

1. Go to <http://LCatalytics.com>

2a. If you have instructor account: Log in, click "Student view"

2b. Otherwise: Create *student* account with signup code DEMO

3. Join session 1234567

Peer Instruction: Engaging students with Learning Catalytics



New Trends in Physics Teaching
BUAP
Puebla, Mexico, 24 May 2013



Peer Instruction: Engaging students with Learning Catalytics



@eric_mazur

New Trends in Physics Teaching
BUAP
Puebla, Mexico, 24 May 2013



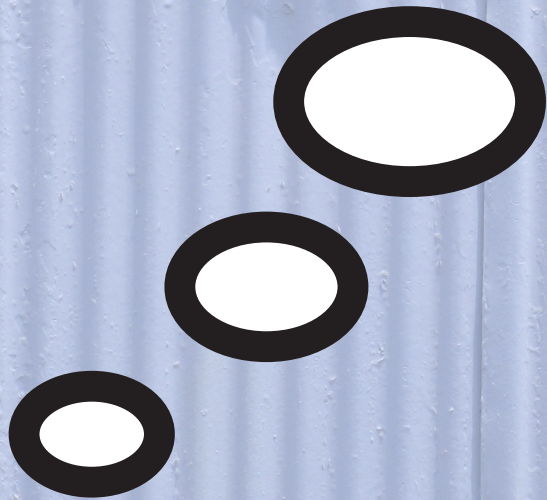


1 lecture

2 PI

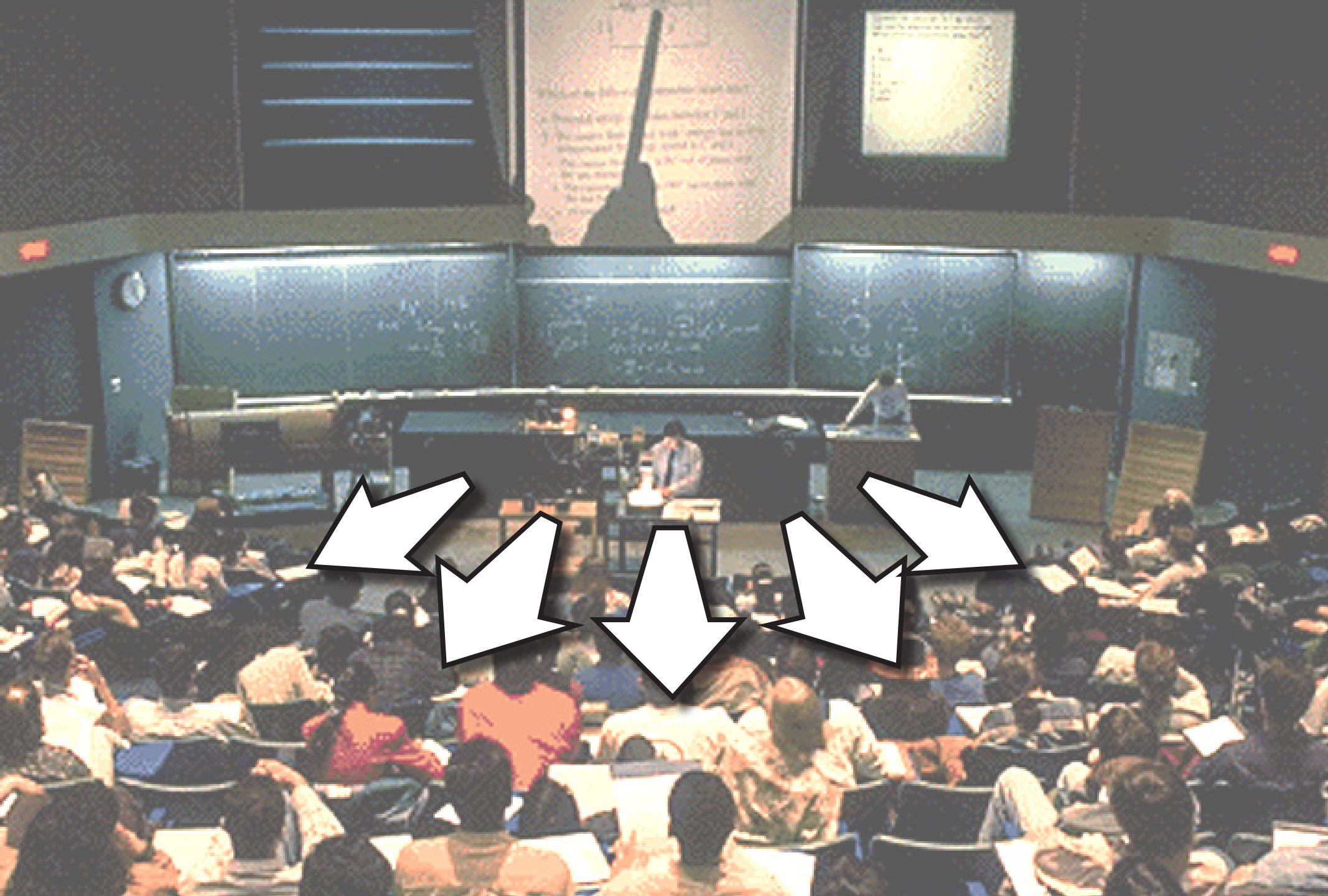
3 PI 2.0

**What happens
in a lecture?**





1 lecture



The result?

EDUCACION

Lack of learning

EDUCACION

Lack of learning

Lack of retention



1 lecture

2 PI



1. transfer of information



1. transfer of information


2. assimilation of that information

- 
- 1. transfer of information (in class)**
 2. assimilation of that information



1. transfer of information (in class)

2. assimilation of that information (out of class)

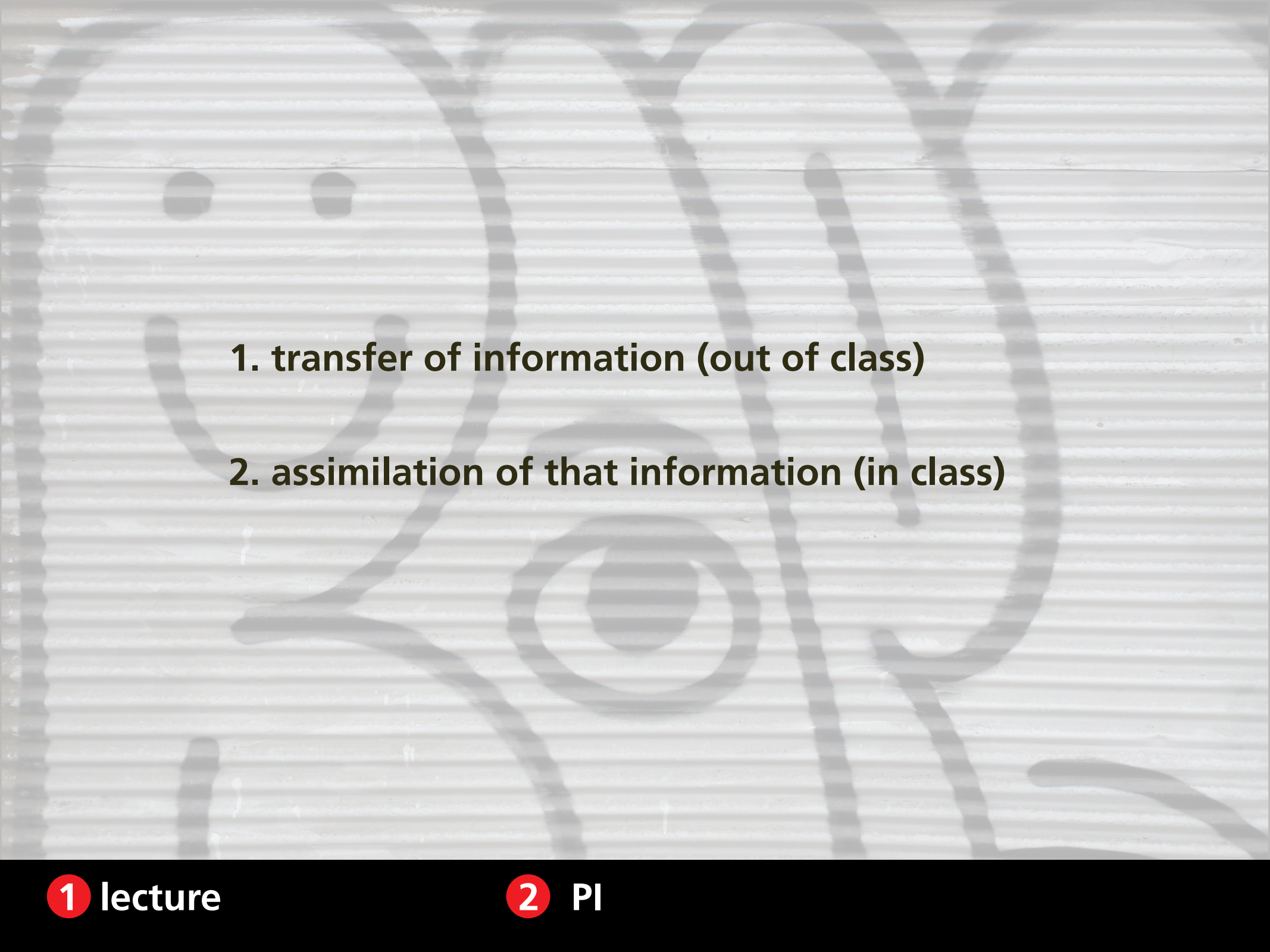


**Should focus
on THIS!**

1. transfer of information (in class)

2. assimilation of that information (out of class)

- 
- 1. transfer of information (in class)**
 - 2. assimilation of that information (out of class)**

- 
1. transfer of information (out of class)
 2. assimilation of that information (in class)

A photograph of a man in a dark suit and red tie leaning over a group of students in a lecture hall. He is pointing at a document held by one of the students. The students are seated in green chairs, and the room has wood-paneled walls. The text is overlaid on the image.

1. transfer of information (out of class)

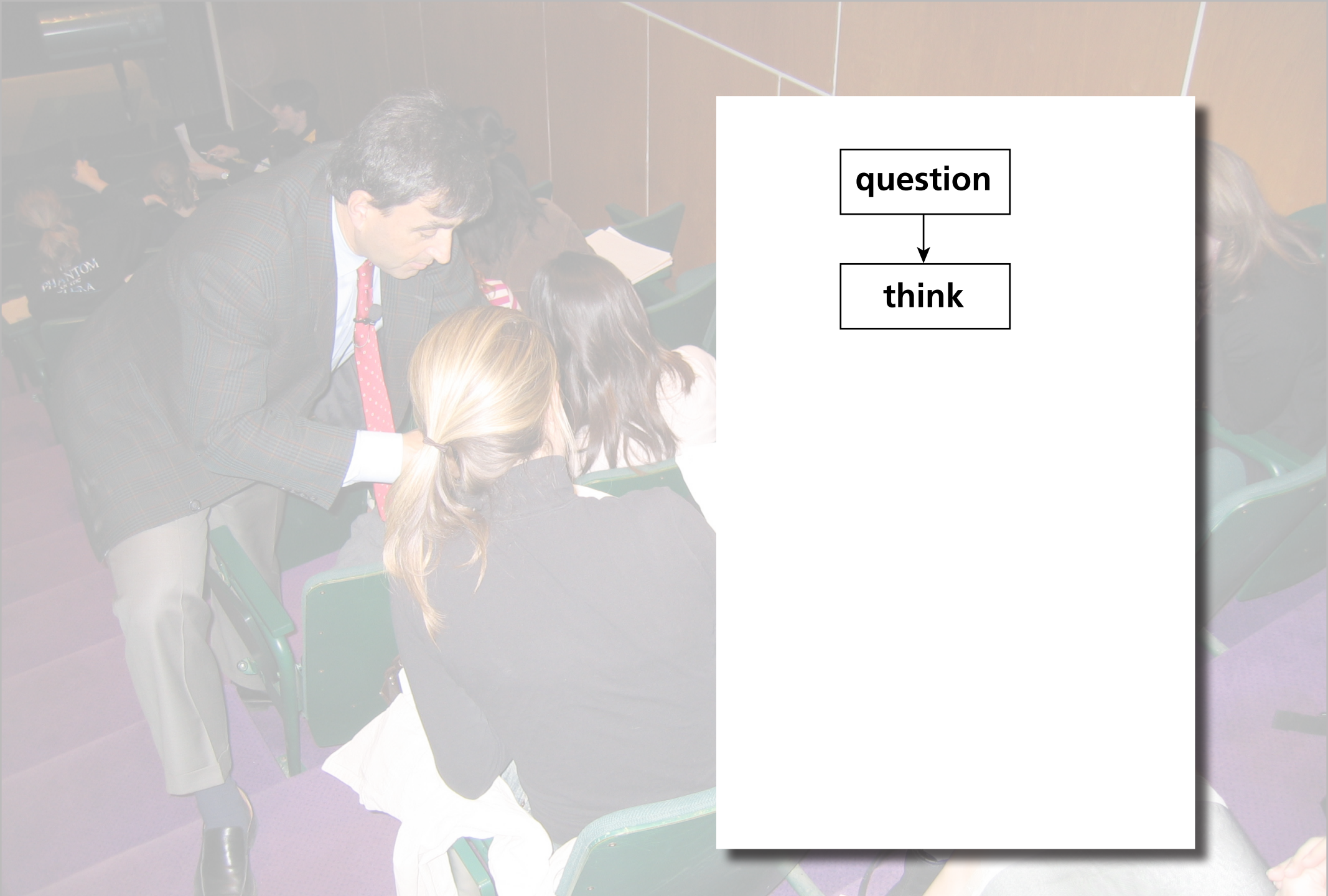
2. assimilation of that information (in class)

A man in a dark plaid suit and red tie is leaning over a woman with long blonde hair in a lecture hall. He appears to be adjusting her chair or providing assistance. Other people are visible in the background, some sitting at desks. The room has wood-paneled walls and green chairs.

question

1 lecture

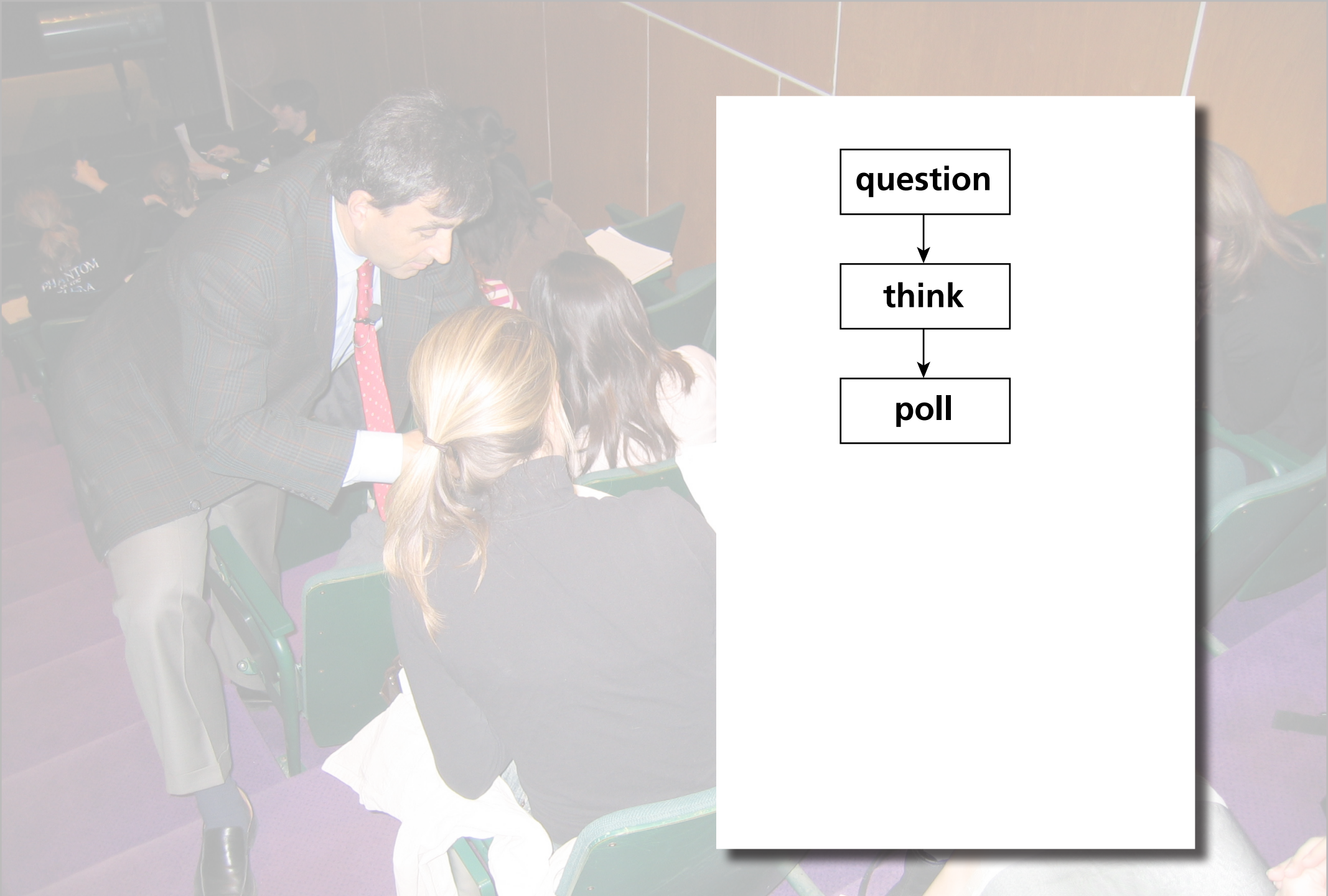
2 PI



question



think



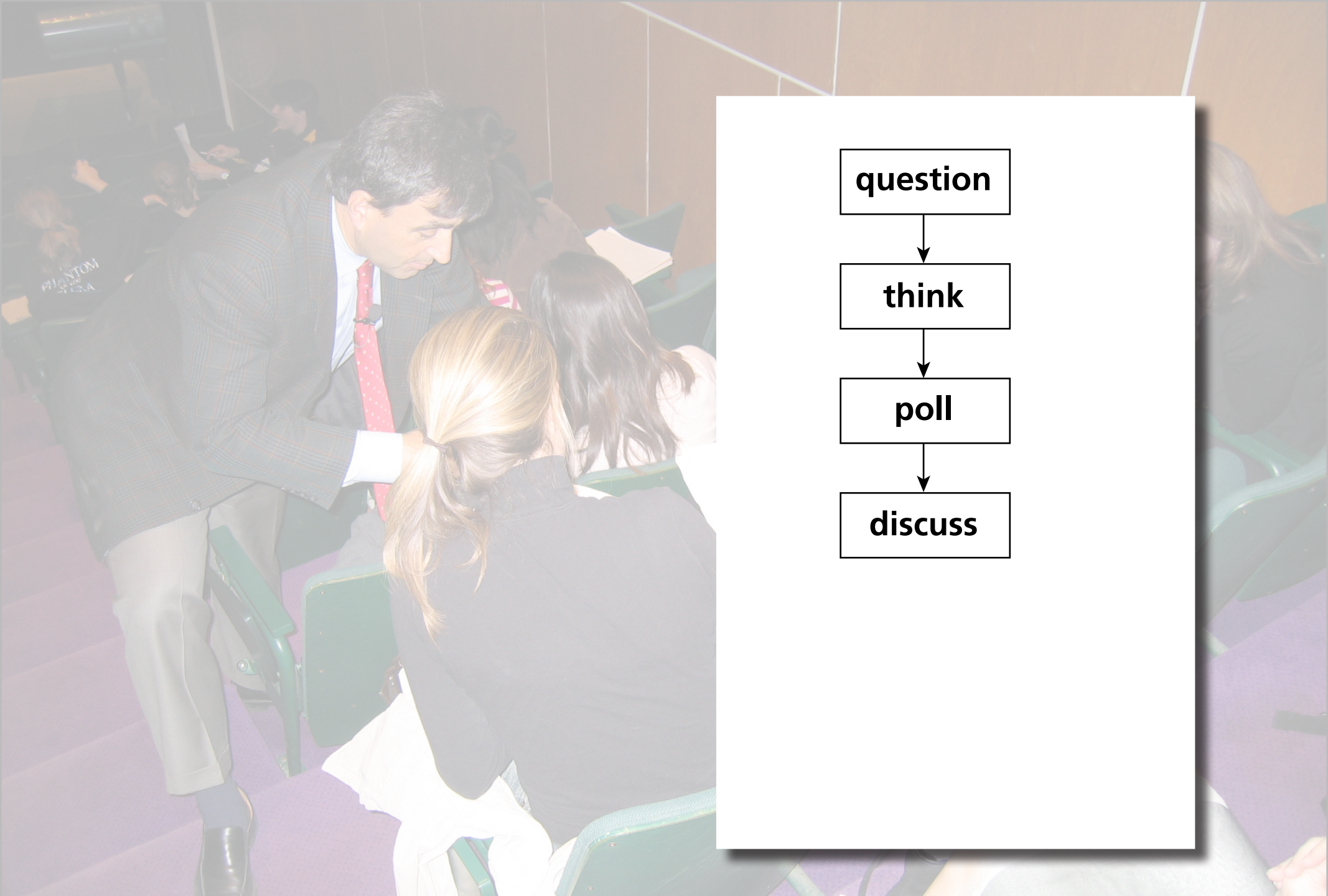
question



think



poll



question



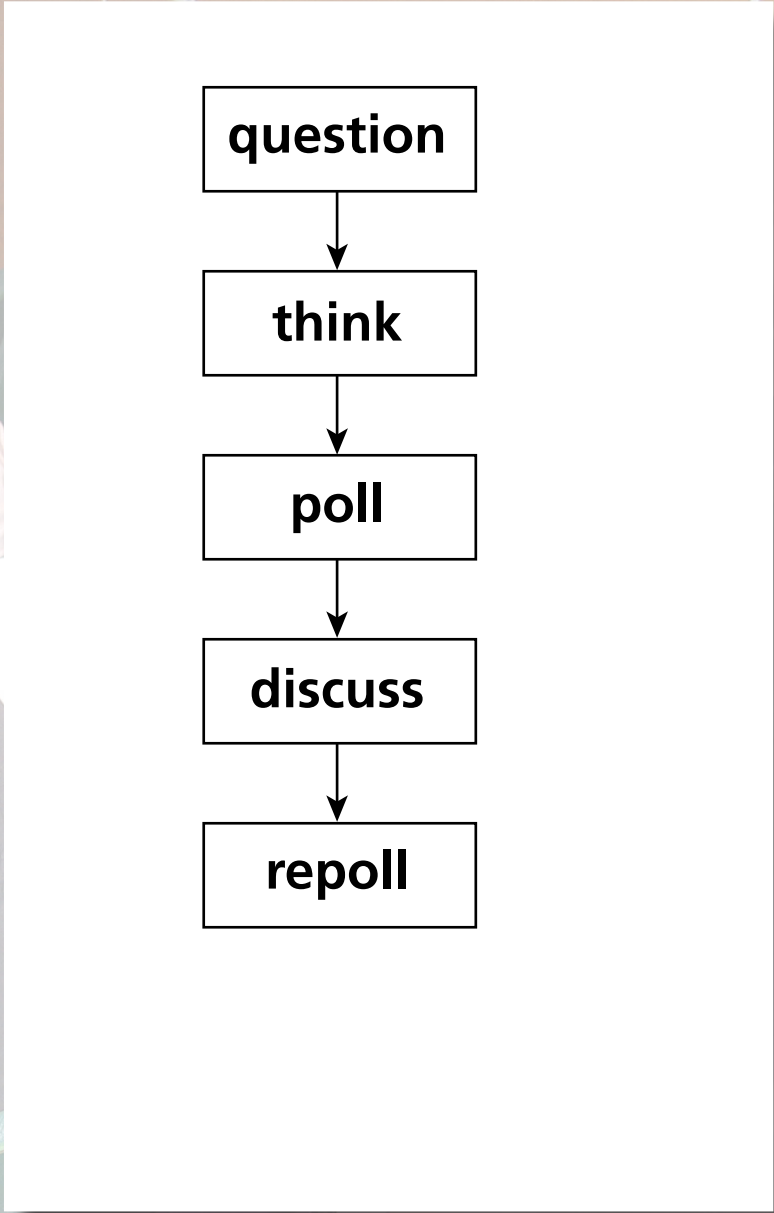
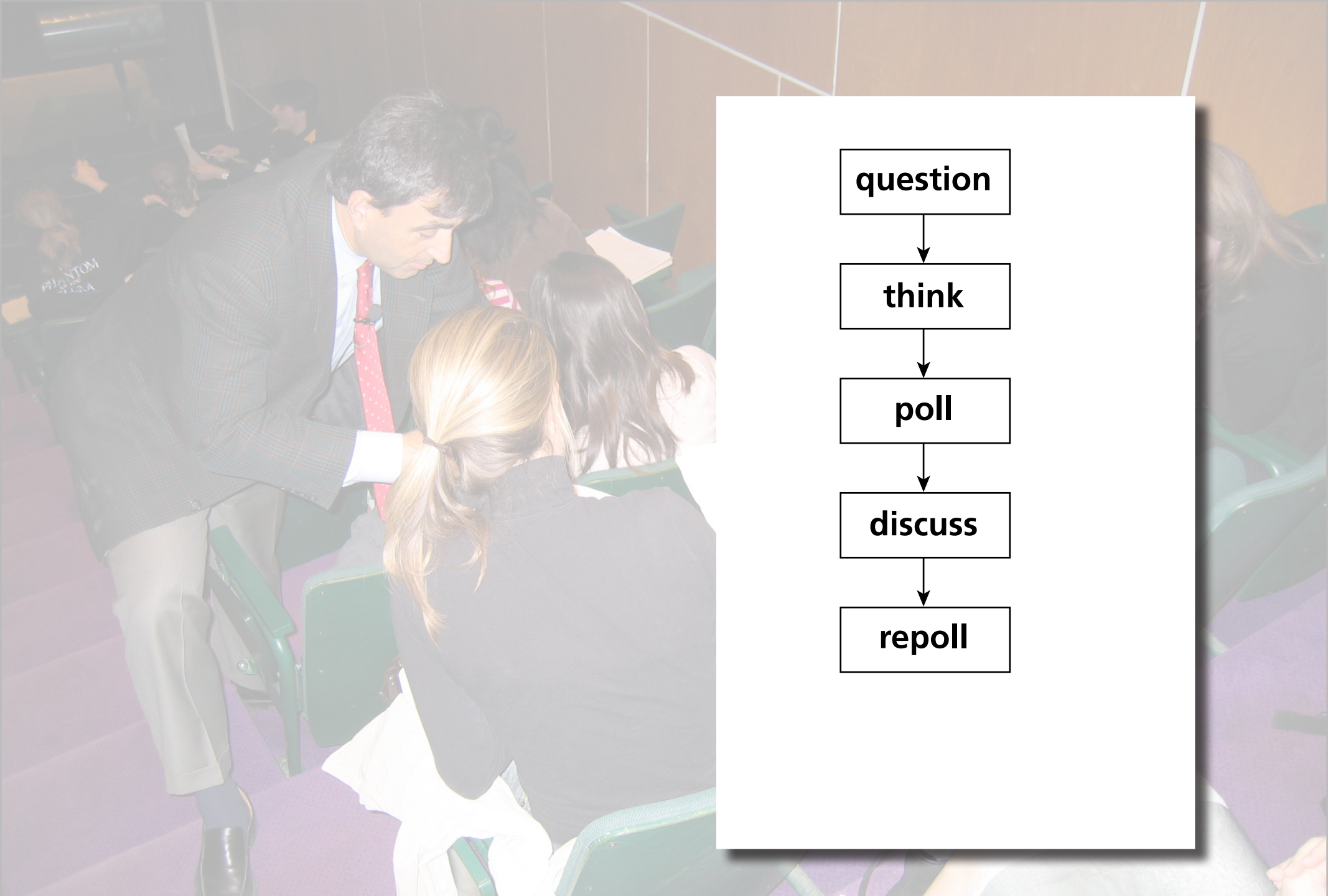
think

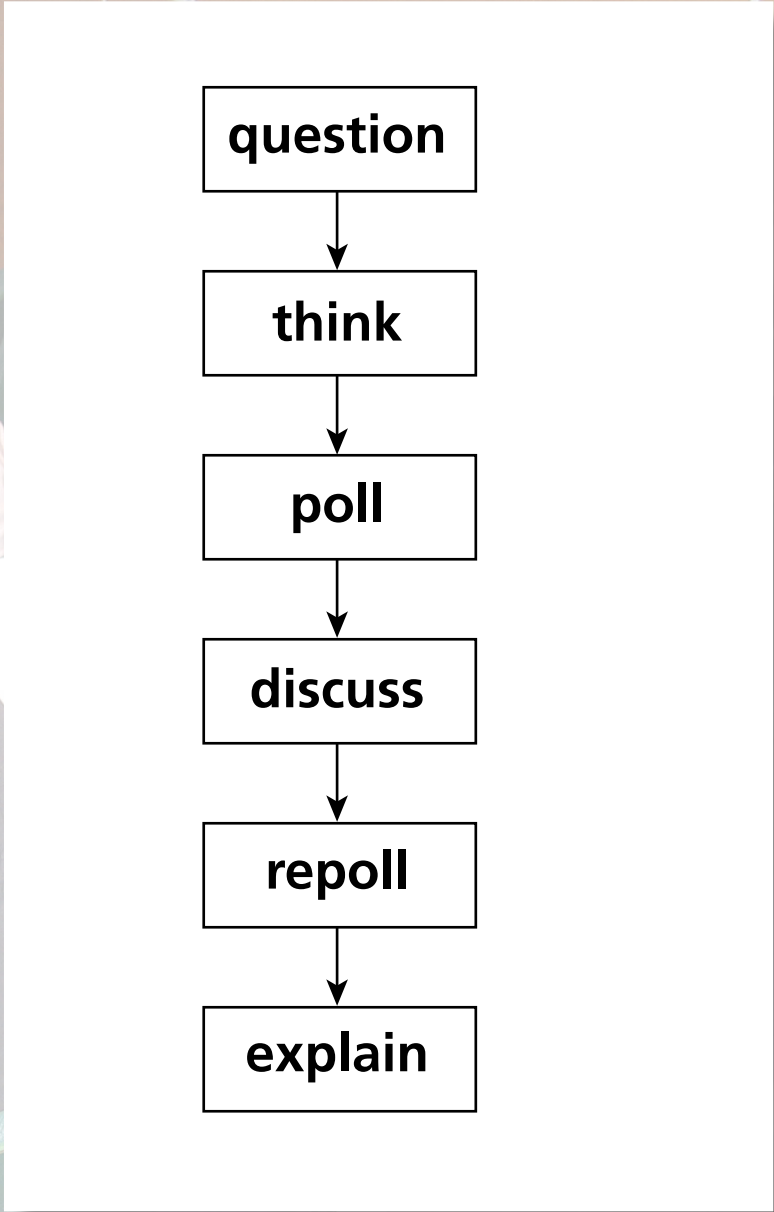
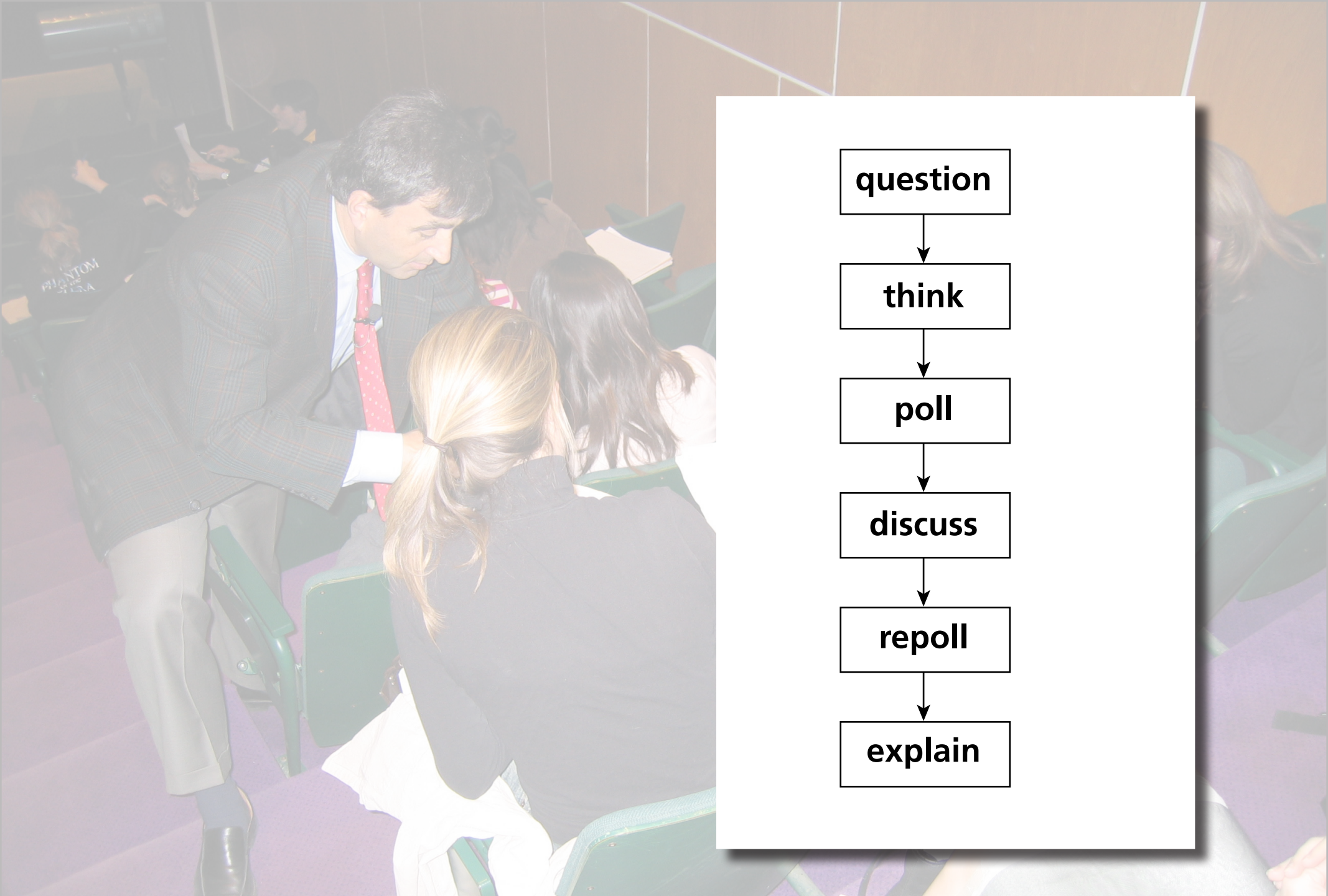


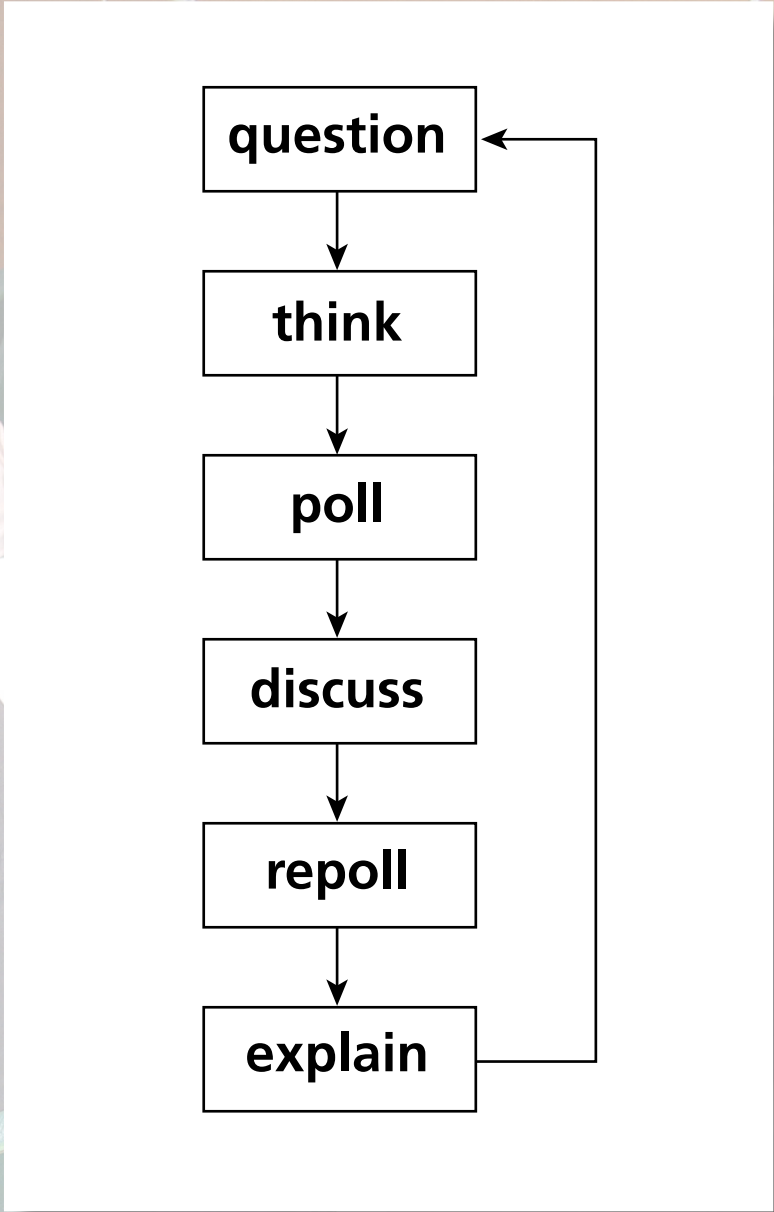
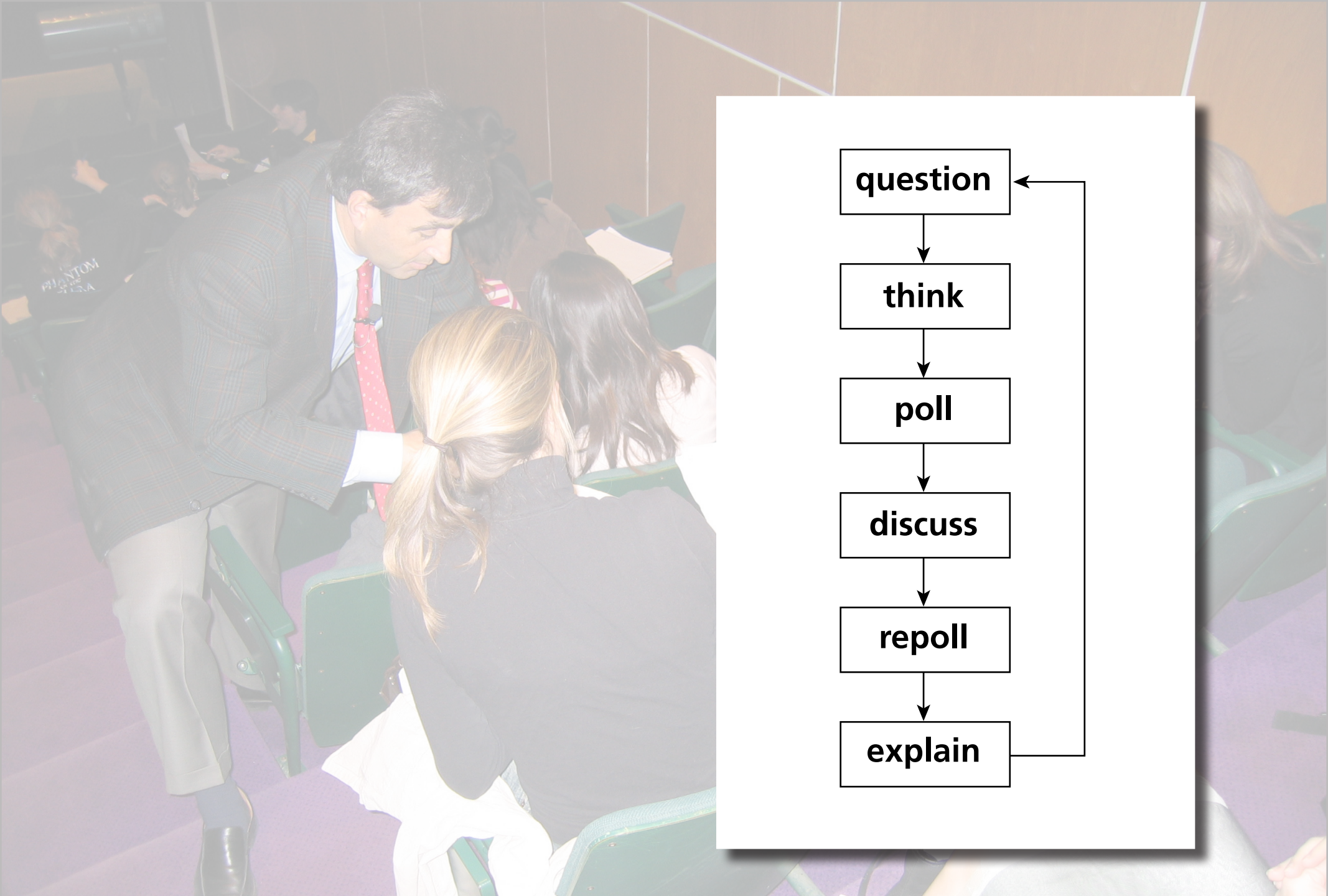
poll

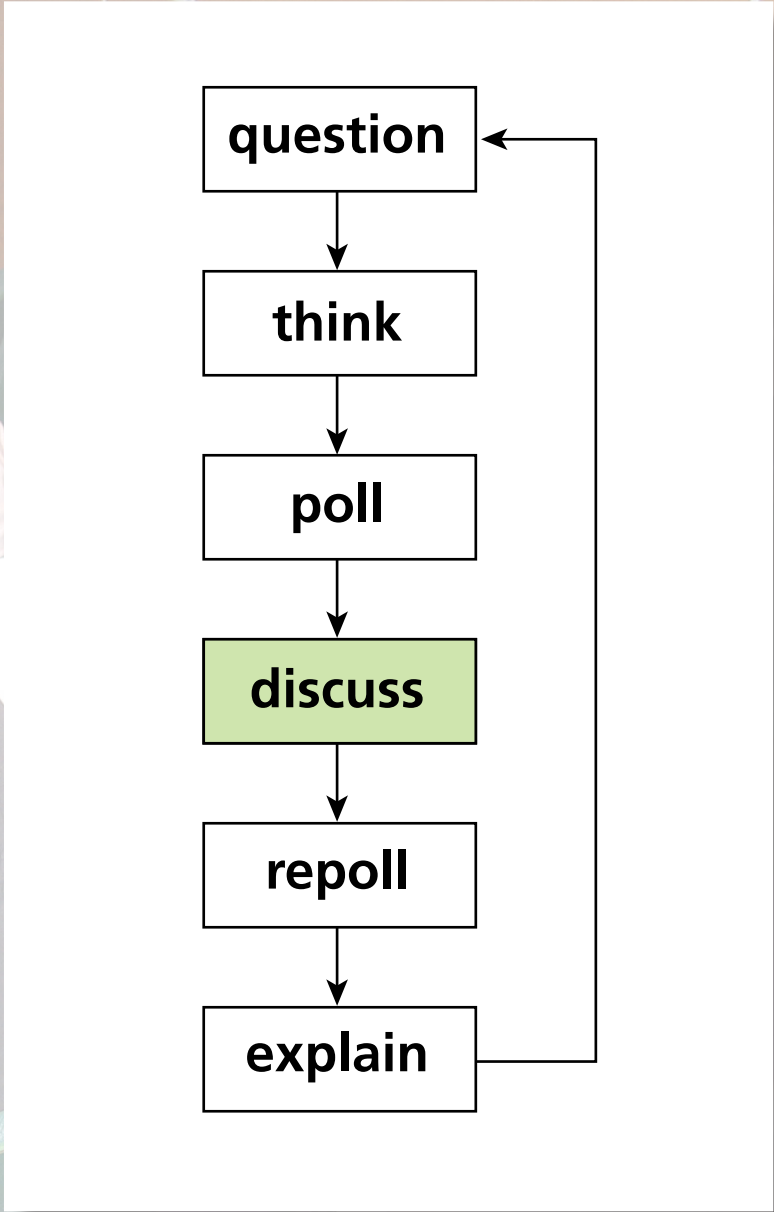
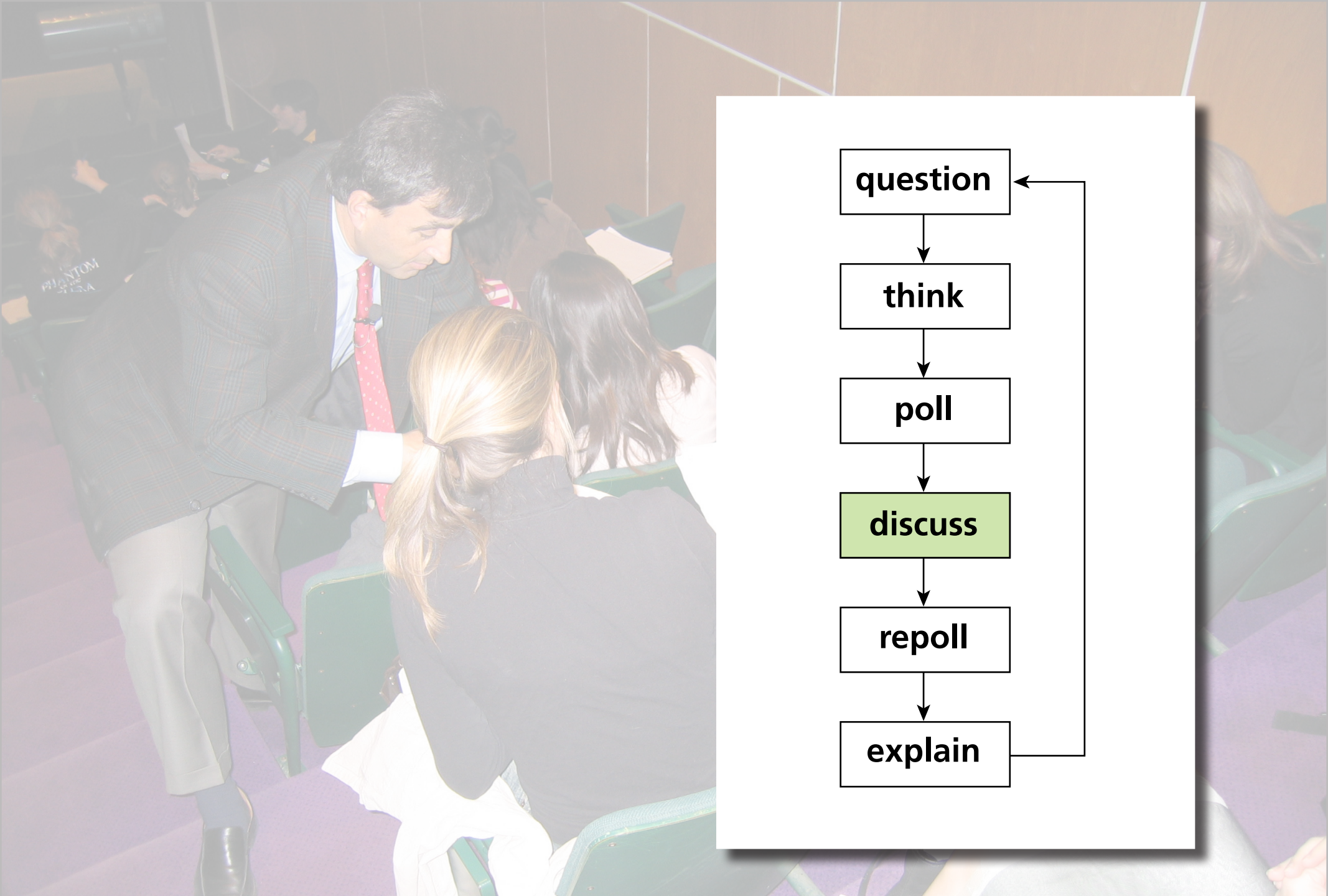


discuss



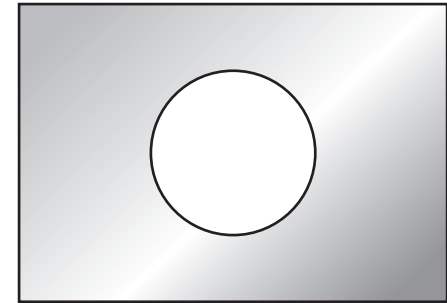






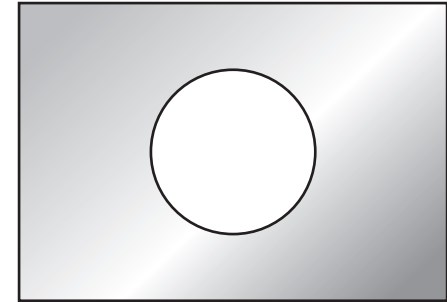


**Consider a rectangular metal plate
with a circular hole in it.**



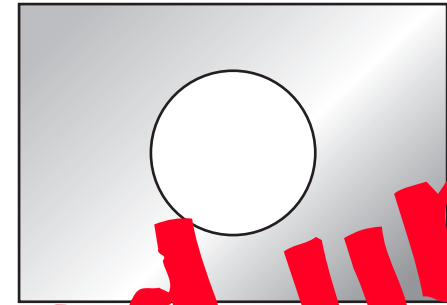
Consider a rectangular metal plate with a circular hole in it.

When the plate is uniformly heated, the diameter of the hole



- 1. increases.**
- 2. stays the same.**
- 3. decreases.**

Consider a rectangular metal plate with a circular hole in it.



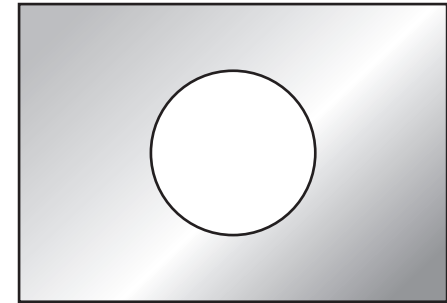
When the plate is uniformly heated, the diameter of the hole

1. increases.
2. stays the same.
3. decreases.

you got all fired up!

Consider a rectangular metal plate with a circular hole in it.

When the plate is uniformly heated, the diameter of the hole



- 1. increases.**
- 2. stays the same.**
- 3. decreases.**

Before I tell you the answer, let's analyze what happened.

Before I tell you the answer, let's analyze what happened.

You...

Before I tell you the answer, let's analyze what happened.

You...

1. made a commitment

Before I tell you the answer, let's analyze what happened.

You...

- 1. made a commitment**
- 2. externalized your answer**

Before I tell you the answer, let's analyze what happened.

You...

- 1. made a commitment**
- 2. externalized your answer**
- 3. moved from the answer/fact to reasoning**

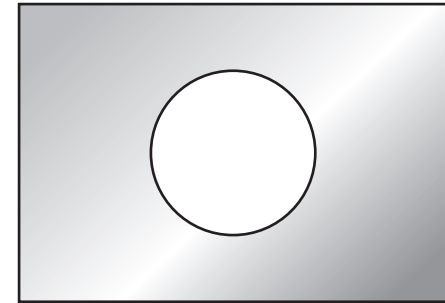
Before I tell you the answer, let's analyze what happened.

You...

- 1. made a commitment**
- 2. externalized your answer**
- 3. moved from the answer/fact to reasoning**
- 4. became emotionally invested in the learning process**

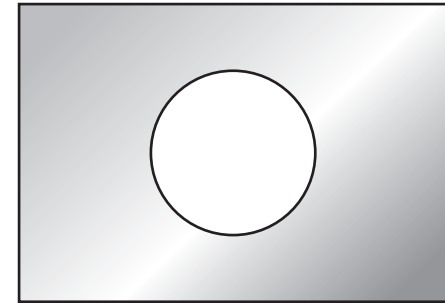
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- 1. increases.**
- 2. stays the same.**
- 3. decreases.**

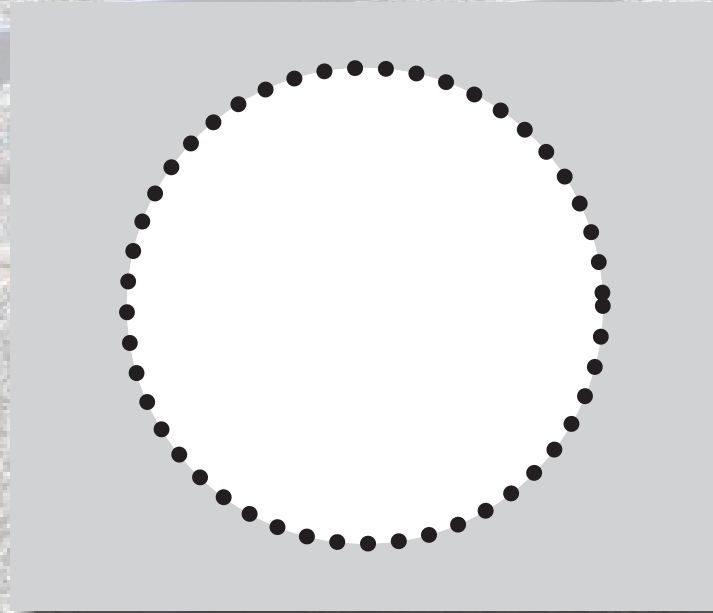
Consider a rectangular metal plate with a circular hole in it.



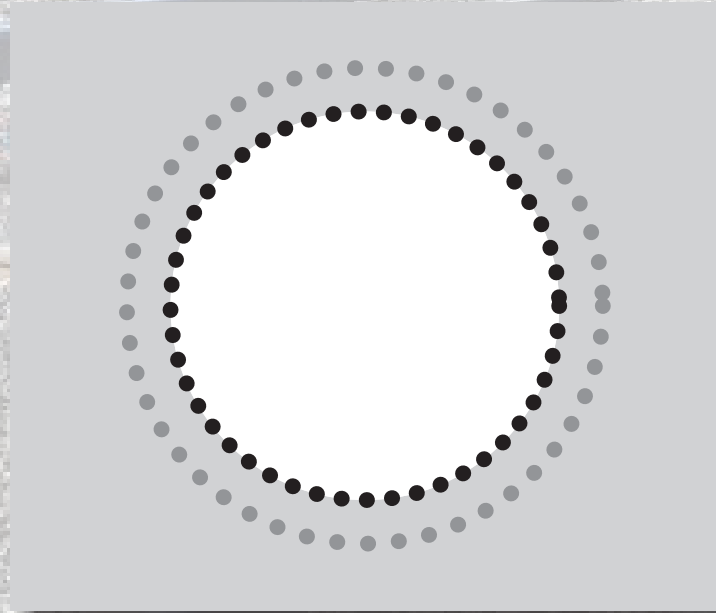
When the plate is uniformly heated, the diameter of the hole

- 1. increases. ✓**
2. stays the same.
3. decreases.

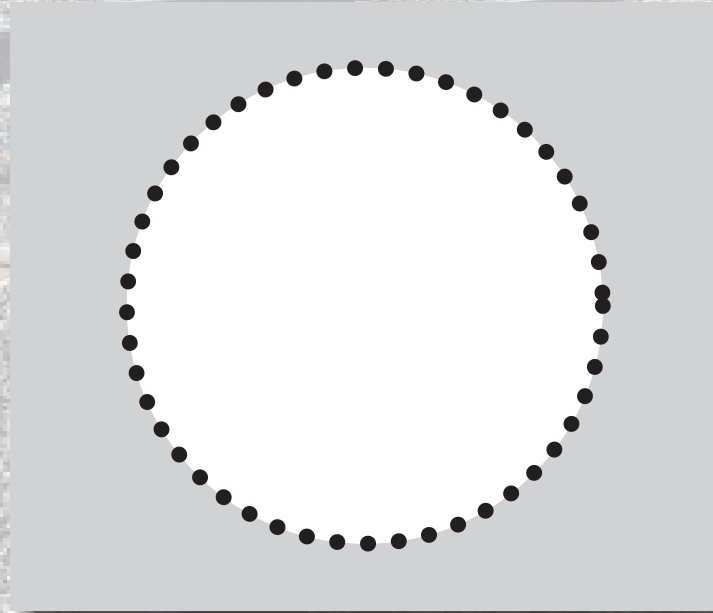
consider atoms at rim of hole



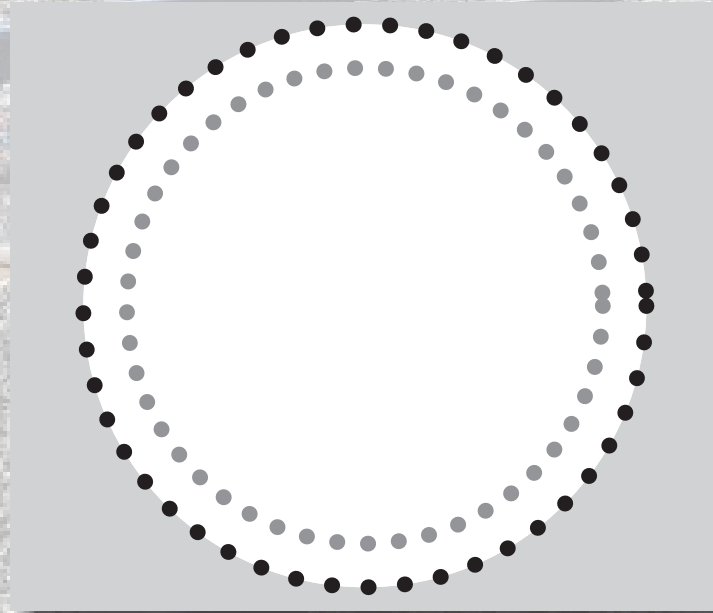
consider atoms at rim of hole



consider atoms at rim of hole



consider atoms at rim of hole



consider atoms at rim of hole

you won't forget this



feedback

1 lecture

2 PI

3 PI 2.0



1991



1 lecture

2 PI

3 PI 2.0



1993

A black handheld remote control is shown at an angle. It features a numeric keypad with buttons for digits 1 through 9, 0, and a red power button. A green logo with the letters 'FRS' is visible on the bottom right. The year '1998' is overlaid in large white text in the center.

1998



1 lecture

2 PI

3 PI 2.0



technology

1 lecture

2 PI

3 PI 2.0



How do I...

- design good questions?
- optimize the discussions?
- manage time?

Use intelligent algorithms and data analytics to...

- improve questioning
- manage discussions
- facilitate time management/flow

- lowest
- A 30-year fixed rate mortgage at 12%
 - A 15-year fixed rate mortgage at 12%
 - A 30-year fixed rate mortgage at 12%
 - A 15-year fixed rate mortgage at 12%
2. The biggest factor that leads American companies to manufacture their products overseas in India is:
- Higher quality of craftsmanship
 - Lower labor costs
 - Decreased transportation costs
 - Effective legal systems
3. Which of the following correctly summarizes the accounting equation for a sole proprietorship?
- $Assets = Liabilities + Owners' equity$
 - $Liabilities = Assets + Owners' equity$
 - $Owner's equity = Assets + Liabilities$
 - $Revenue = Assets - Liabilities$
4. In order to present a business plan to a group of potential investors, a businessperson would most likely use which of the following?
- Powerpoint
 - Quickbooks
 - Peoplesoft
 - Excel
5. In order to start an online business, and individual would need all but which of the following:
- Business model
 - Depreciation?

extensible plug-in architecture for question types

- a. A 30-year fixed rate mortgage at 12%
- b. A 15-year fixed rate mortgage at 12%
- c. A 30-year fixed rate mortgage at 12%
- d. A 15-year fixed rate mortgage at 12%

2. The biggest factor that leads American companies to manufacture their products over India is:

- a. Higher quality of craftsmanship
- b. Lower labor costs
- c. Decreased transportation costs
- d. Effective legal systems

3. Which of the following correctly summarizes the accounting equation for a sole proprietorship?

- a. $Assets = Liabilities + Owners' equity$
- b. $Liabilities = Assets + Owners' equity$
- c. $Owner's equity = Assets + Liabilities$
- d. $Revenue = Assets - Liabilities$

4. In order to present a business plan to a group of potential investors, a businessperson should most likely use which of the following?

- a. Powerpoint
- b. Quickbooks
- c. Peoplesoft
- d. Excel

5. In order to start an online business, an individual would need all but which of the following:

business model

Sample question types:

- direction
- expression
- long answer, short answer, word cloud (fill in text)
- multiple-choice, many-choice
- numerical (enter a number)
- ranking
- region (select point on image)
- sketch

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2. Create student account with signup code DEMO

3. Join session 1234567

4. Pick your seat from the seat map



1 lccatalytics.com

2 create student account

3 ID 1234567

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4. **direction** This image shows Oahu as seen from the Space Shuttle. The image provides several clues about the direction of prevailing winds in Oahu. Indicate this direction by drawing an arrow on your screen. [Deliver](#) [Show all results](#)

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2 PI

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4. direction
prevailing

...le. The image provides several clues about the direction of
...on your screen.

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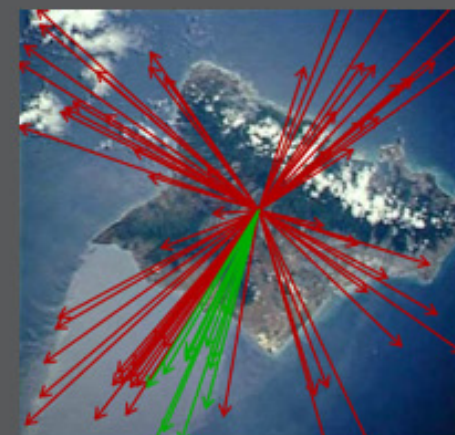
4. direction
prevailing

...le. The image provides several clues about the direction of
...on your screen.

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Round 1

77 responses, 16% correct



✓ 17 get it now
✗ 3 still don't get it



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optics i

current session: 766079 | 69 students

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6

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9

10

11

12

13

14

15



4. direction Light enters horizontally into the combination of two perpendicular mirrors as shown below.

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Indicate the direction of the incident light after it reflects off of both mirrors.



feedback & support

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current session: **766079** | 69 students

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6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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current session: **766079** | 69 students

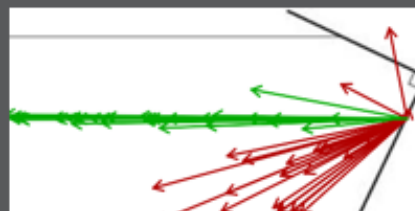
[Map](#) [Show floating session ID](#) [Edit](#) [Delete](#)

6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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Round 1   
● 57 responses, 58% correct



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current session: **766079** | 69 students

Map Show floating session ID Edit Delete

6 7 8 9 10 11 12 13 14 15

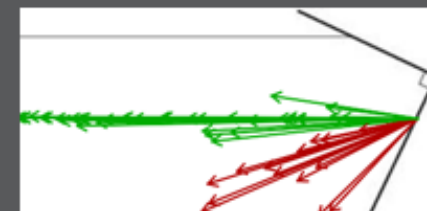
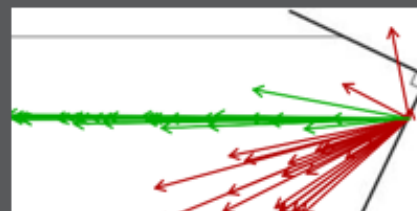


perpendicular mirrors as shown below.

Deliver Show all results

Round 1
● 57 responses, 58% correct

Round 2
● 51 responses, 73% correct



✓ 8 get it now
✗ 0 still don't get it

feedback & support



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transformations of parabolas

current session: **773885** | 9 students

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1

2

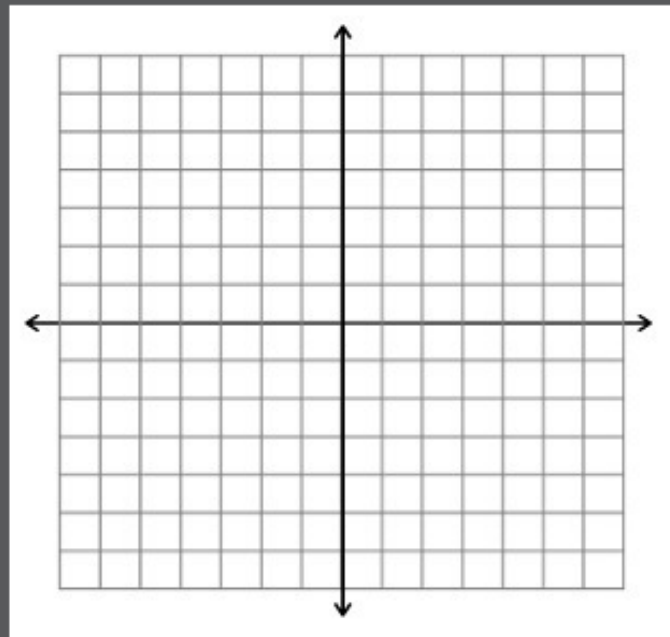
3

4



4. sketch Sketch a graph of the function $f(x) = (x - 3)^2 + 2$.

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1 education

2 PI

3 PI 2.0

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transformations of parabolas

current session: **773885** | 9 students

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1

2

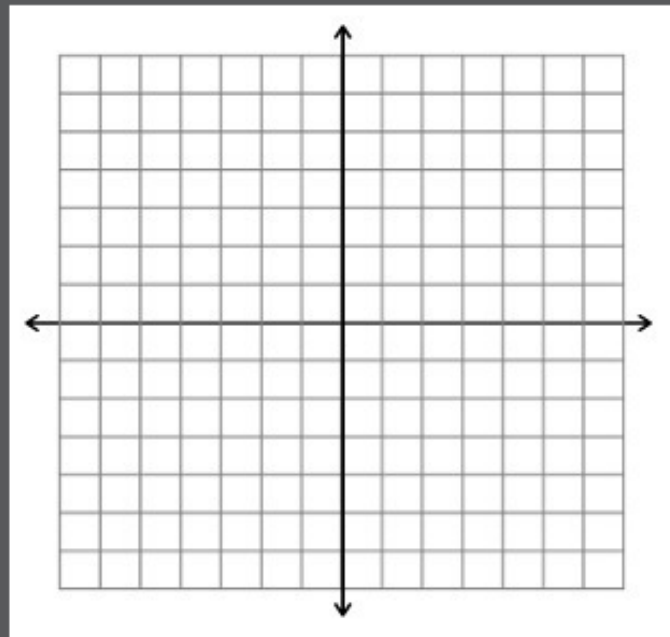
3

4



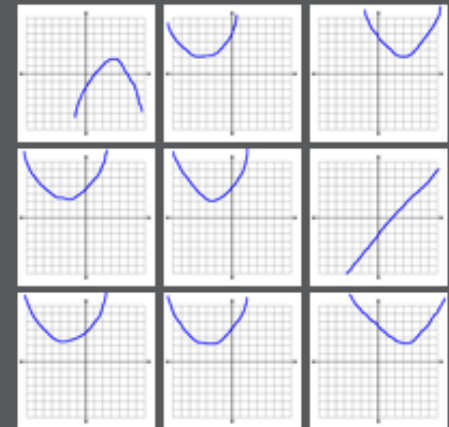
4. sketch Sketch a graph of the function $f(x) = (x - 3)^2 + 2$.

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Round 1

9 responses



1 education

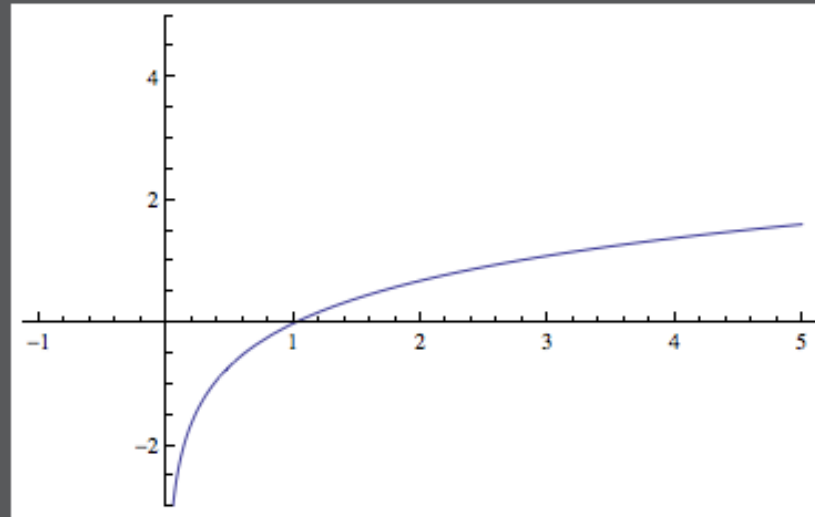
2 PI

3 PI 2.0

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This is a graph of $f(x) = \ln x$. Sketch a graph of the derivative $f'(x)$.



1 education

2 PI

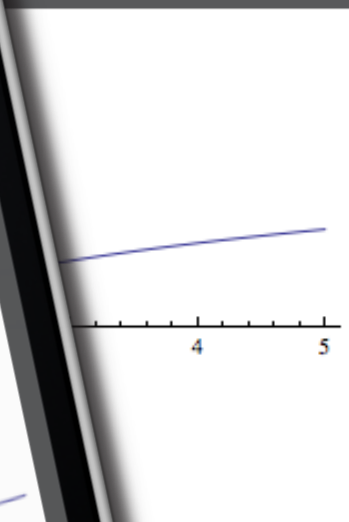
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This is a graph of $f(x) =$



1 education

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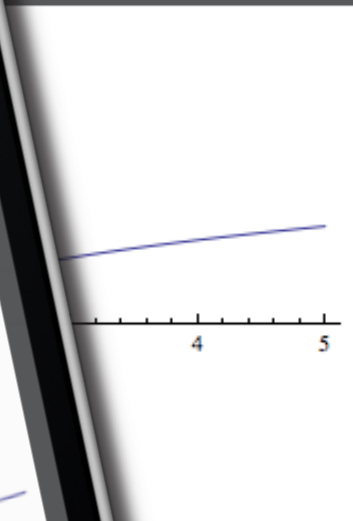
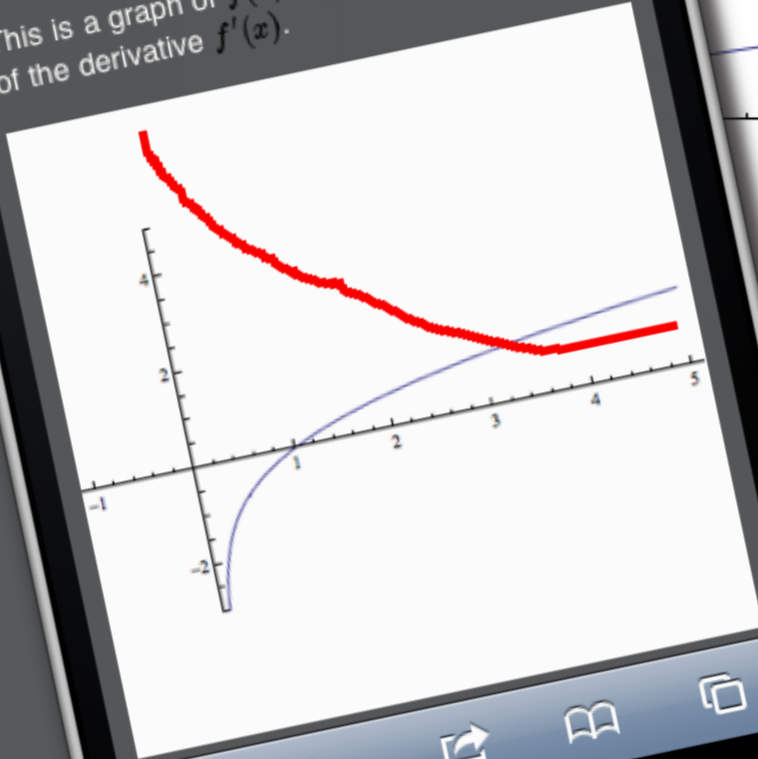
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This is a graph of $f(x) =$

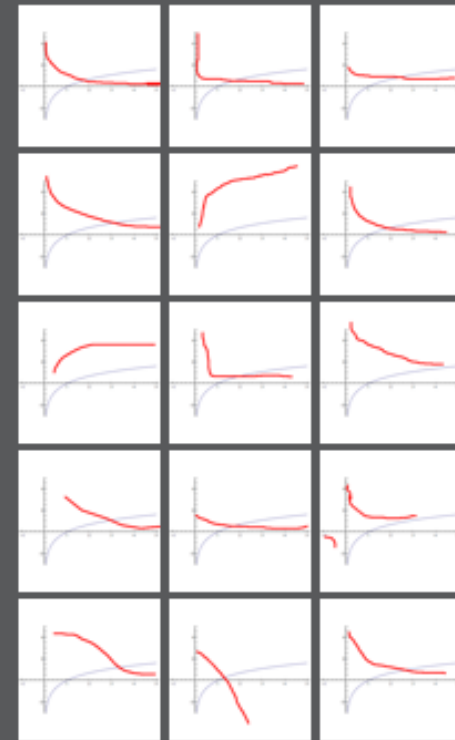


This is a graph of $f(x) = \ln x$. Sketch a graph of the derivative $f'(x)$.



Round 1

15 responses



✓ 6 get it now
 ✗ 0 still don't get it

1 education

3 PI 2.0

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1. highlighting What do you see as the most important part of this Shakespeare sonnet? [Stop delivery](#) [Deliver again](#) [Assign groups](#) [Show all results](#)

For shame! deny that thou bear'st love to any,
Who for thyself art so unprovident.
Grant, if thou wilt, thou art beloved of many,
But that thou none lovest is most evident;
For thou art so possess'd with murderous hate
That 'gainst thyself thou stick'st not to conspire.
Seeking that beauteous roof to ruinate
Which to repair should be thy chief desire.
O, change thy thought, that I may change my mind!
Shall hate be fairer lodged than gentle love?
Be, as thy presence is, gracious and kind,
Or to thyself at least kind-hearted prove:
Make thee another self, for love of me,
That beauty still may live in thine or thee.

1 education

2 PI

3 PI 2.0

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1. highlighting
sonnet?

this Shakespeare

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1 educa

3 PI 2.0

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1. highlighting
sonnet?

[his Shakespeare](#) [Stop delivery](#) [Deliver again](#) [Assign groups](#) [Show all results](#)



Round 1

3 responses

For shame! deny that thou bear'st
love to any,
Who for thyself art so
unprovident.
Grant, if thou wilt, thou art
beloved of many,
But that thou none lovest is most
evident;
For thou art so possess'd with
murderous hate
That 'gainst thyself thou stick'st
not to conspire.
Seeking that beauteous roof to
ruinate
Which to repair should be thy
chief desire.
O, change thy thought, that I may
change my mind!
Shall hate be fairer lodged than
gentle love?
Be, as thy presence is, gracious
and kind,

Sample question types:

- direction
- expression
- long answer, short answer, word cloud (fill in text)
- multiple choice, many choice
- numerical (enter a number)
- ranking
- region (select point on image)
- sketch

data analytics



1 lecture

2 PI

3 PI 2.0



human interaction

1 lecture

2 PI

3 PI 2.0

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review results for session 399757 in electrostatic work and energy ii

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Round 1 74 responses, 61% correct

A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

Round 2 75 responses, 83% correct

A. 83%
B. 0%
C. 17%
D. 0%
E. 0%

A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B



A. positive
B. zero
C. negative
D. depends on the path taken from A to B
E. cannot be determined without knowing more about the polarization induced in the sphere

Search: _____

1 lecture


2 PI

3 PI 2.0

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learning catalytics





A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B as illustrated below.



A. positive
 B. zero
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Round 1
 74 responses, 61% correct

- A. 61%
- B. 4%
- C. 35%
- D. 0%
- E. 0%

Round 2
 75 responses, 83% correct

- A. 83%
- B. 0%
- C. 17%
- D. 0%
- E. 0%

Search: _____

1 lecture

2 PI

3 PI 2.0

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Round 1 74 responses, 61% correct

A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

Round 2 75 responses, 83% correct

A. 83%
B. 0%
C. 17%
D. 0%
E. 0%

A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B



A. positive
B. zero
C. negative
D. depends on the path taken from A to B
E. cannot be determined without knowing more about the polarization induced in the sphere

Search: _____

1 lecture

2 PI

3 PI 2.0

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A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B as illustrated below. The potential difference from A to B is

A. positive
 B. zero
 C. negative
 D. depends on the path taken from A to B
 E. cannot be determined without knowing more about the polarization induced in the sphere

Round 1
 74 responses, 61% correct

A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

Round 2
 75 responses, 83% correct

A. 83%
B. 0%
C. 17%
D. 0%
E. 0%

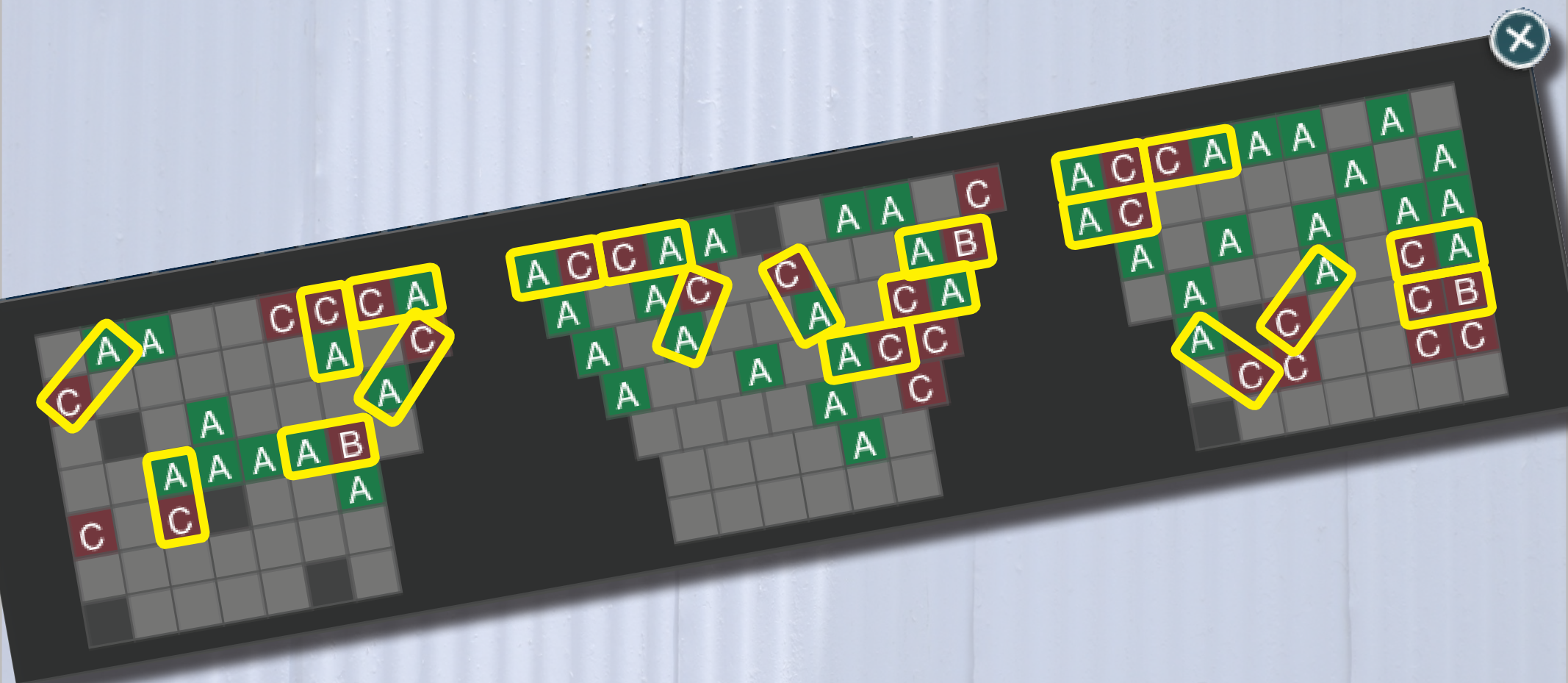
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let system manage pairing



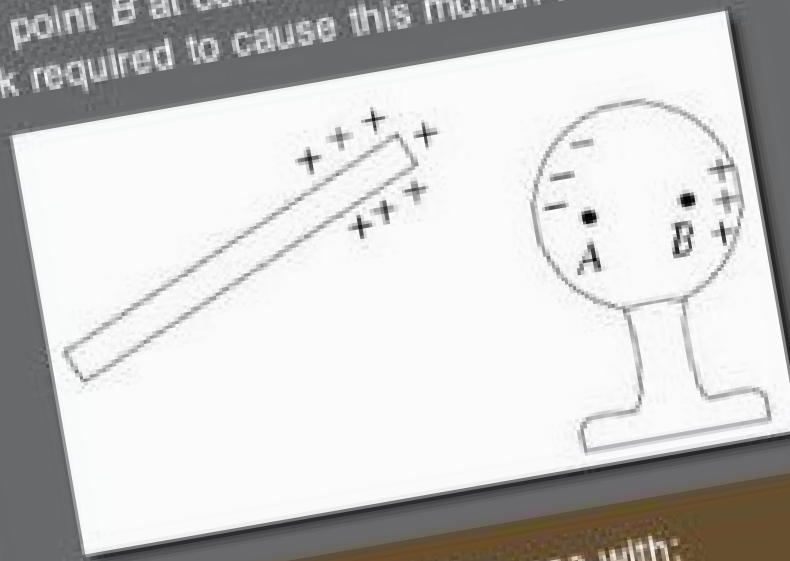
1 lecture

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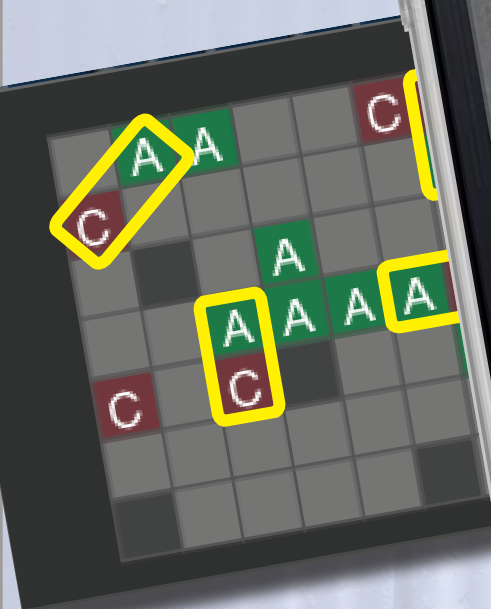
A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B at constant speed. The mechanical work required to cause this motion is



Please discuss your response with:

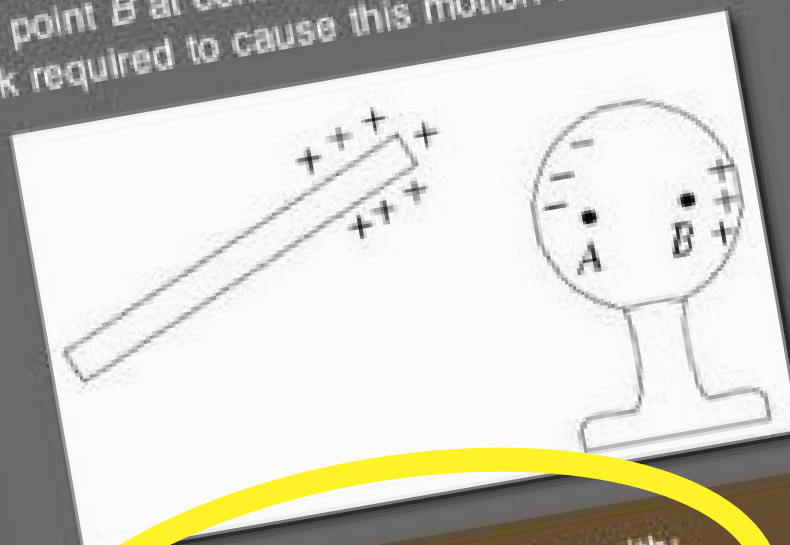
- Brian Lukoff (to your left)

I am talking to this person/people



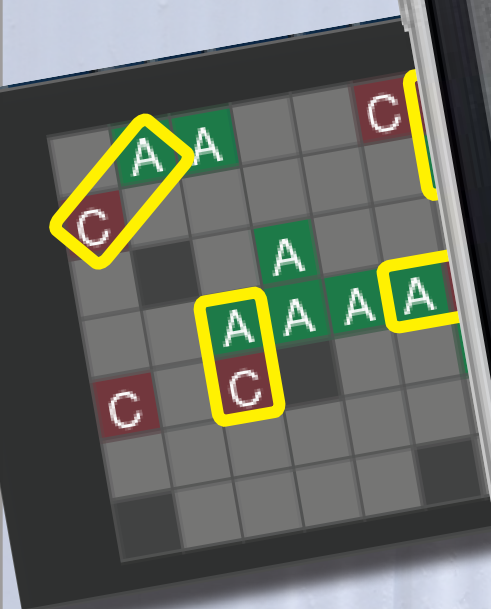
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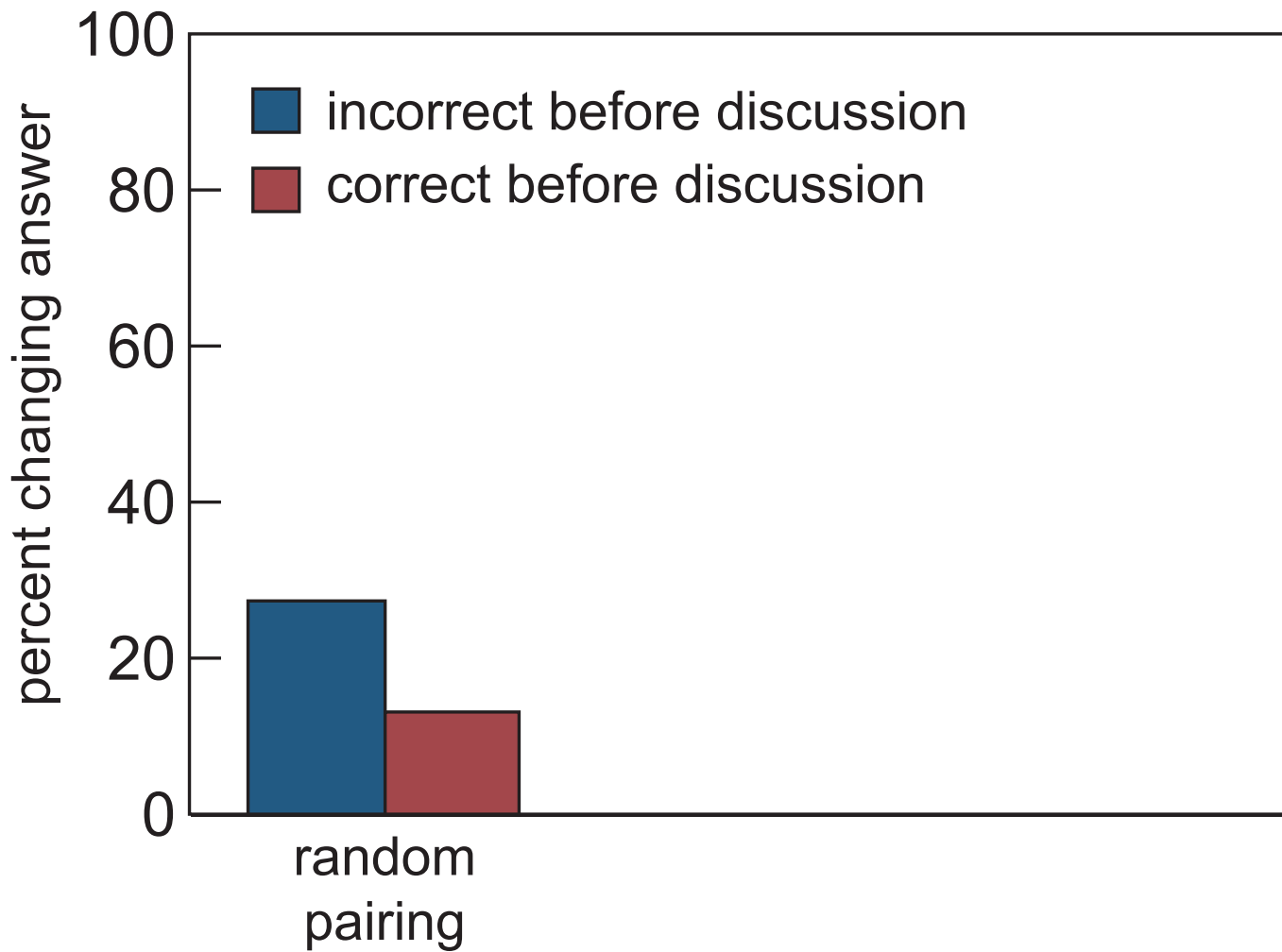
A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B at constant speed. The mechanical work required to cause this motion is

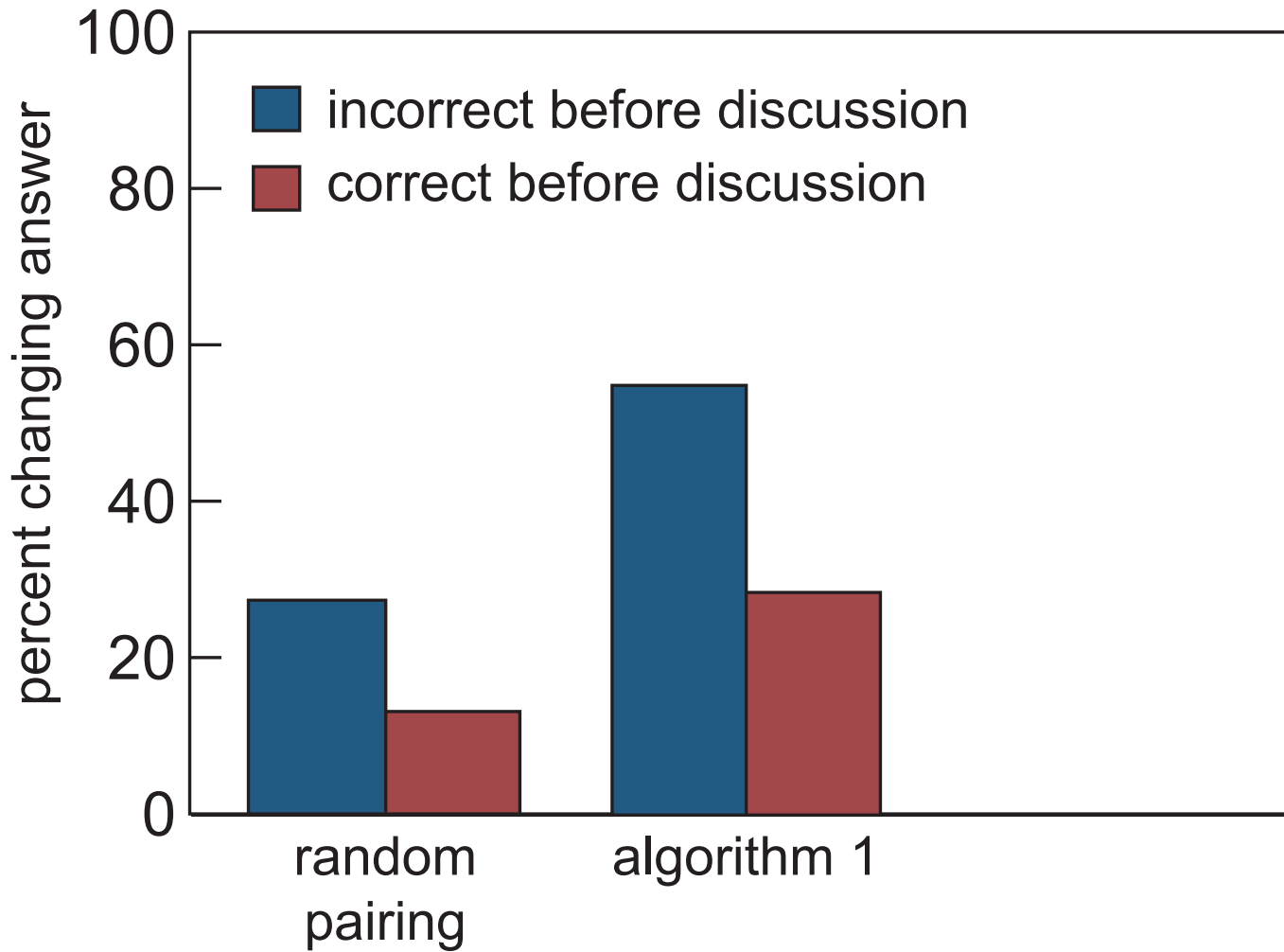


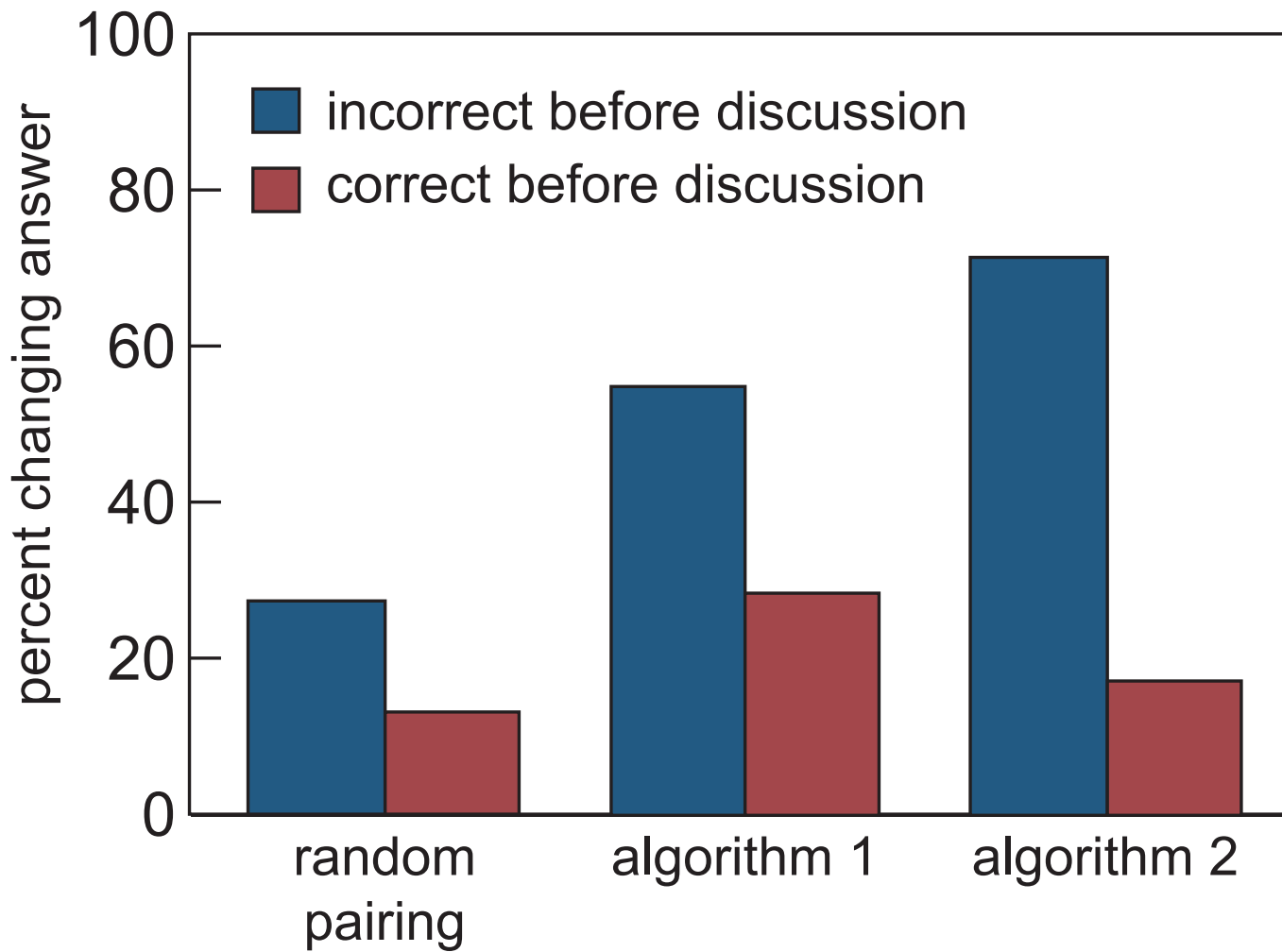
Please discuss your response with:

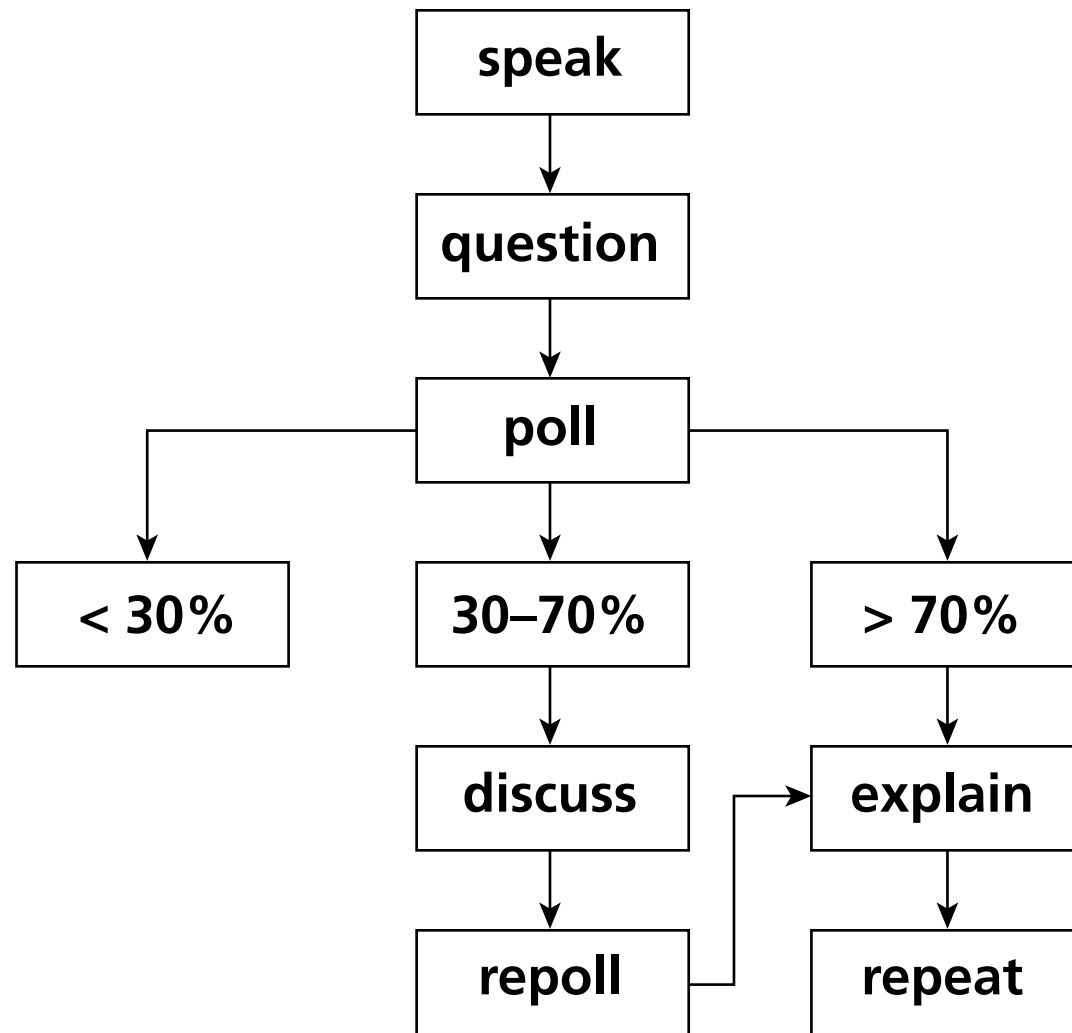
- Brian Lukoff (to your left)

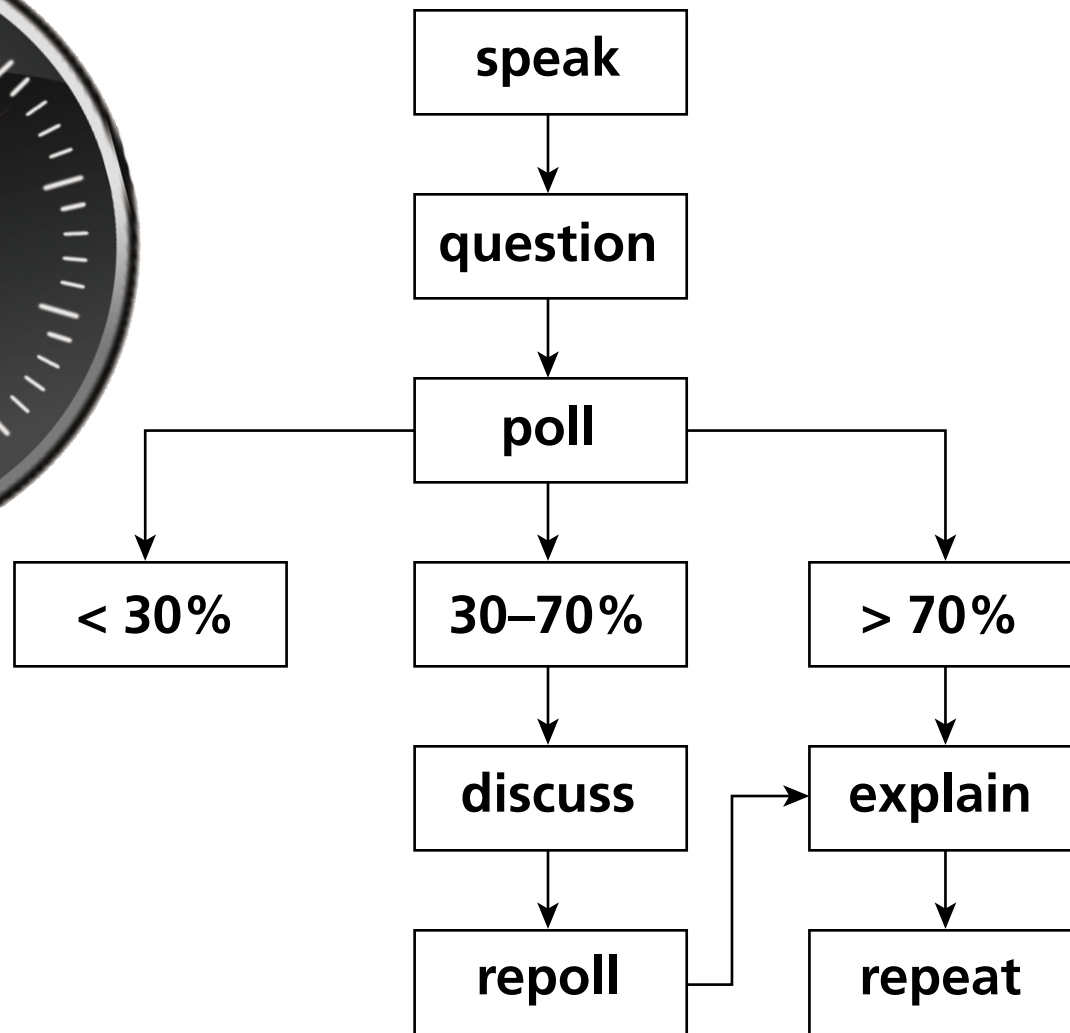














1 lecture

2 PI

3 PI 2.0



1 education

2 PI

3 PI 2.0

The background of the slide features a window with horizontal blinds. Behind the blinds, there is a painting of three large, detailed eyes looking out. The overall color palette is muted, with yellows, reds, and greys.

Learning Catalytics:

- implement proven, researched pedagogy



Learning Catalytics:

- implement proven, researched pedagogy
- use consumer devices

Learning Catalytics:

- **implement proven, researched pedagogy**
- **use consumer devices**
- **avoid pitfalls of MC assessment**

Learning Catalytics:

- implement proven, researched pedagogy
- use consumer devices
- avoid pitfalls of MC assessment
- create a smart classroom *anywhere*

Funding:

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