist, then?

[NOTEBOOK](#) [E-MAIL](#) [ALL ANSWERS](#)

Alicia Carrasco
11/03/98 11:51:03 AM
Total responses sent: 3

Local machine zone

Database-driven notebook

Instructor view of student responses

The screenshot shows a web browser window titled "Physics 1a Reading Assignments". The address bar shows the URL "http://physics1.harvard.edu/assign.taf". The page content is titled "Physics 1a Reading Assignments Process Feedback".

On the left side, there is a vertical navigation bar with the following links: Favorites, History, Search, and Page Master.

The main content area displays the following information for a student named David Tam:

- David Tam**
- 11/02/98 11:03:05 PM
- Responses sent: 8

The page lists three questions and their corresponding responses:

1. Suppose you observe an object that moves along a trajectory that is neither circular nor straight. Without determining the object's speed, can you tell if its acceleration is zero or nonzero? Explain briefly.

Acceleration is dependent upon velocity, both are vector quantities. Thus, acceleration can be the result not only of a change of speed, but a change of direction. So if you look at the direction of the object's velocity at two successive moments, you can see if it's change directions and thus if its acceleration is nonzero.
2. Explain in your own words the difference between inertia and rotational inertia.

Inertia is an immutable characteristic of an object, whether it's rotating or not. It is simply a measure of how hard it is to move something. Rotational inertia is dependent upon inertia, but is also dependent upon the object's location relative to the axis of rotation. So while you can't change an object's inertia, you can change its rotational inertia.
3. Please tell us briefly what questions you have after completing your reading assignment. If the reading was entirely clear and you have no questions, please tell us what parts of the reading you found most interesting.

I was a little bit confused as to the relation between centripetal force and static frictional force (as in the case of the cube on the turntable). The answer in part B says that once the static frictional force reaches its maximum, the cube will fly off. Does this mean that the centripetal force is entirely contained in the static frictional force?

At the bottom of the browser window, there is a status bar that says "Local machine zone".

Database-driven notebook


Instructor adds reply to database

Physics 1a Reading Assignments

Back Forward Stop Refresh Home Favorites History Search Autofill Larger Smaller Print Mail Preferences

Address: Go

Favorites
History
Search
Page Holder



Original response by Alicia Camacho:

The free body diagrams for circular motion gave me some trouble. I still don't quite understand them, especially the one in figure 12.12. Other than that, it seems pretty clear.

1. Reduce original response to simple question:

2. Index question: (e.g., Section 10.2, Checkpoint 6.7)

3. Subject:

4. Compose response:

Sign as:

Local machine zone

Database-driven notebook


Entries available for re-use

Physics 1a Reading Assignments

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Address: Go

Favorites
History
Search
Page Hider



Original response by David Tam:

I was a little bit confused as to the relation between centripetal force and static frictional force (as in the case of the cube on the turntable). The answer in part B says that once the static frictional force reaches its maximum, the cube will fly off. Does this mean that the centripetal force is entirely contained in the static frictional force?

1. Reduce original response to simple question:

In the example of the eraser on the turntable, what is the relation between centripetal force and static frictional force? Is the centripetal force entirely contained in the static frictional force?

2. Index question: (e.g., Section 10.2, Checkpoint 6.7)

3. Subject:

4. Compose response:

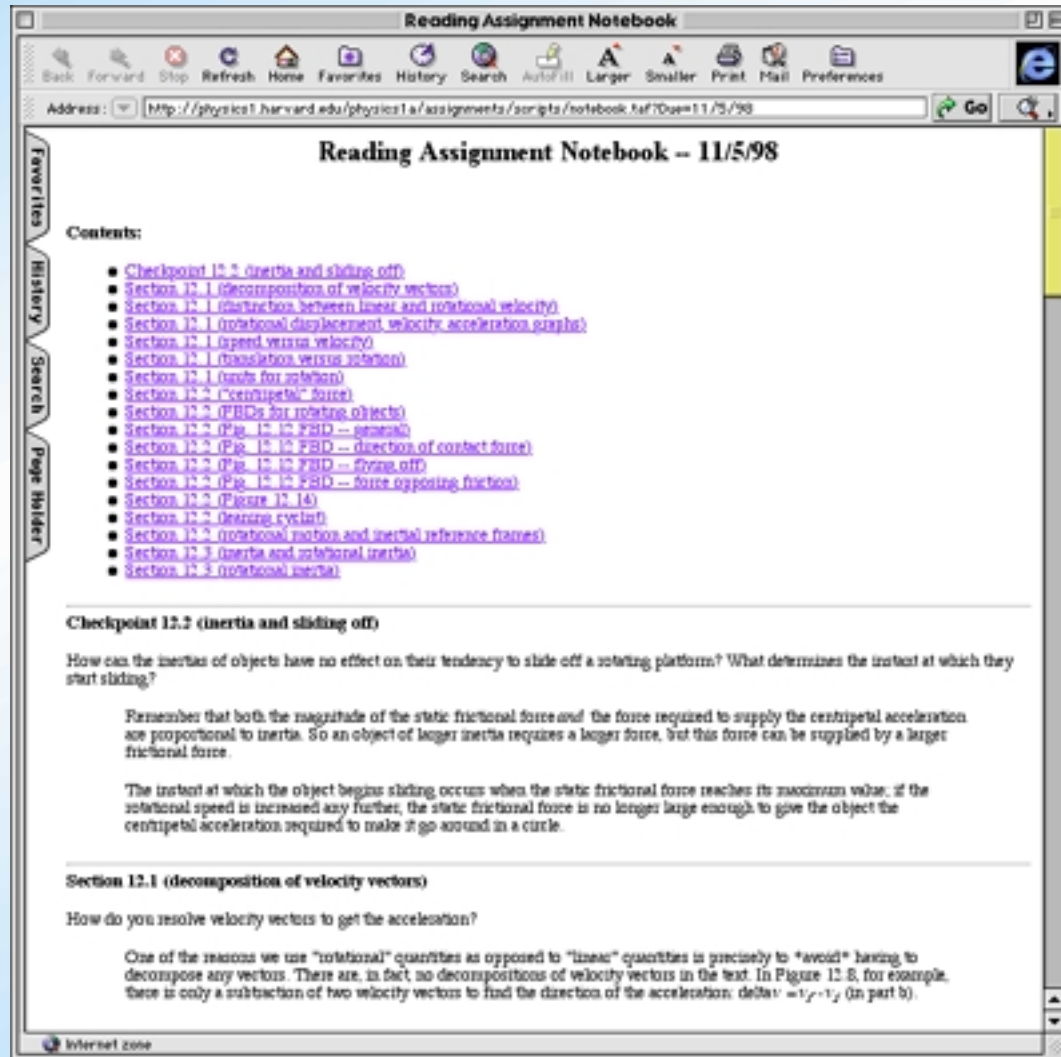
I suggest avoiding the term "centripetal force" (if you find any mention of it in the text, please let me know). Any object going in a circle has a centripetal acceleration and in order for the object to have a centripetal acceleration, some force must be exerted on the object. The force responsible for the centripetal acceleration can be any type of force or combination of forces. In the case of the eraser on the turntable, it is the static frictional force that causes the centripetal acceleration.

Sign as:

Local machine zone

Student view of notebook

Students can read and search posted replies



Benefits

- ▶ better use of classroom time
- ▶ connects names and faces
- ▶ increases student-faculty interaction
- ▶ study resource for students

Funding: National Science Foundation

Programming: Andrey Gubarev

**For a copy of this talk and
additional information:**

<http://mazur-www.harvard.edu>