Interactive Learning Toolkit: Tools for the Interactive Classroom

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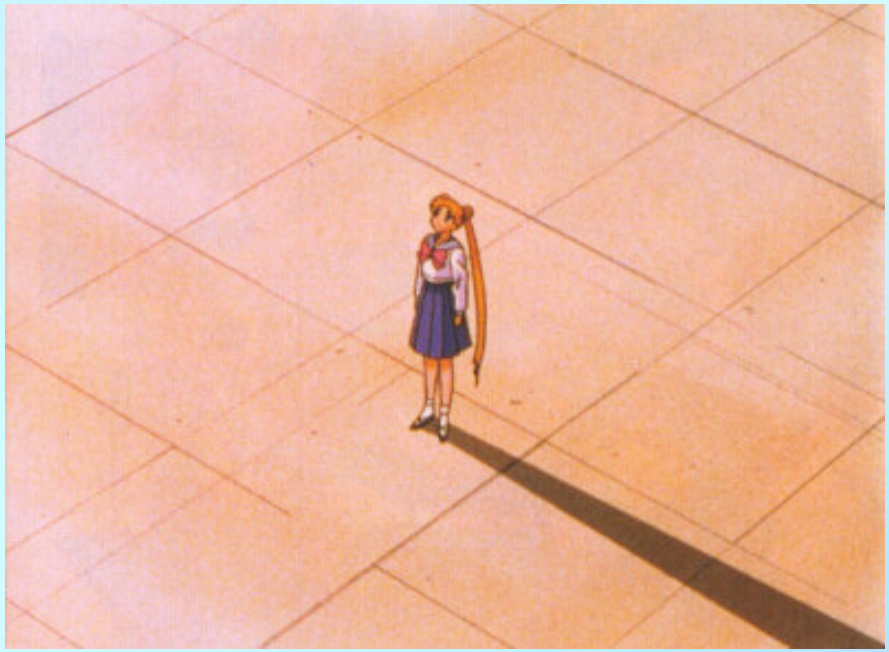
Outline

- **Interactive Teaching Techniques**
- **Web-based support**
- **Summary**
- **Resources**

The 'large lecture' problem

Students passively receive information with no emphasis on interaction



PhD Research

68% of students do not have the ability, motivation or discipline for self-study!

Ref: McCauley (2002) *PhD Thesis.* University of Limerick.

PhD Research

Shift the focus in lecture from delivering to synthesizing information

Ref: McCauley (2002) *PhD Thesis.* University of Limerick.

The solution

- **Information transfer - outside classroom:**

Just in Time Teaching

- **Discussion, interaction - in classroom:**

Peer Instruction

Just in Time Teaching Strategy

- **Pre-lecture reading assignment (2 X content and 1 X feedback)**
- **Graded on effort - 10% final grade**

Ref: Novak et al. (1999) See: www.jitt.org

Just in Time Teaching works!

- **Improves preparation**
- **Feedback**
- **Better use of class time**

Ref: Novak et al. (1999) See: www.jitt.org

Peer Instruction

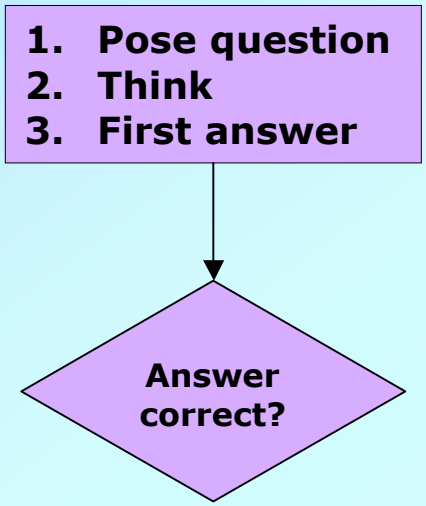
Promotes student interaction

Ref: Mazur (1997) Prentice Hall.

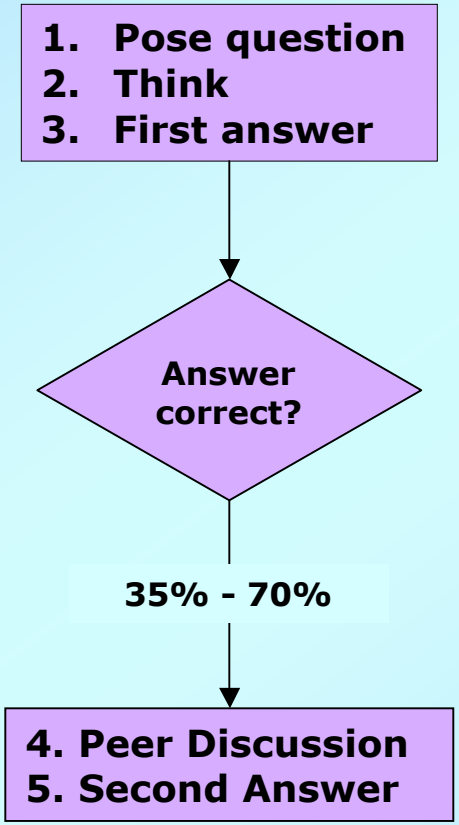
Peer Instruction

1. **Pose question**
2. **Think**
3. **First answer**

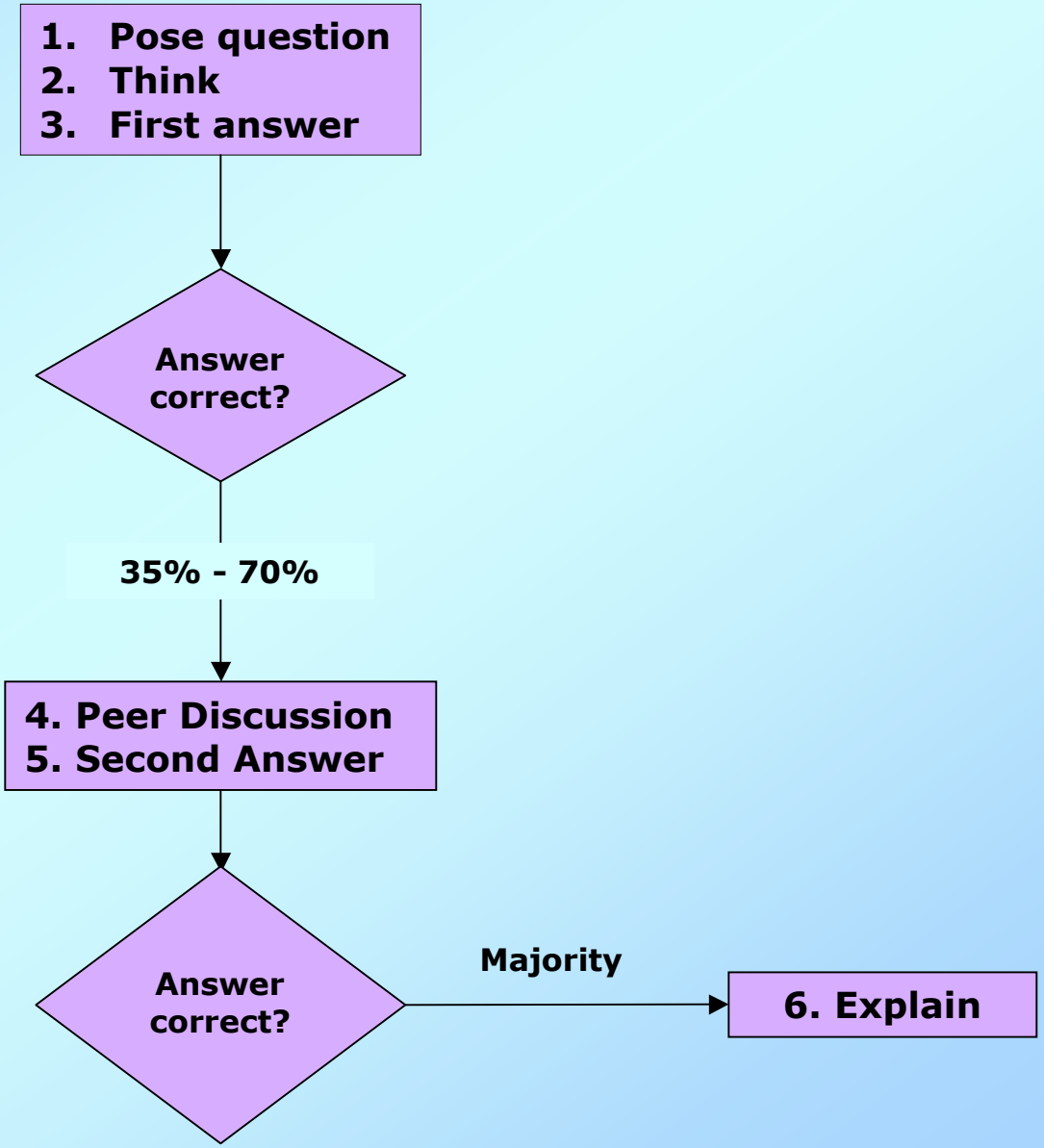
Peer Instruction



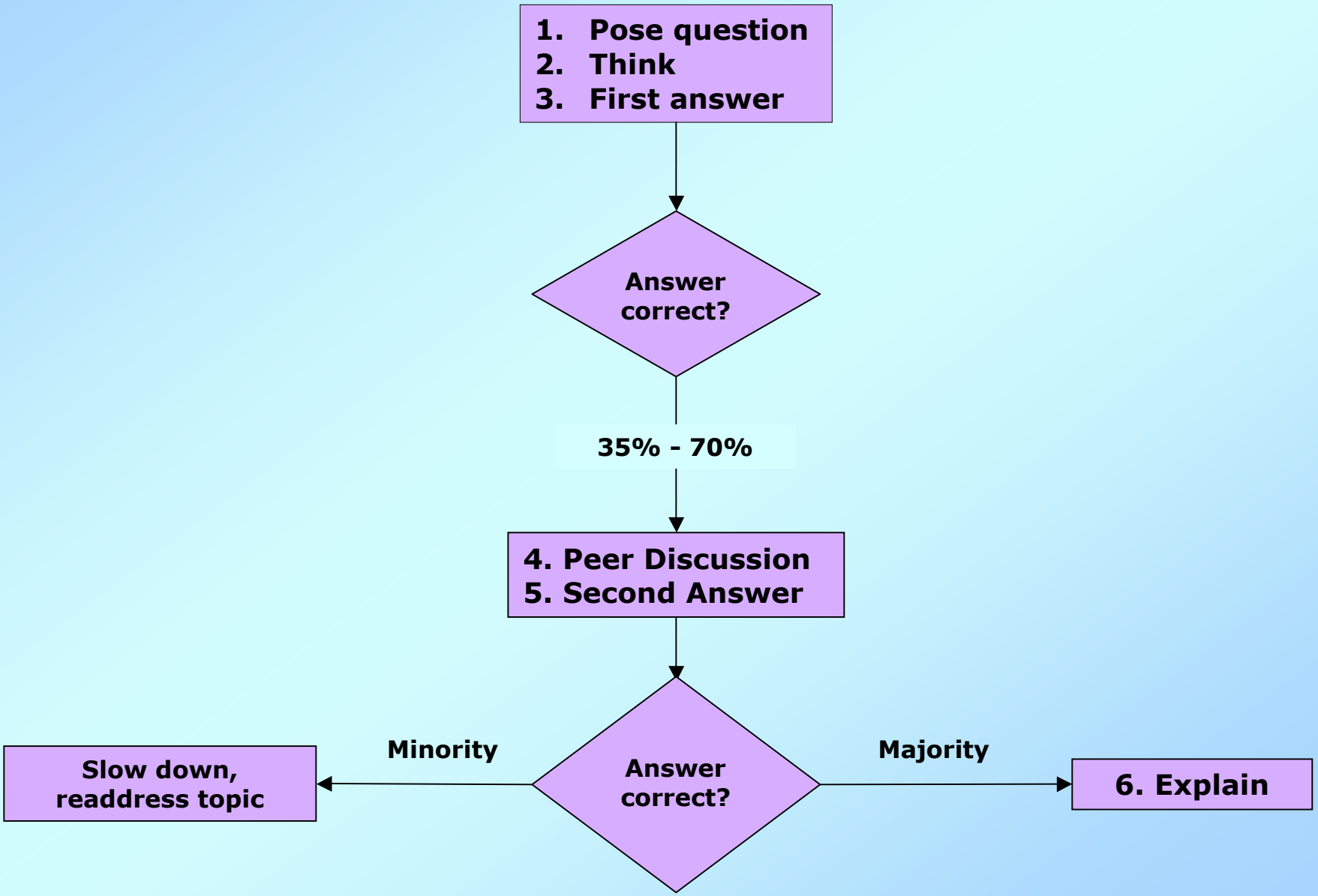
Peer Instruction



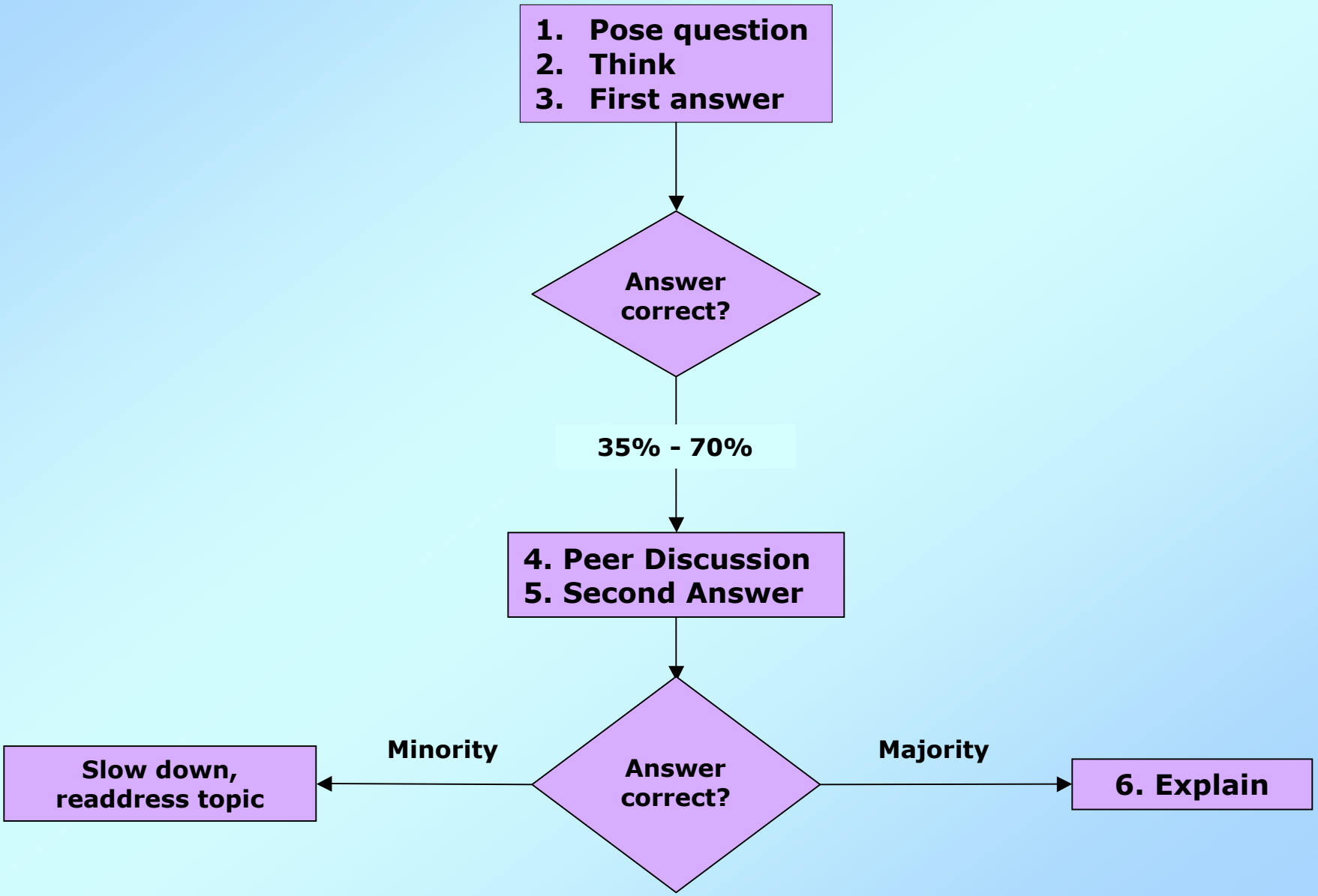
Peer Instruction



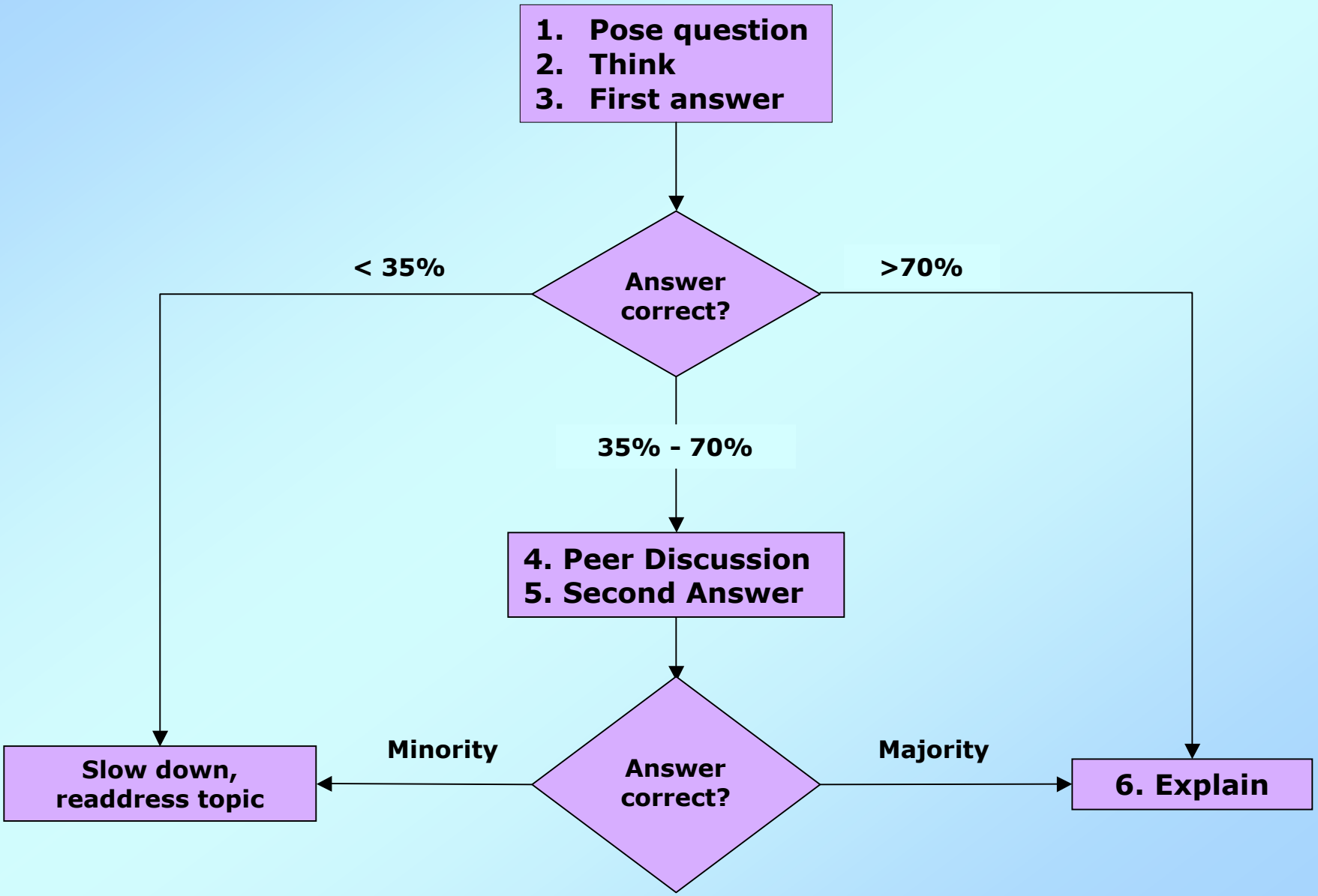
Peer Instruction



Peer Instruction



Peer Instruction

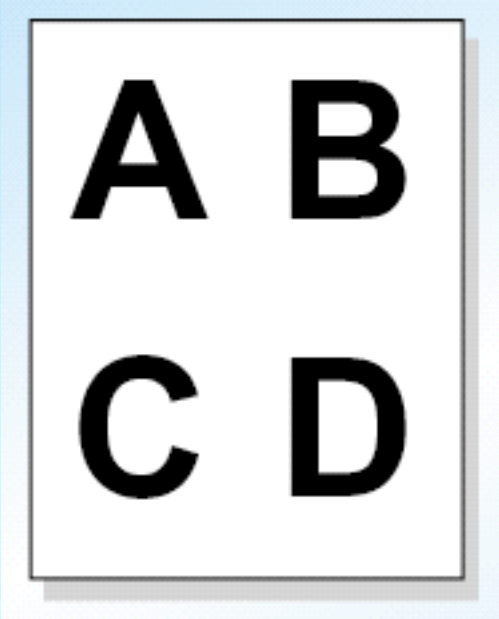


Feedback

- **PRS - Personal Response System**

Feedback

- PRS - Personal Response System
- Flashcards



Feedback

- **PRS - Personal Response System**
- **Flashcards**
- **Colour Cards**

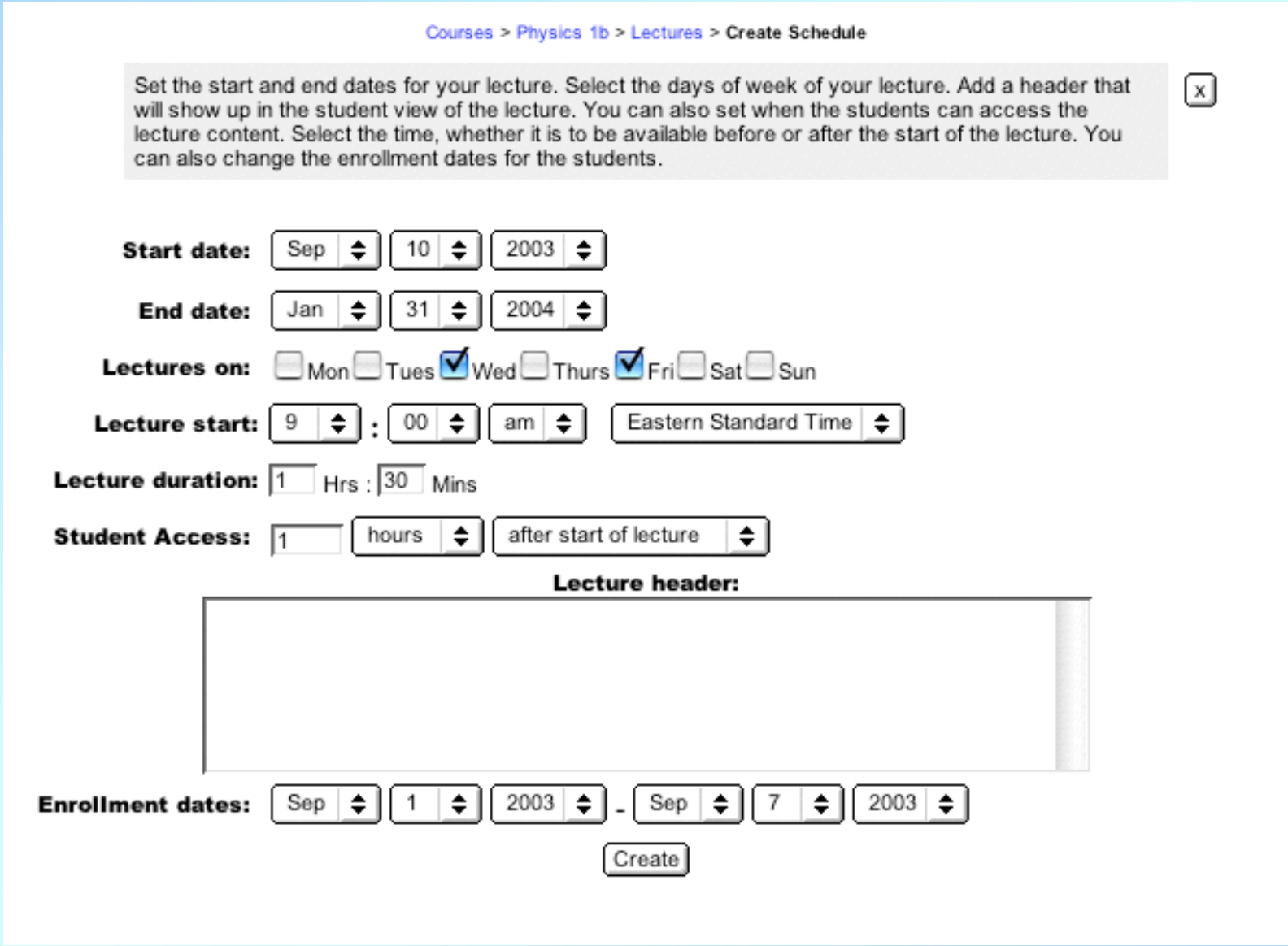
Feedback

- **PRS - Personal Response System**
- **Flashcards**
- **Colour Cards**
- **Heads down/Hands up**

Interactive Learning Toolkit [ILT]

www.deas.harvard.edu/galileo

Create calendar-based lecture schedule



Create Reading Assignment schedule

READING LECTURES ASSIGNMENTS FORUMS NEWS HANDOUTS

Courses > Physics 1b > **Create Reading Automatically**

Use this page to create a schedule of reading assignments. Each lecture will have a reading assignment associated with it. Use this page to specify how long before the lecture you want to publish the assignment to students. Also specify when you want to make it due.

x

At what time do you want the reading assignment to be made available?

At 12 : 00 AM

2 day(s) before start of lecture

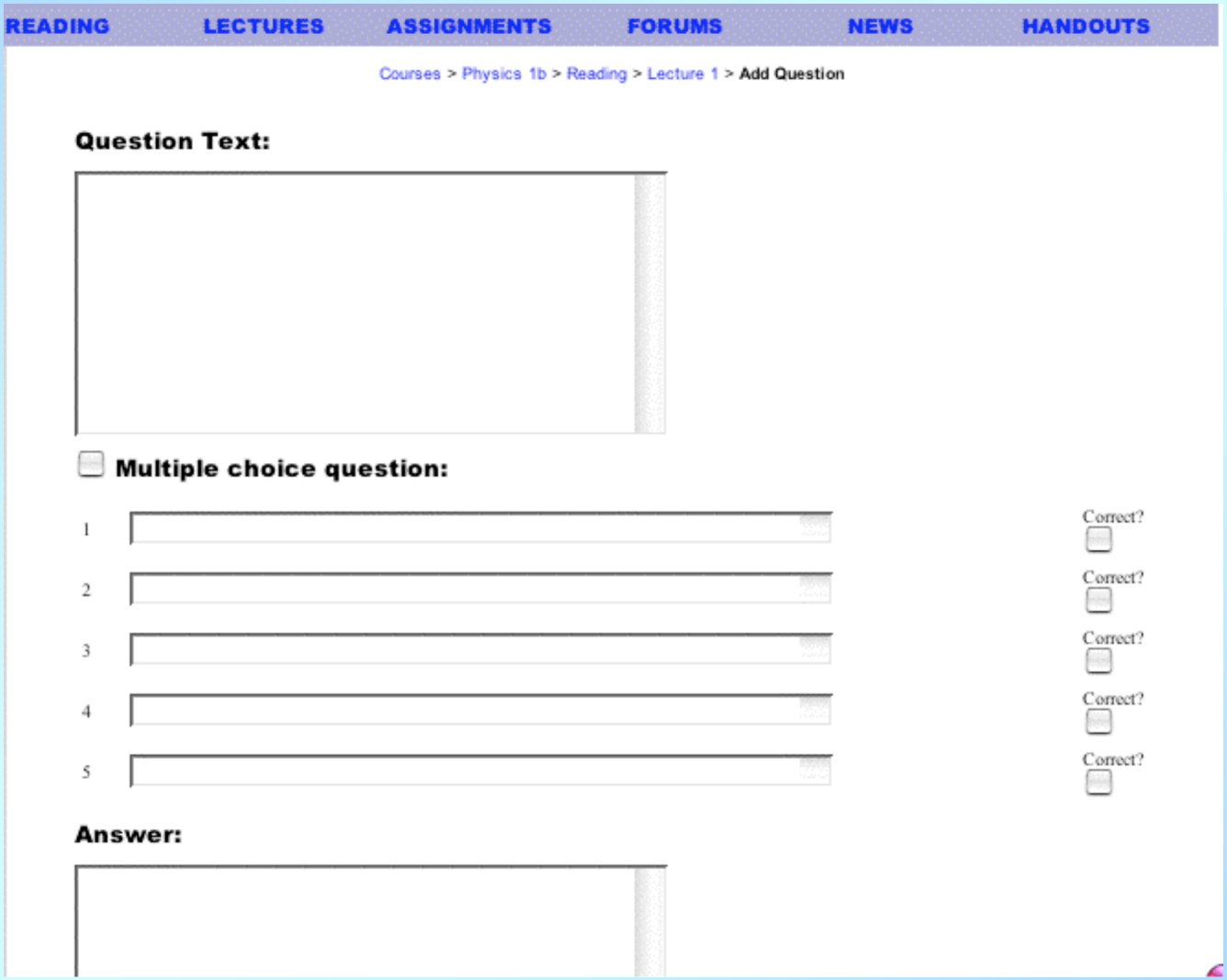
At what time do you want the reading assignment to be due?

At 6 : 00 PM

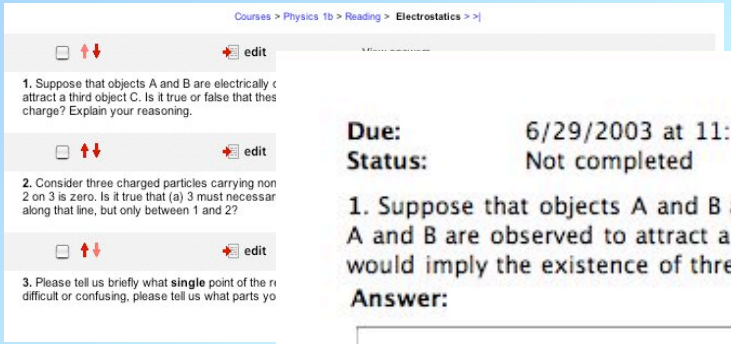
1 day(s) before start of lecture

Create

Add questions to Reading Assignment



Students respond to Reading Assignment



Readings > Current Reading

Due: 6/29/2003 at 11:59 PM
Status: Not completed

1. Suppose that objects A and B are electrically charged and are observed to attract each other. Both A and B are observed to attract a third object C. Is it true or false that these observations, if correct, would imply the existence of three different kinds of charge? Explain your reasoning.
Answer:

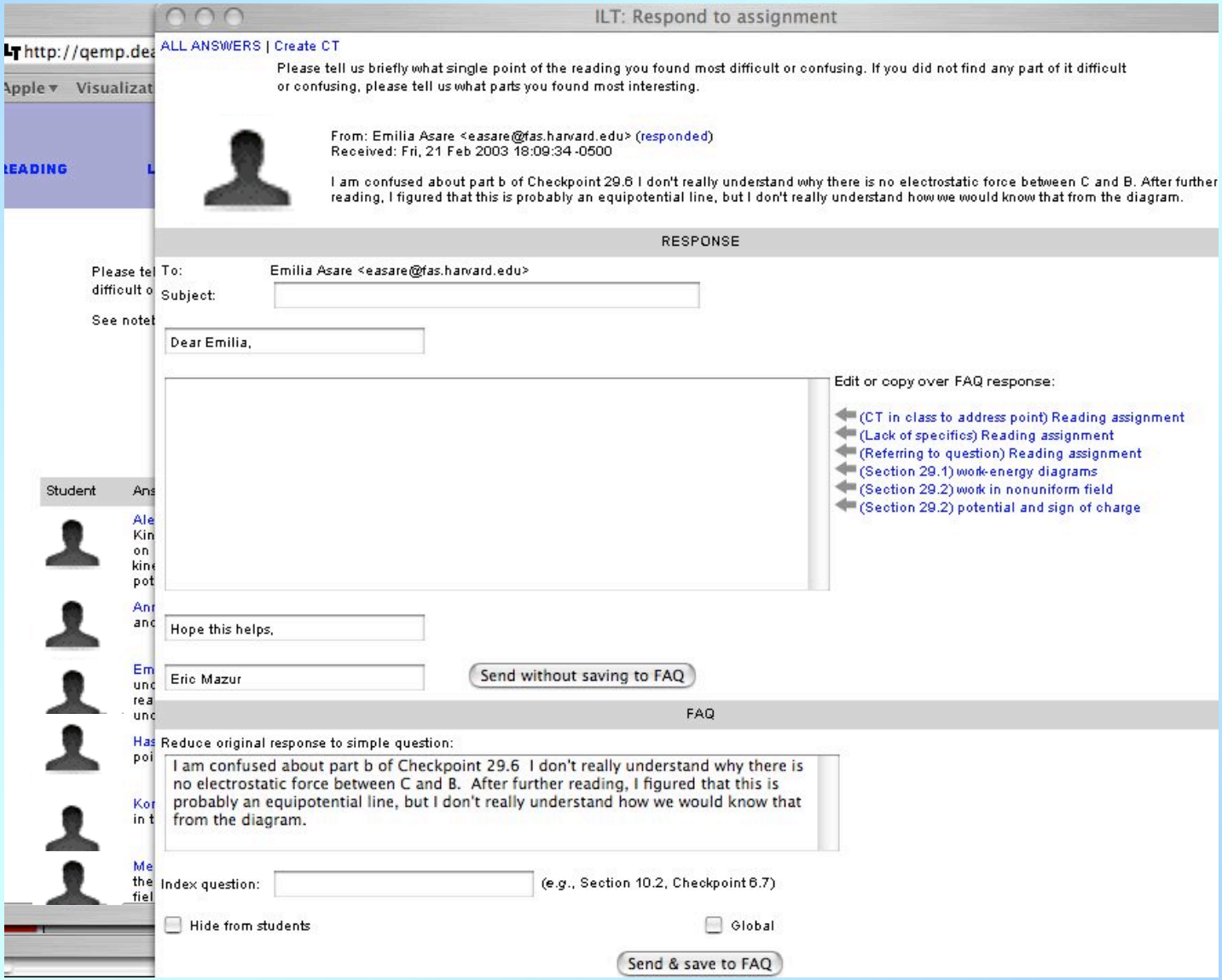
2. Consider three charged particles carrying nonzero charges q1, q2, and q3. The vector sum of the forces exerted by 1 and by 2 on 3 is zero. Is it true that (a) 3 must necessarily lie somewhere along the line connecting 1 and 2 or (b) 3 must lie somewhere along that line, but only between 1 and 2?
Answer:

3. Please tell us briefly what **single** point 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.
Answer:

Responses: work, face & name connected

Student	Answer	Time	Response
	Mysha Mason terminology question -- are neutral objects considered to be electrically charged (i.e. their charge is zero), or just positive and negative objects?	2/3/2003 7:59:16 pm	0 / 2
	Alyssa Berman Pg. 12 of the reading states that "any two dissimilar materials become charged when brought in contact." Why, then, is no "static electricity" created when wood is rubbed against wool, for example? (Unlike glass against silk.)	2/3/2003 8:47:20 pm	0 / 2
	Leslie Garbarino I had difficulty reading the force diagrams for different charges. It was tricky to figure out which forces were acting on which particles, given attraction and repulsion and also the fact that in a set of two particles, each is exerting a separate force on the other. I would like to see a diagram like this drawn out and have each force named as it is drawn. It would help me get a hold on them as opposed to seeing a bunch of arrows on the paper.	2/3/2003 9:23:39 pm	0 / 2
	Christine Tran I found the concept of elementary charge confusing, and I am still hoping that I can get more clarification abbout Coulomb's Law -- that part is still shaky for me.	2/3/2003 9:29:44 pm	0 / 2
	Andrea Li 26.7 was conceptually difficult for me, the elecrostatic equilibrium example specifically.	2/3/2003 10:20:37 pm	1 / 2
	Neil Shah I had a bit of difficulty understanding why a neutral object is attracted to a charged object and not repelled by the charged object (since the neutral object has equal amounts of both charges).	2/3/2003 10:27:58 pm	1 / 2
	Lisa Simpson The last 2 sections on coulumb's law was a bit confusing. Some of the notation and the math was not as clear as i would have hoped. Perhaps more numerical examples to help show the application of the equation into real charges.	2/3/2003 10:50:46 pm	1 / 2

Response email to a RA question



Select ConcepTest Q's from database

READING | LECTURES | ASSIGNMENTS | FORUMS | NEWS | HANDOUTS

Courses > VU Course > Introduction > **Add CT**

Please select the CTs you want to add to your lecture and click "Add to lecture". You can also click "Generate slides" to produce slides of question selected. You can modify your search or perform a new search using the search tools on the left. You can change the view of the CTs using the "Expand all" or "Collapse all" links on the left.

x

1 - 10 of 156 CTs > >|

Sort by: Question text Sort

Physics > Introductory Electromagnetism > DC Circuits > CT: 3874
October 17, 2001 02:03:23 pm

1. Consider two identical resistors wired in series. If there is an electric current through the combi...

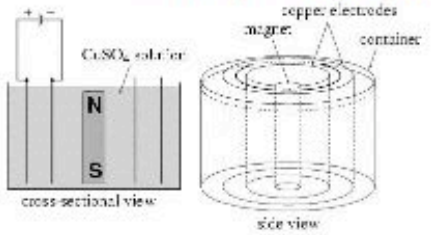
1. equal to
2. half
3. smaller than, but not necessarily half

Physics > Introductory Electromagnetism > Magnetism > CT: 3983
October 1, 2001 00:00:00 am

2. A $CuSO_4$ solution is placed in a container housing coaxial cylindrical copper electrodes....

1. positive.
2. negative.
3. both positive and negative.

...



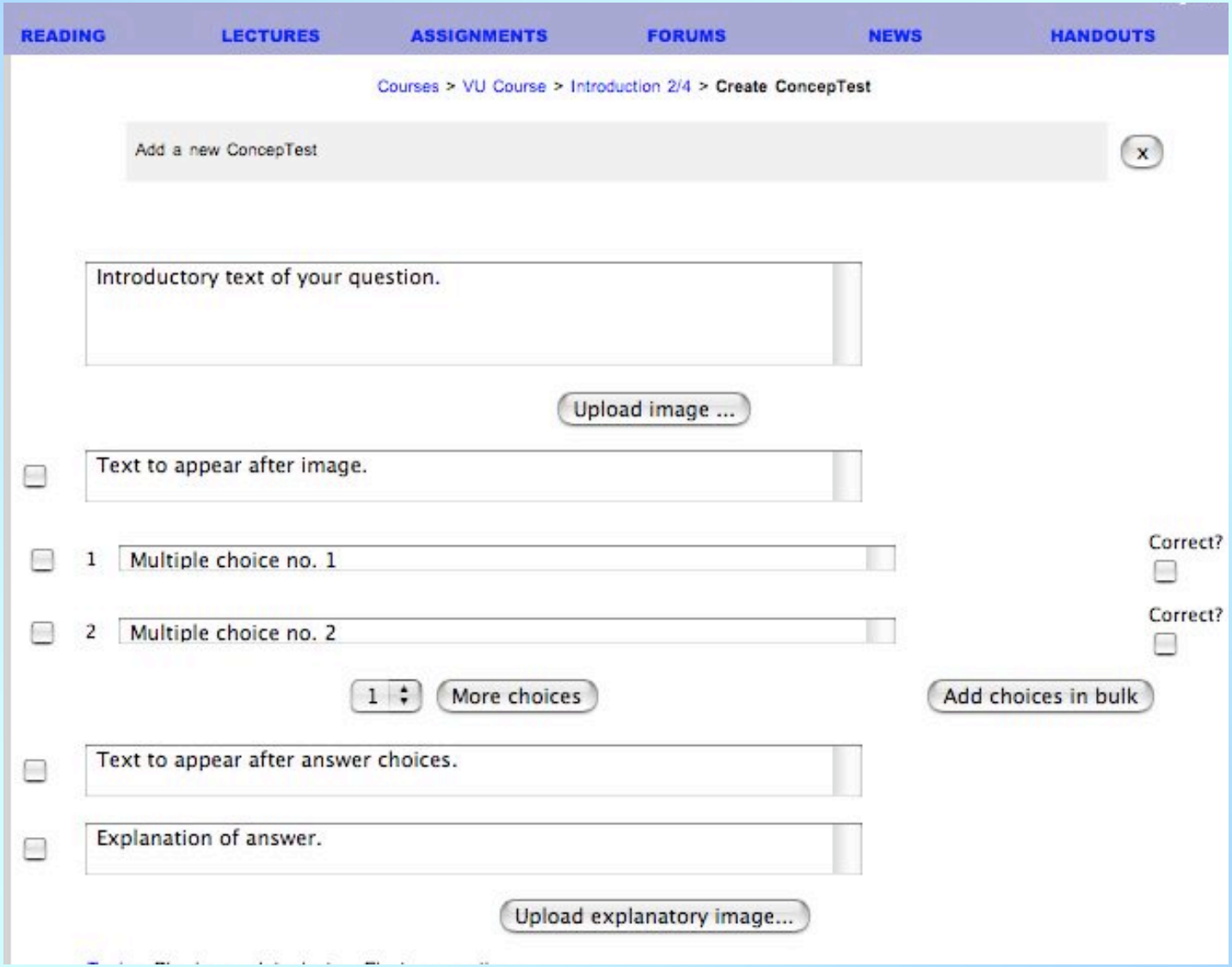
Physics > Introductory Electromagnetism > Magnetism > CT: 3980
October 1, 2001 00:00:00 am

3. A battery establishes a steady current around the circuit below. A compass needle is placed successi...

1. *P*, *Q*, *R*.
2. *Q*, *R*, *P*.
3. *R*, *Q*, *P*.

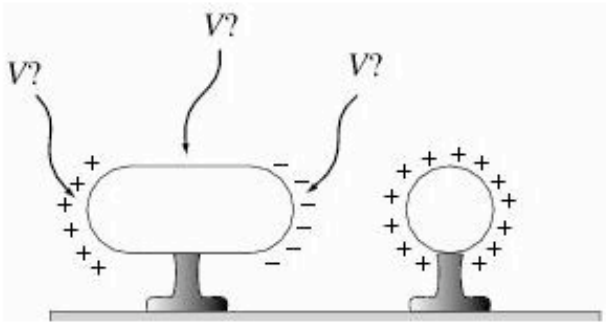
...

Create your own ConcepTest Q's



Create student view of lecture

1. A charged object is brought near an uncharged metal object. Negative charges accumulate on the side of the uncharged object nearest to the charged sphere, positive charges on the opposite side. On the uncharged metal object, the potential is

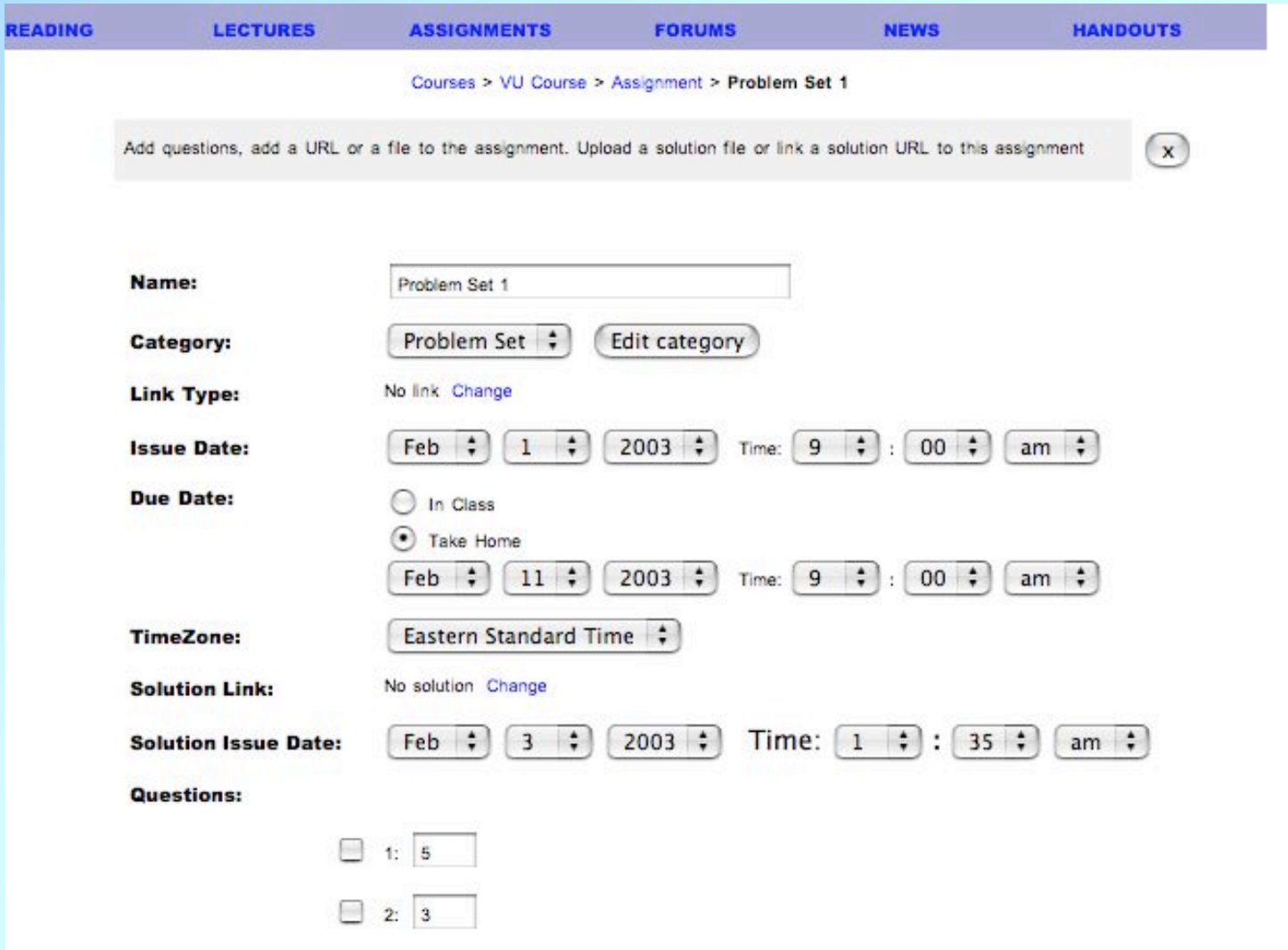


1. largest on the positive side
2. largest on the negative side
3. largest in the middle
4. the same everywhere

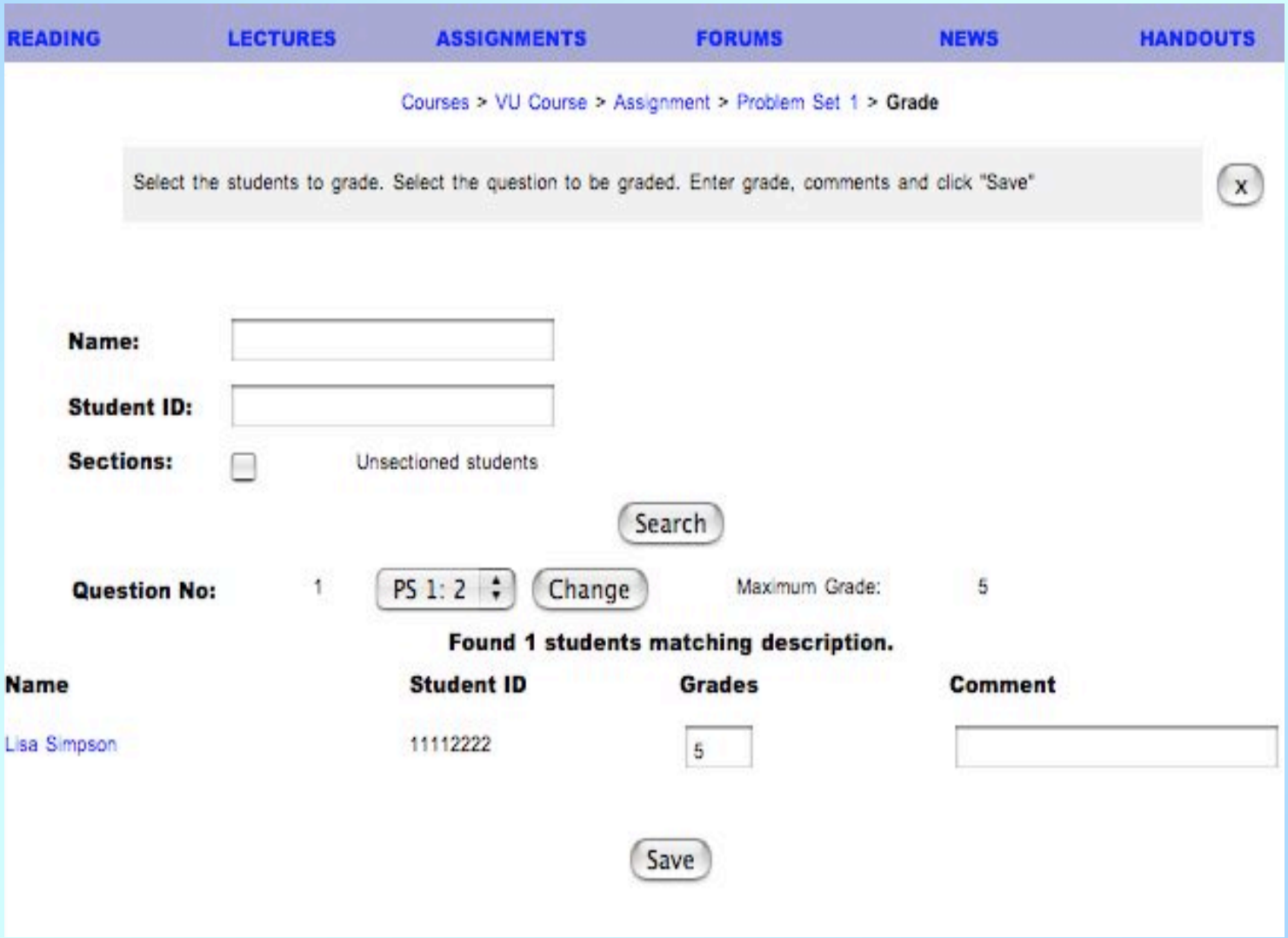
Answer

2. A cylindrical piece of insulating material is placed in an external electric field, as shown. The net electric flux passing through the surface of the cylinder is

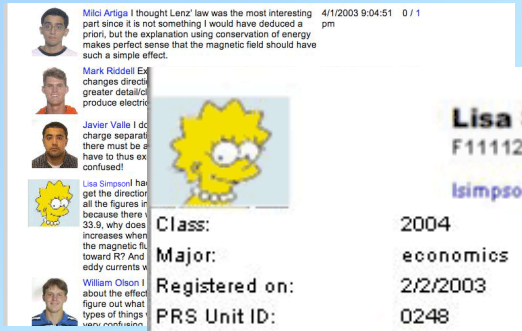
Assignments: upload problem sets



Grade book: database of students grades



Face book: connects all elements of course



Milci Artiga I thought Lenz' law was the most interesting part since it is not something I would have deduced a priori, but the explanation using conservation of energy makes perfect sense that the magnetic field should have such a simple effect. 4/1/2003 9:04:51 pm 0 / 1

Mark Riddell Ex changes directi greater detail/cl produce electric

Javier Valle I do charge separati there must be a have to thus ex confused!

Lisa Simpson I ha get the direction all the figures in because there v 33.9, why does increases when the magnetic flu toward R? And eddy currents w

William Olson I about the effect figure out what types of things very confusing

Lisa Simpson
F11112222

lsimpson@fas.harvard.edu

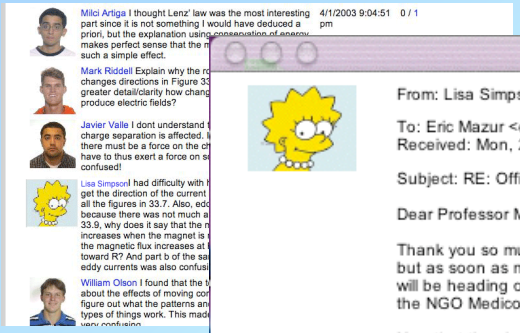
Laboratory 8 Tue 1:00:pm
Section 5 Wed 4:00:pm

Class:	2004	Forums:	4 posts
Major:	economics	Email:	36
Registered on:	2/2/2003	No. of self-tests	1 self-tests
PRS Unit ID:	0248	Reading FAQs:	1
Final grade:	B		

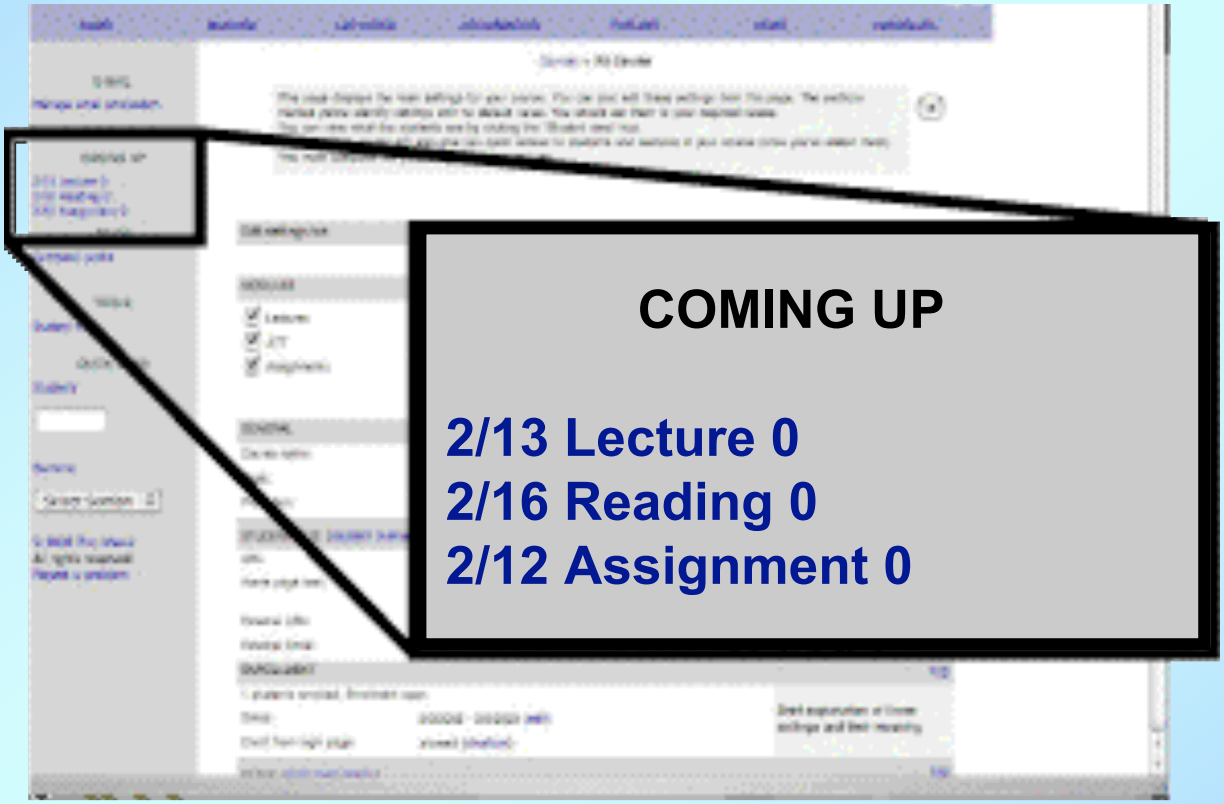
RA	CT	PT	L	PS	HE	OT	FE
6/6	1/1	2/2	9/10	40/40	20/35	5/5	39/60
4/6	5/6	2/2	9/10	28/35	14/35	15/15	
5/6 *	5/6	0/2		35/35	25/35	18/18	
5/6 *	2/3	2/2	9/10	35/35 *			
5/6 *	6/9	2/2	10/10	35/35			
6/6	7/8	0/2		35/35			
6/6	3/4	2/2		35/35			
6/6	5/9	2/2		35/35			
5/6 *	9/9	2/2					
6/6	8/11						
6/6							
5/6 *	5/5						
6/6	10/10						
6/6	8/9						
6/6	10/10						
6/6	7/7						
6/6							
6/6							
6/6	11/11						
6/6	9/9						
6/6	8/8						
6/6	13/13						
119/126	132/148	14/18	37/40	278/285	59/105	38/38	39/60
94%	89%	78%	93%	98%	56%	100%	65%

RA: Reading assignments; CT: ConcepTests; PT: Pretest; L: Laboratory; PS: Problem Set; HE: Hour Exam; OT: Online Test; FE: Final Exam;

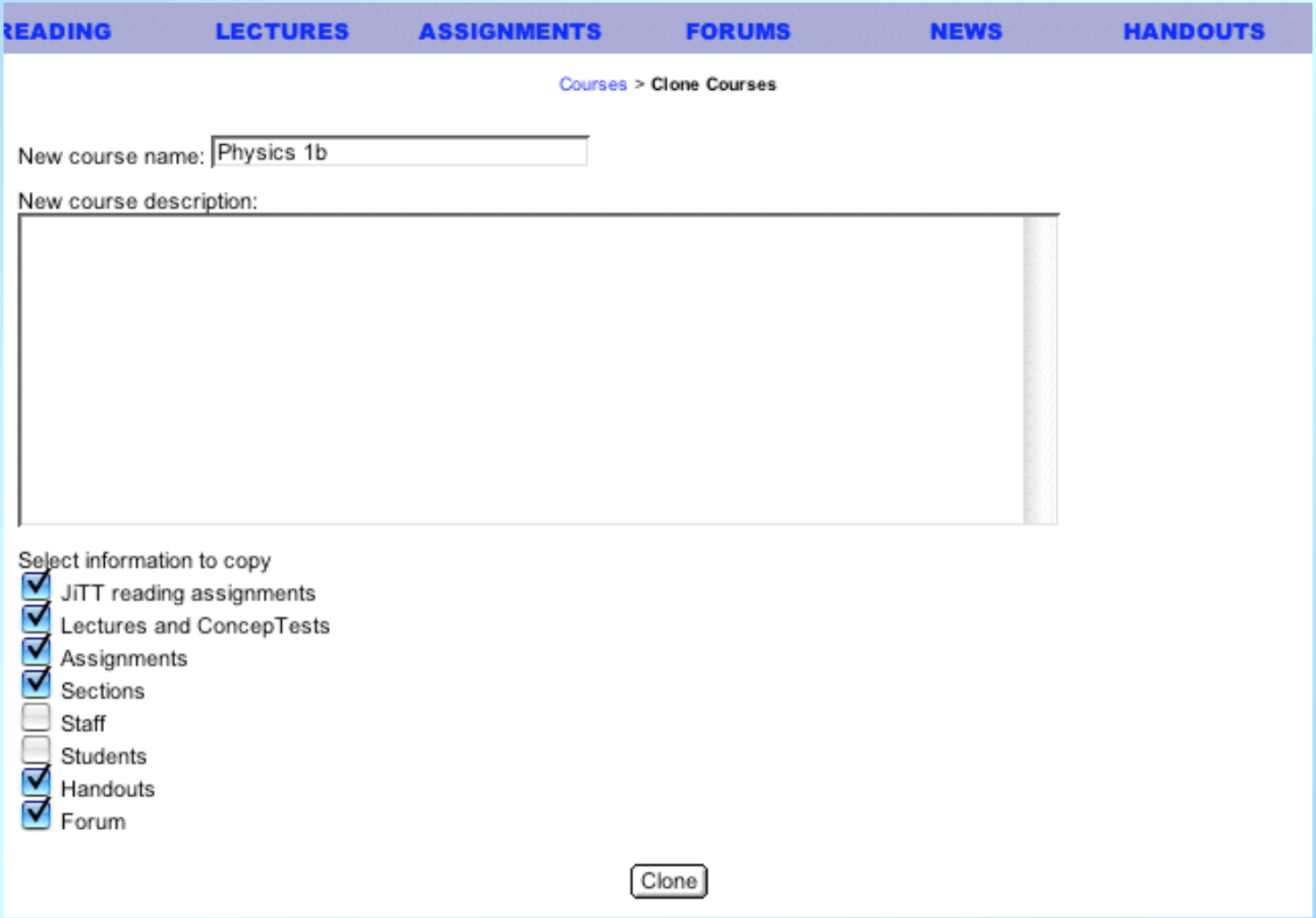
Email: priority listed and FAQ



Calendar-based reminders: students & staff



Clone course: saves time & great template



Essential Elements

- **Reading (before class)**
- **Participating (in class)**
- **Problem solving (after class)**
- **Appropriate testing/assessment**
- **Technology Support - Interactive Learning Toolkit**

Acknowledgments

NSF Distinguished Teaching Scholar Award

DEAS Information Technology Group

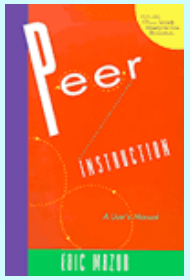
ASA Assessment of Student Achievement in Undergraduate Education

Mazur Group website (papers/talks):

http://mazur.deas.harvard.edu/

Resources

- **Peer Instruction: A User's Manual (Prentice Hall, 1997)**



- **Galileo Website: http://galileo.harvard.edu/home.html**
- **Interactive Learning Toolkit: http://www.deas.harvard.edu/galileo**
- **Just In Time Teaching http://www.jitt.org**
- **Assessment techniques: FLAG (Field-tested Learning Assessment Guide) http://www.flaguide.org**