

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

Confessions of a converted lecturer



EDUCACION

Lucia Mar Unified School District
Arroyo Grande, CA, 19 August 2013



Confessions of a converted lecturer



@eric_mazur

EDUCATION

Lucia Mar Unified School District
Arroyo Grande, CA, 19 August 2013



Think of something you are good at

EDUCACION

1 lcatalytics.com 2 create student account 3 ID 1234567

Now think how you became good at it



- 1 lcatalytics.com
- 2 create student account
- 3 ID 1234567



What are the following...
1. Personal...
2. The...
3. The...
4. The...
5. The...

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1 education

2 PI



1 education

2 PI

3 test



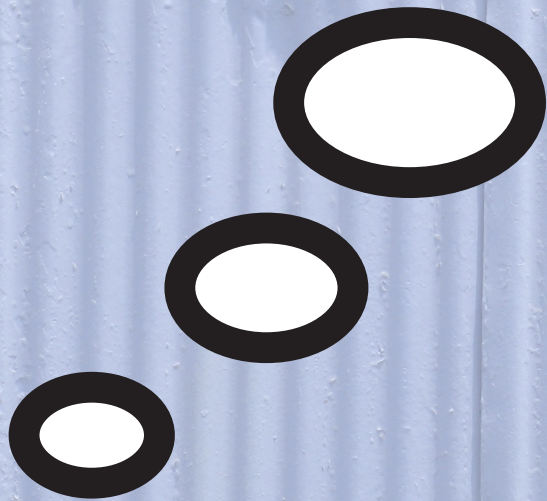
**better pay
attention!**

1 education

2 PI

3 test

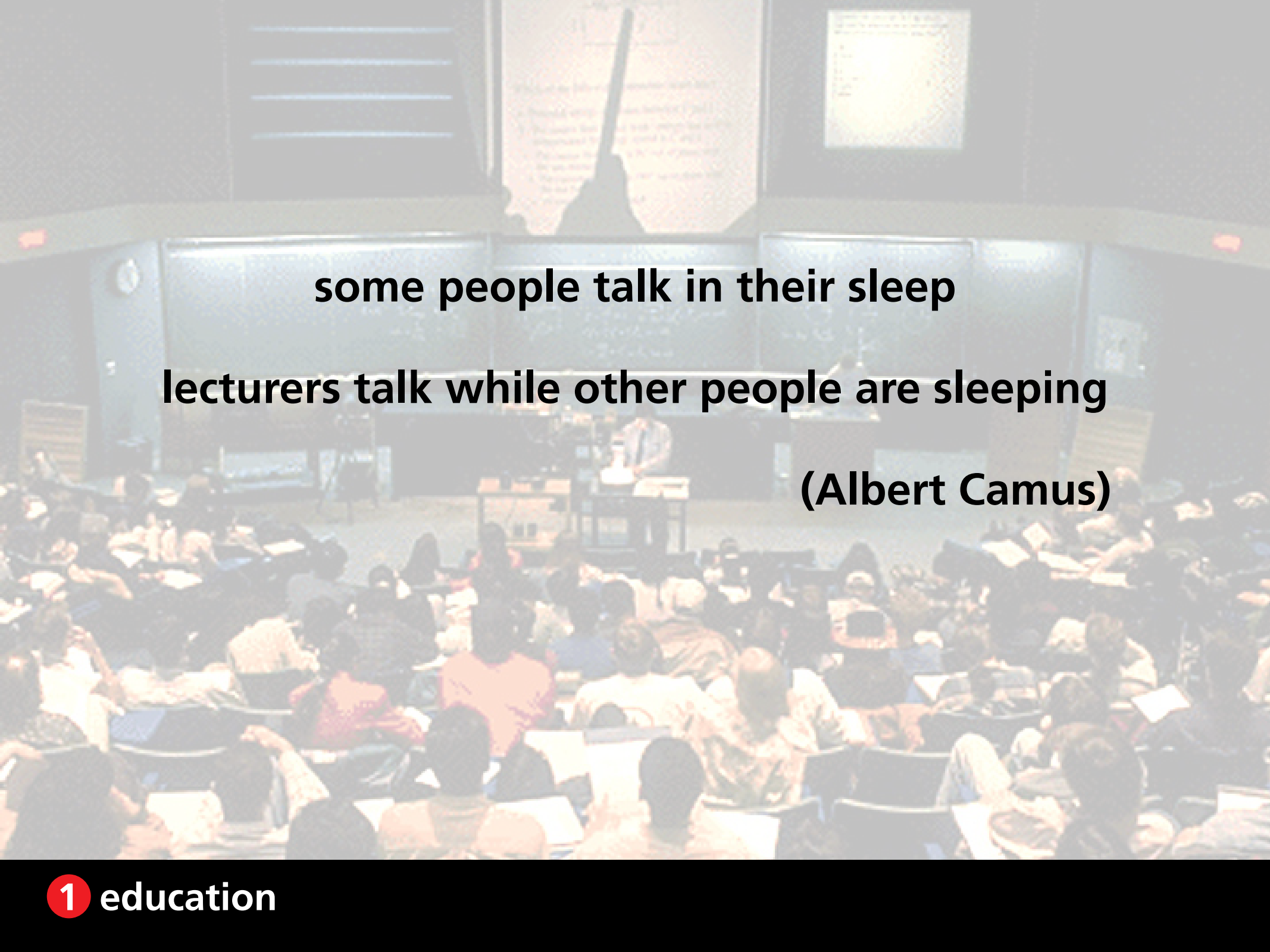
**What happens
in a lecture?**





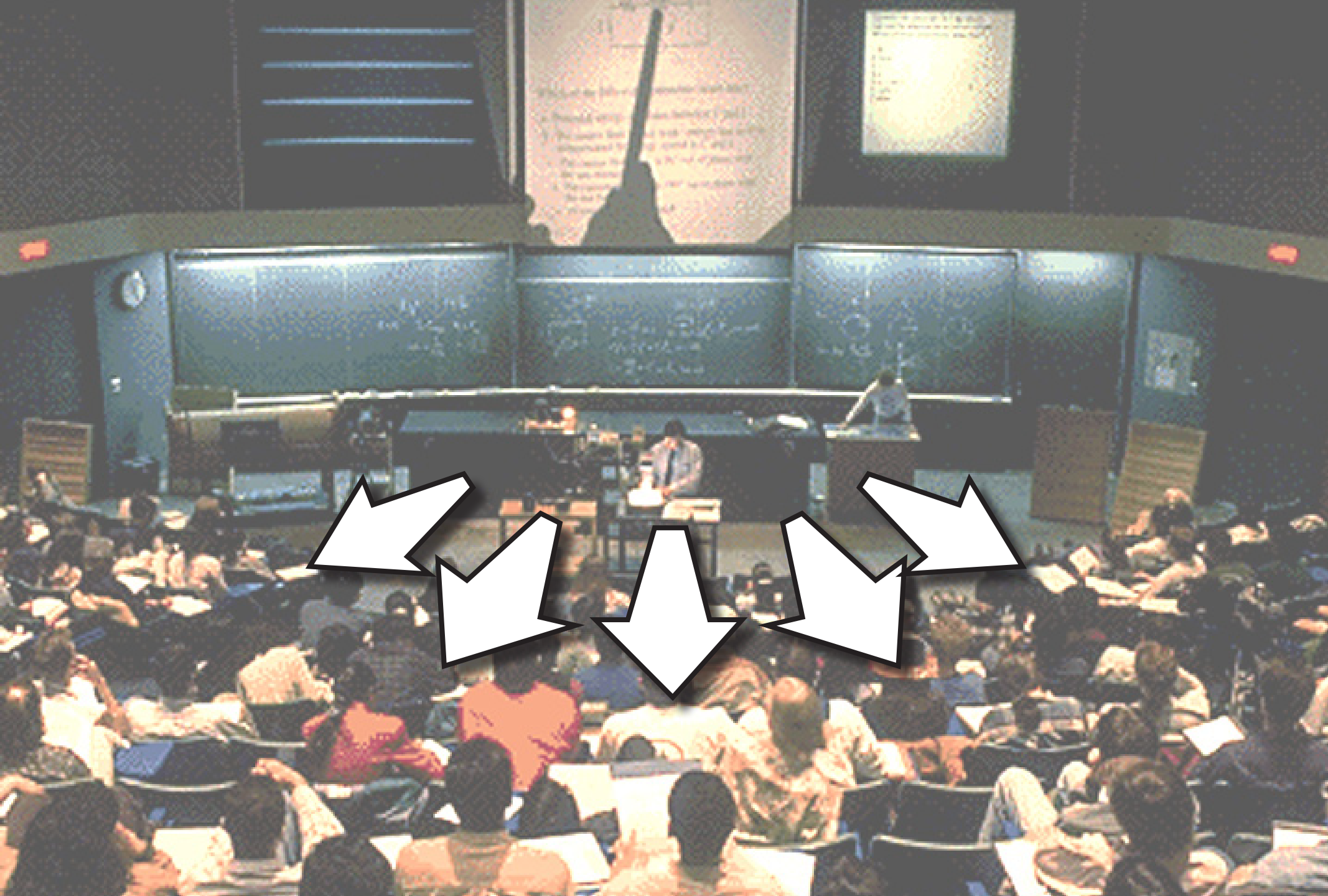
A large lecture hall with a professor at a podium and students in the audience. The professor is standing at a podium on the stage, facing the audience. The audience is seated in rows of chairs, facing the stage. The room has a curved wall and a large screen at the front. The text "some people talk in their sleep" is overlaid on the image.

some people talk in their sleep

A large lecture hall with a lecturer at a podium and a large audience of students. The room is filled with people, many of whom appear to be sleeping or resting. The lecturer is standing at a podium in the center of the stage, facing the audience. The audience is seated in rows of chairs, filling the foreground and middle ground. The room has a high ceiling and large windows or screens in the background. The overall atmosphere is one of a large, formal educational setting.

some people talk in their sleep
lecturers talk while other people are sleeping
(Albert Camus)





not transfer but assimilation of information is key

EDUCACION

The result?

EDUCACION

Lack of learning

EDUCACION

Lack of learning

Lack of retention



1 education

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!**

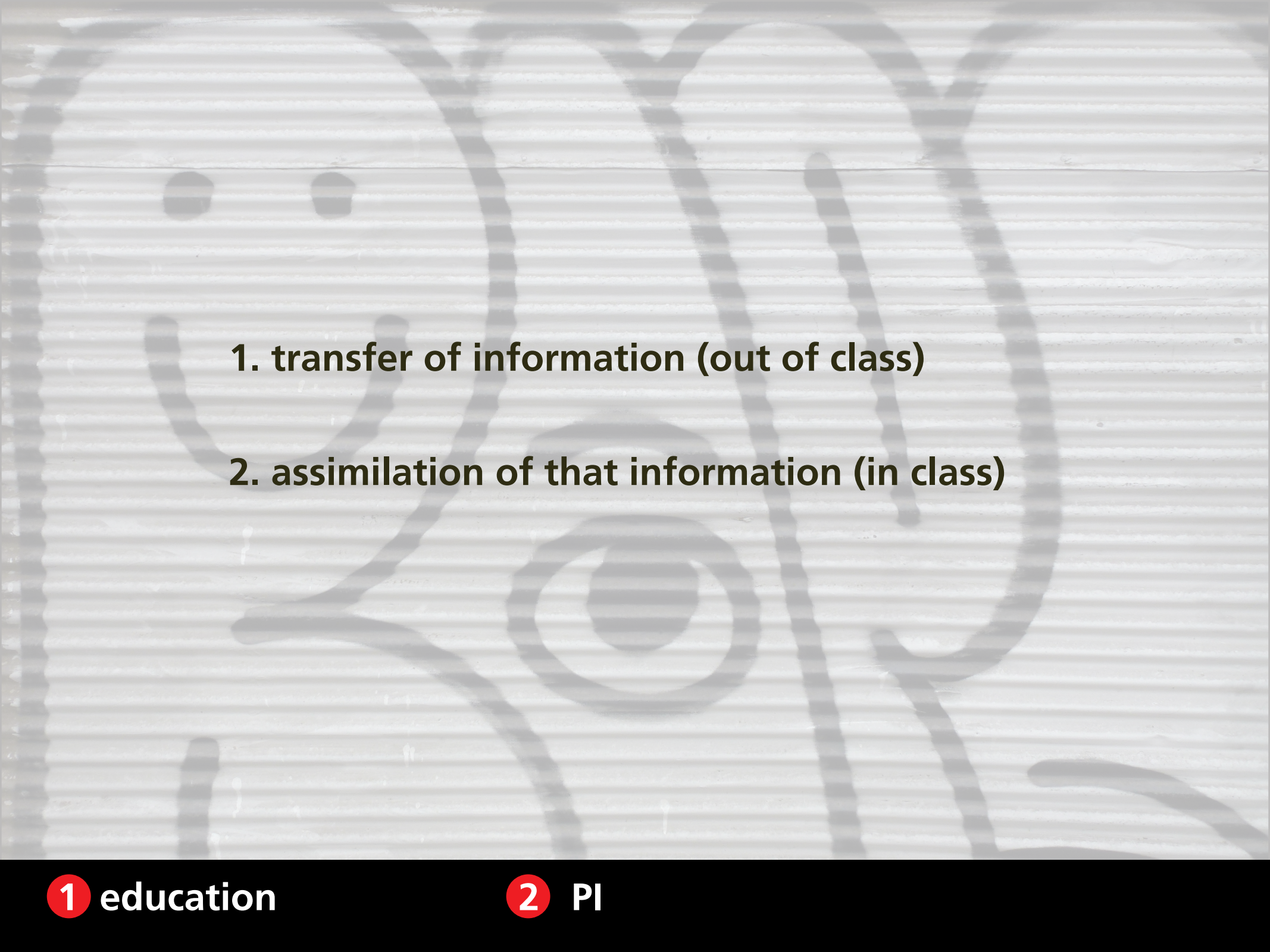
1. transfer of information (in class)

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)**

Peer



1. transfer of information (out of class)

2. assimilation of that information (in class)

INSTRUCTION

question

1 education

2 PI

question



think

question



think



poll

question



think



poll



discuss

question



think



poll



discuss



repoll

question



think



poll



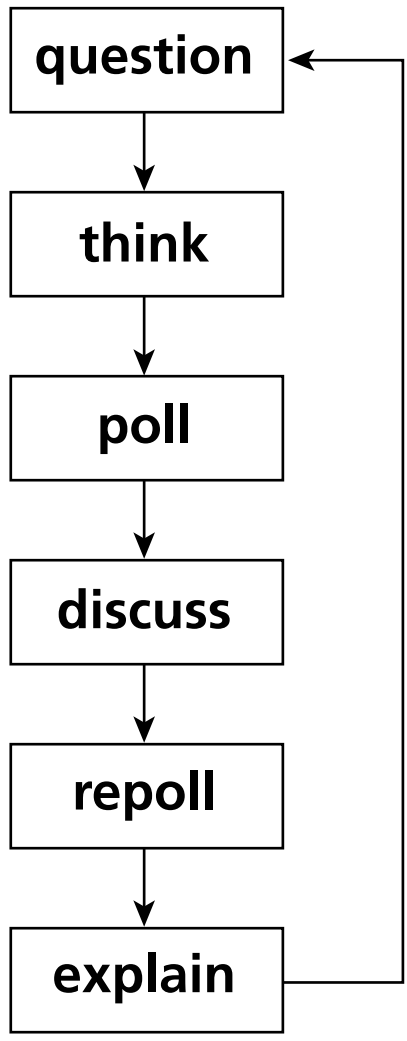
discuss

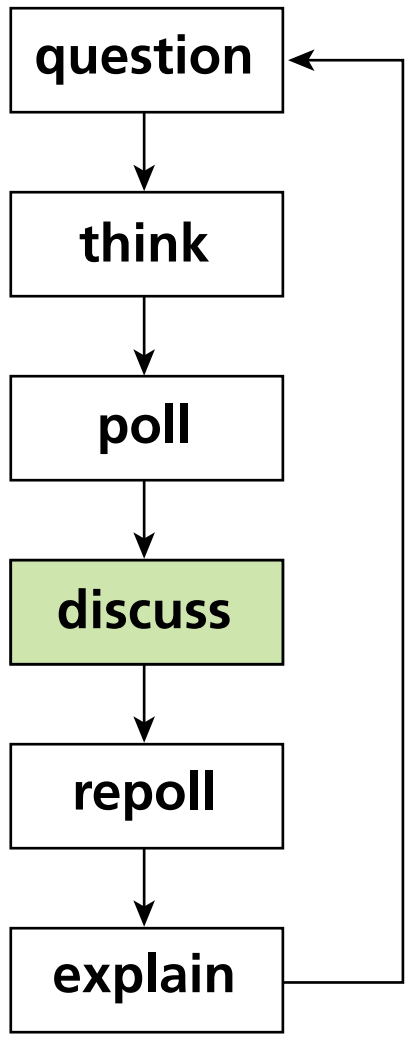


repoll



explain





1 education

2 PI

Let's try it!

QUESTION

think

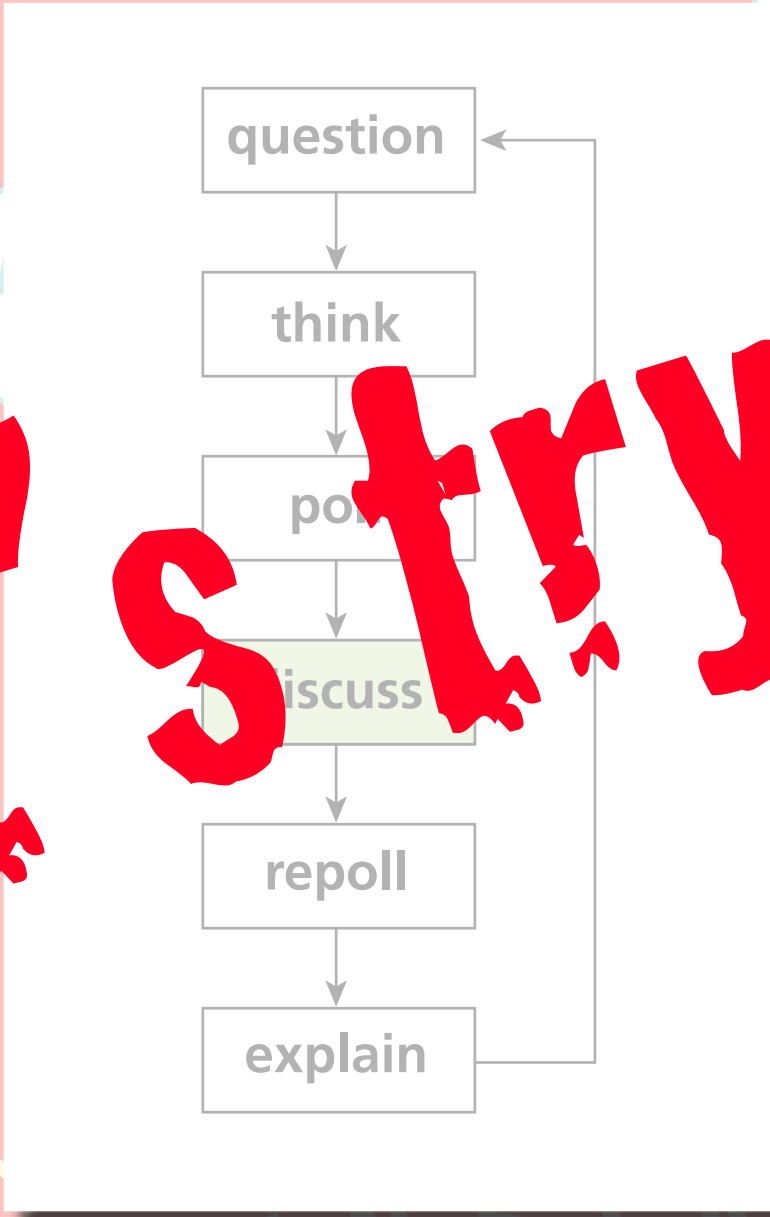
poll

discuss

repoll

explain

ACTION

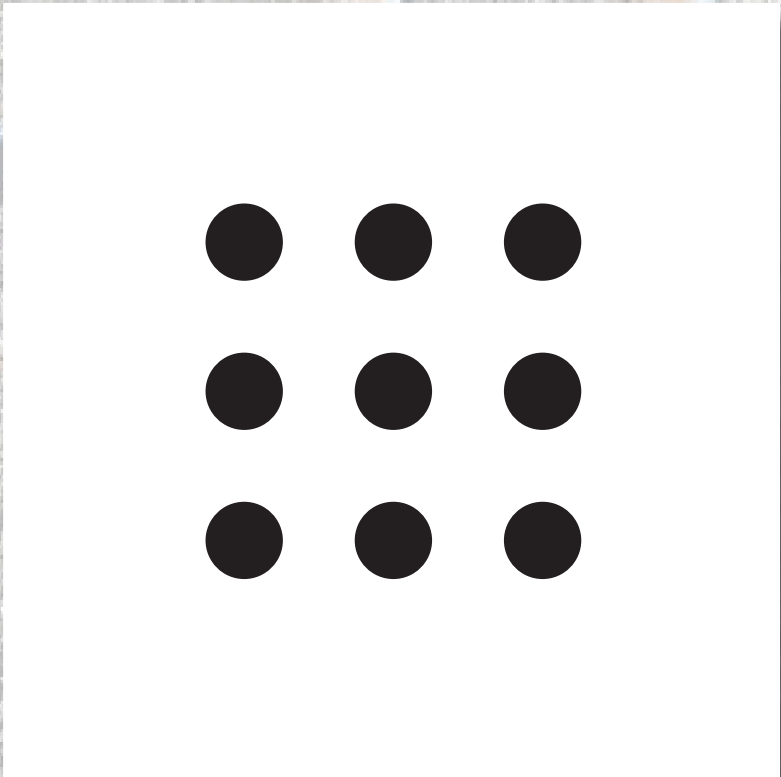


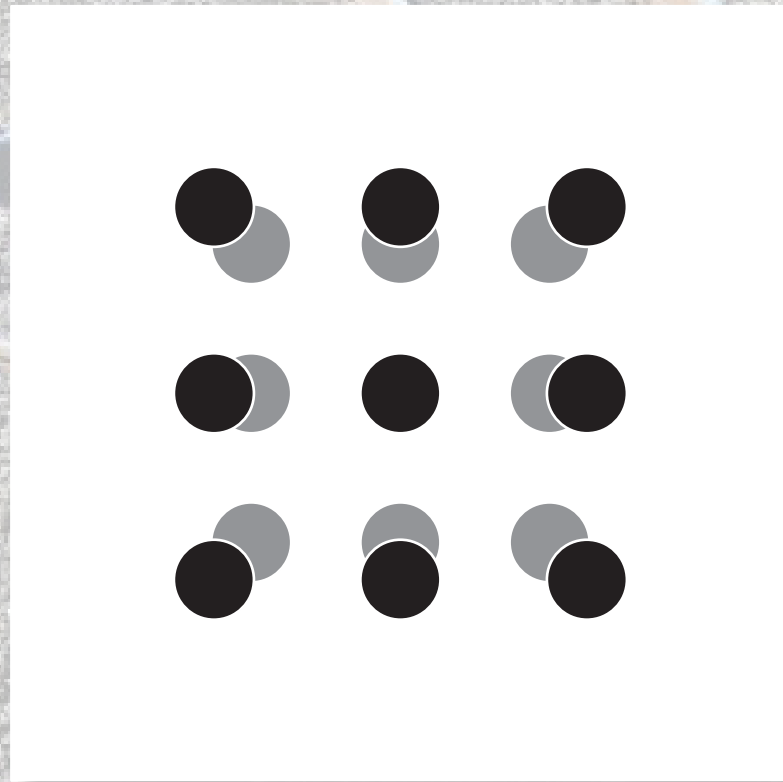
1 education

2 PI

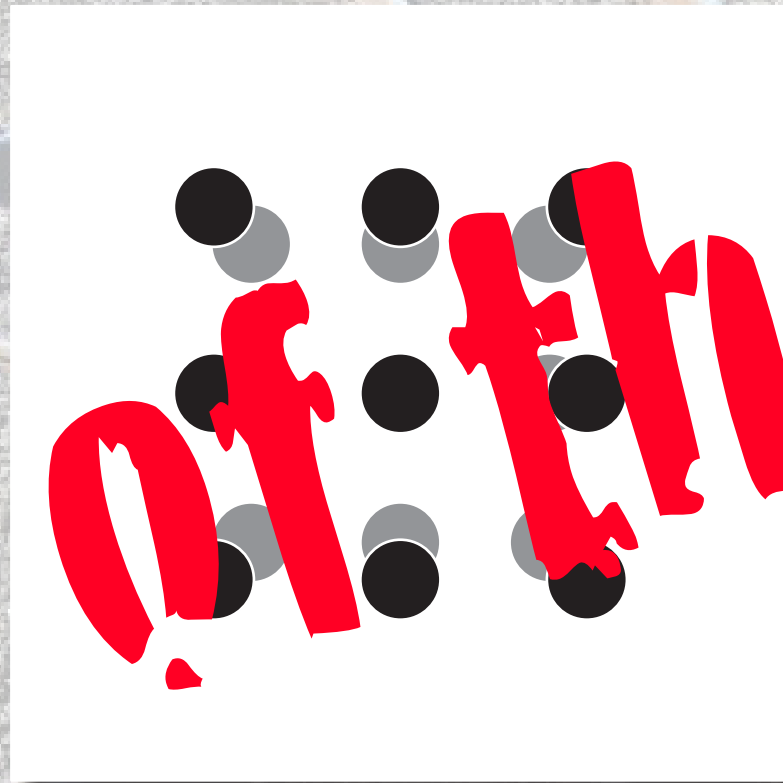
A photograph of a gravel path with a blue wavy line drawn on it, illustrating thermal expansion. The path is made of grey gravel and is bordered by green grass on both sides. The blue line is drawn in a series of connected, rounded curves, resembling a sine wave. The text "thermal expansion" is overlaid in the center of the path.

thermal expansion





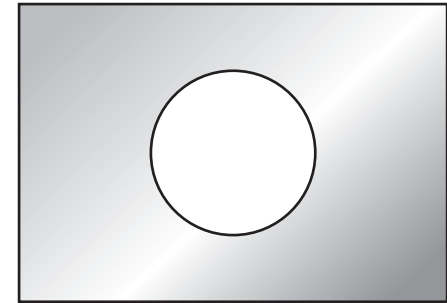
all of them!



1 education

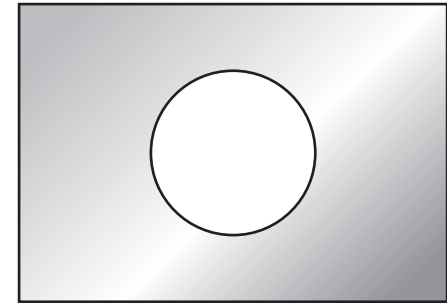
2 PI

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



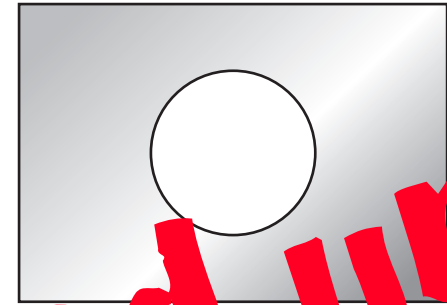
Consider a rectangular metal plate with a circular hole in it.

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.



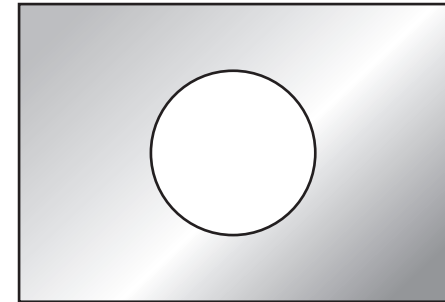
When the plate is uniformly heated, the diameter of the hole

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**

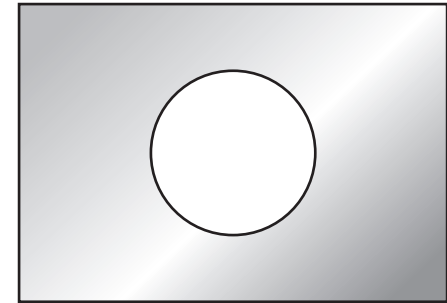
Before I tell you the answer, let's analyze what happened.

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**

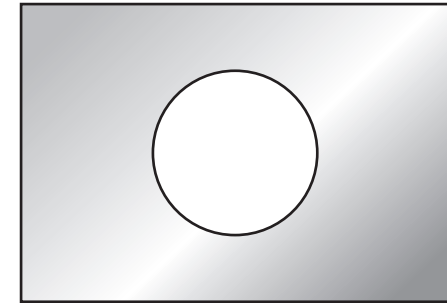
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When the plate is uniformly heated, the diameter of the hole



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

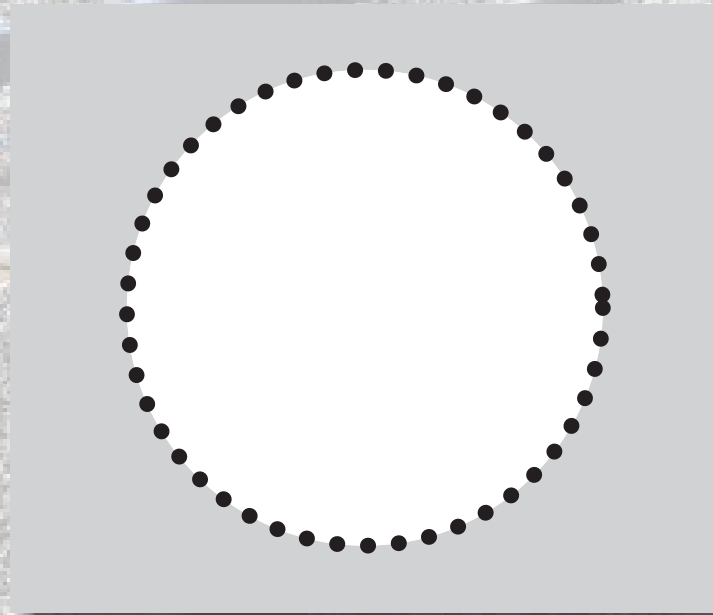
Consider a rectangular metal plate with a circular hole in it.



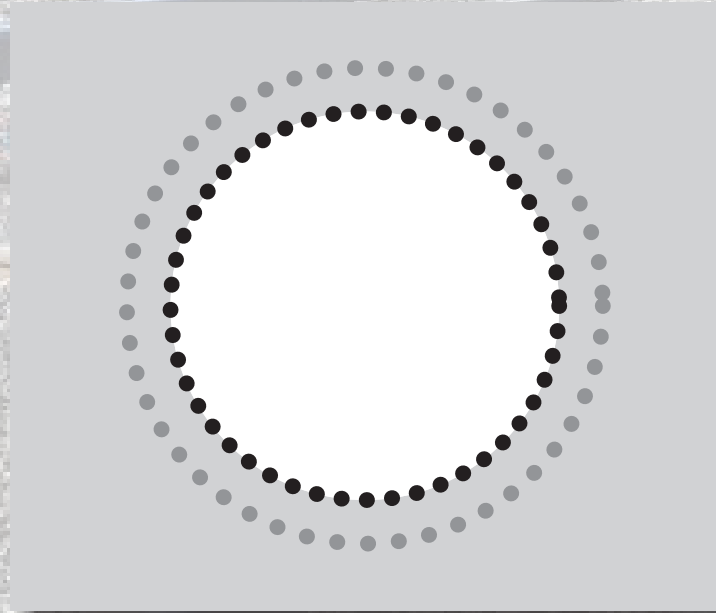
When the plate is uniformly heated, the diameter of the hole

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

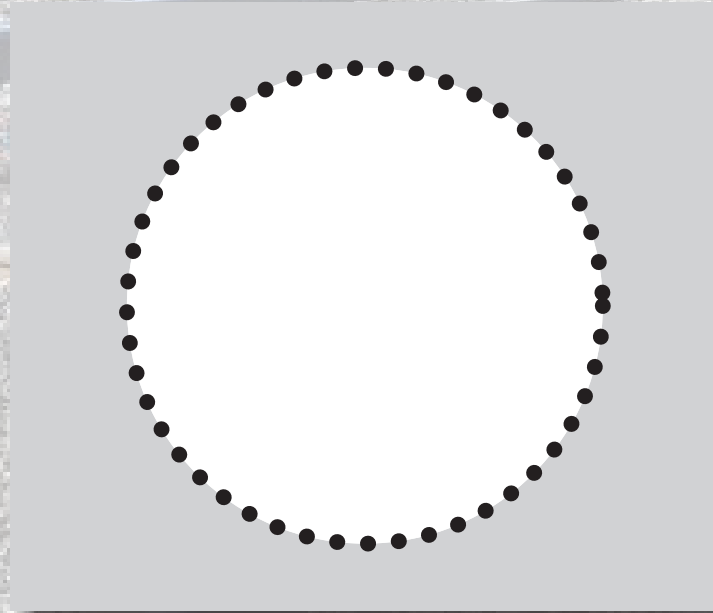
consider atoms at rim of hole



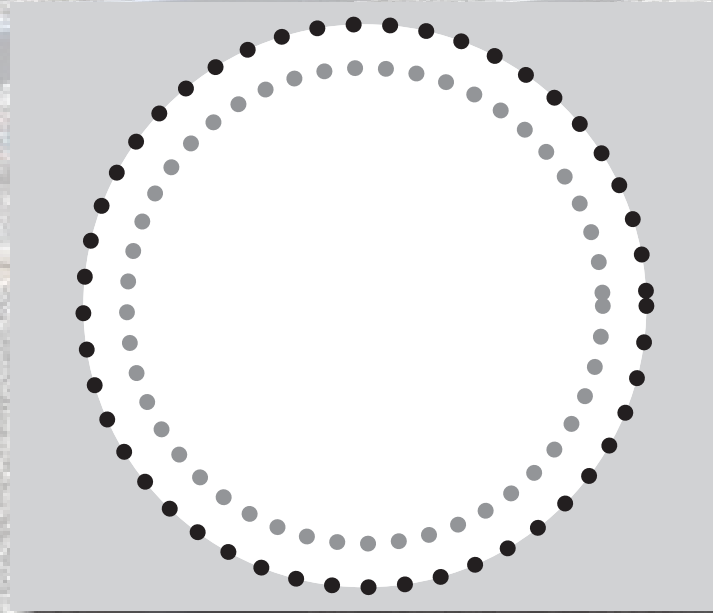
consider atoms at rim of hole



consider atoms at rim of hole



consider atoms at rim of hole



consider atoms at rim of hole

you won't forget this





Join now!

PeerInstruction.net

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. 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 overseas in 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 would most likely use which of the following?
- a. Powerpoint
 - b. Quickbooks
 - c. Peoplesoft
 - d. Excel
5. In order to start an online business, and individual would need all but which of the following:
- a. business model
 - b. capital
 - c. a business plan
 - d. depreciation?

extensible plug-in architecture for question types

- lowest
- A 30-year fixed rate mortgage at 12%
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 - $\text{Owner's equity} = \text{Assets} + \text{Liabilities}$
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- business model
 - depreciation?

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



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](#)

1 education

2 PI

3 PI 2.0

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4. direction
prevailing

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

[Deliver](#) [Show all results](#)



1 educa

3 PI 2.0

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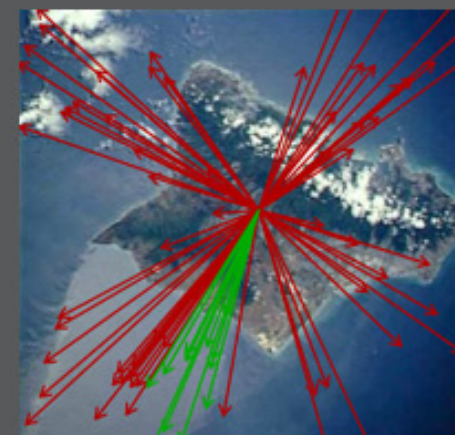
4. direction
prevailing

...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



1 educa

3 PI 2.0

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optics i

current session: 766079 | 69 students

[Back to all lectures](#) [Stop session](#) [Review results](#) [Seat map](#) [Show floating session ID](#) [Edit](#) [Delete](#)



Jump to ▾

1

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12

13

14

15



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

[Deliver](#) [Show all results](#)



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



feedback & support

1 education

2 PI

3 PI 2.0

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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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[feedback & support](#)



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current session: **766079** | 69 students

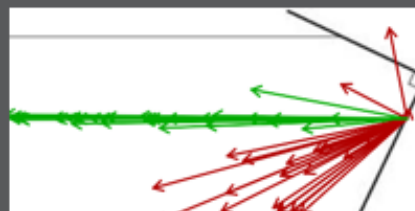
[Map](#) [Show floating session ID](#) [Edit](#) [Delete](#)

6 7 8 9 10 11 12 13 14 15

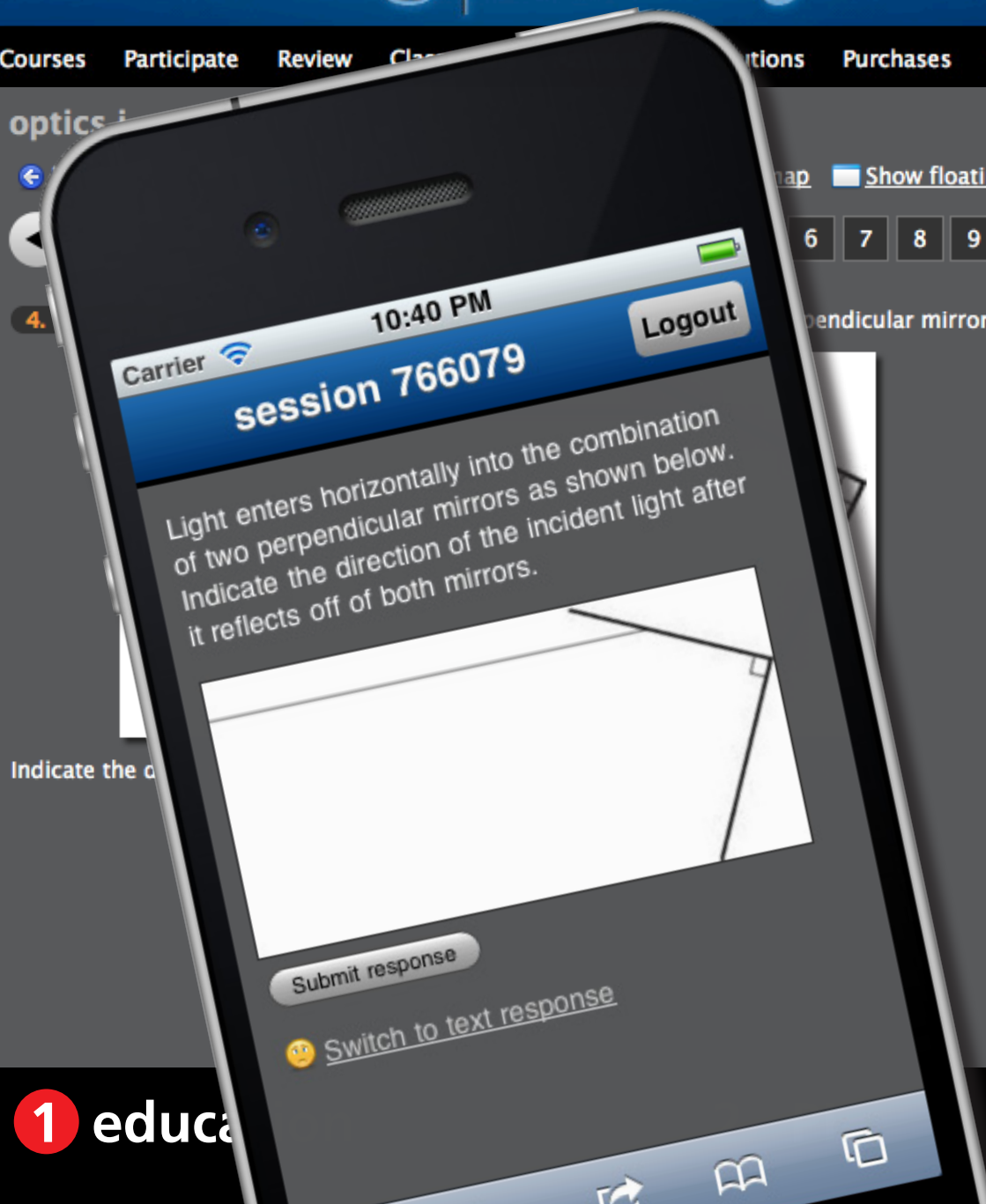
perpendicular mirrors as shown below.

[Deliver](#) [Show all results](#)

Round 1   
● 57 responses, 58% correct



 [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

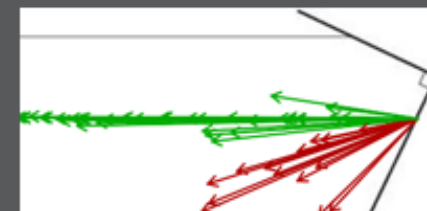
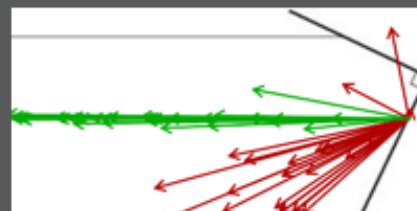


perpendicular mirrors as shown below.

[Deliver](#) [Show all results](#)

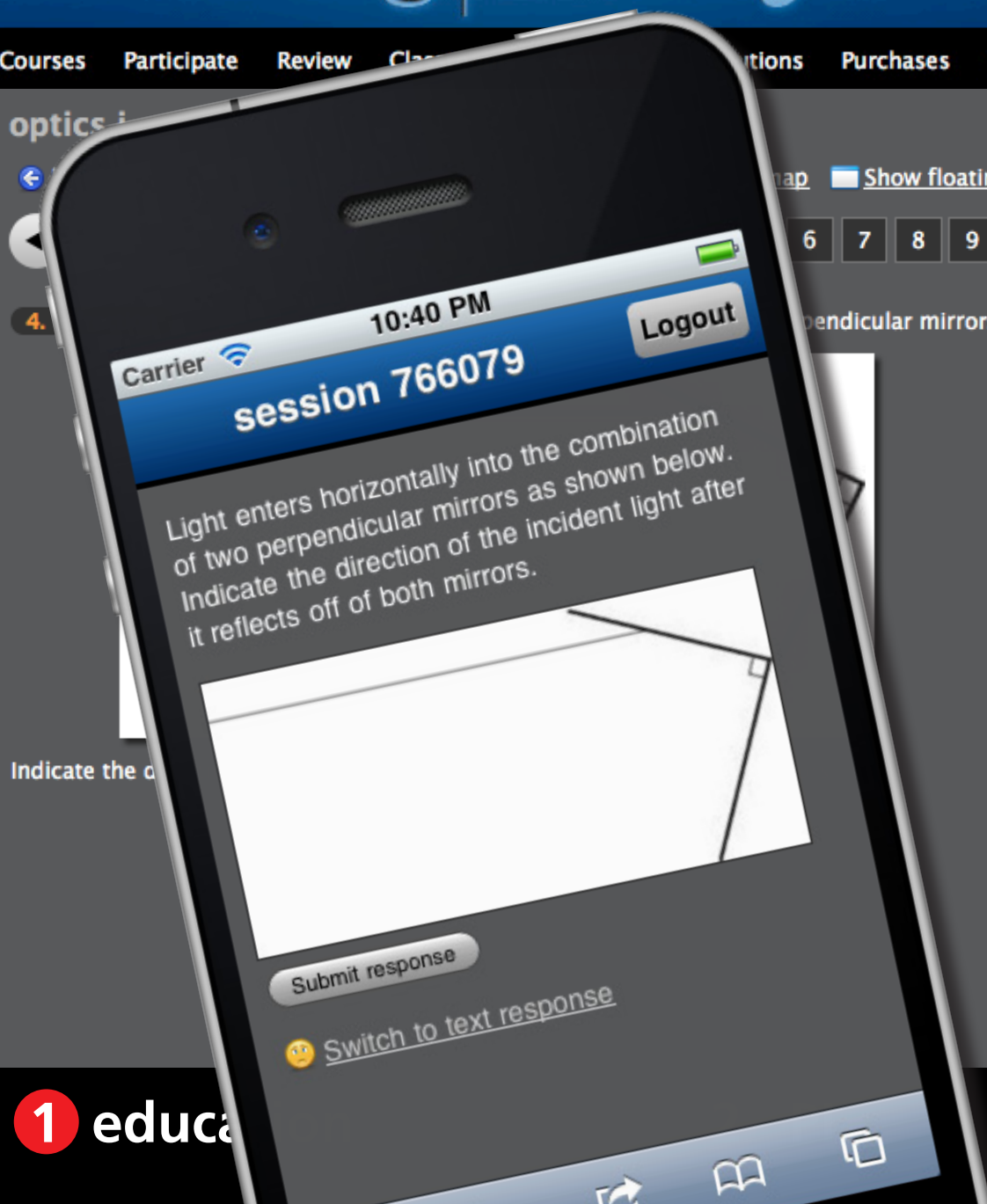
Round 1 [✖](#) [📊](#) [📄](#)
● 57 responses, 58% correct

Round 2 [✖](#) [📊](#) [📄](#)
● 51 responses, 73% correct



✓ 8 get it now
✗ 0 still don't get it

[📣 feedback & support](#)



If $2x - y = 4$, then $x =$

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transformations of parabolas

current session: **773885** | 9 students

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1

2

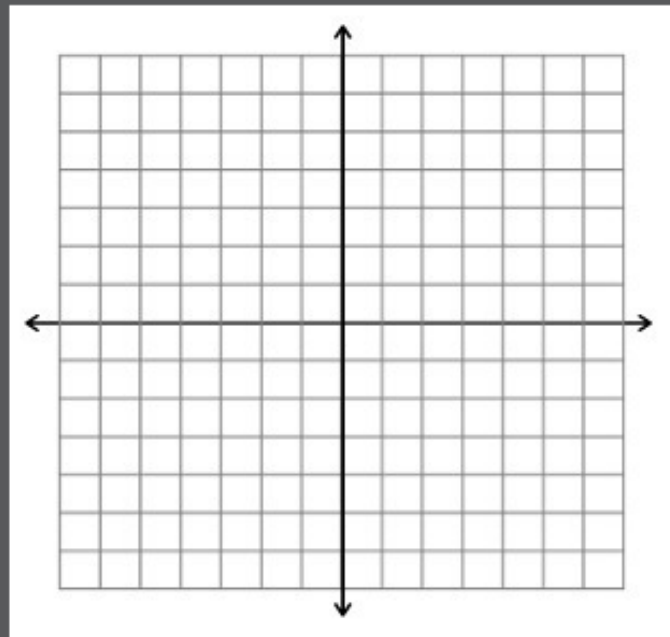
3

4



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

[✖ Stop delivery](#) [🔄 Deliver again](#) [👥 Assign groups](#) [📊 Show all results](#)



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

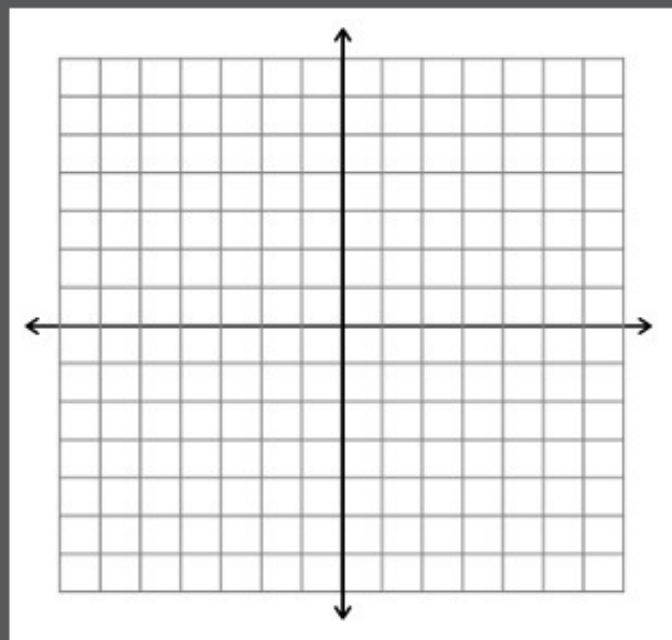
3

4



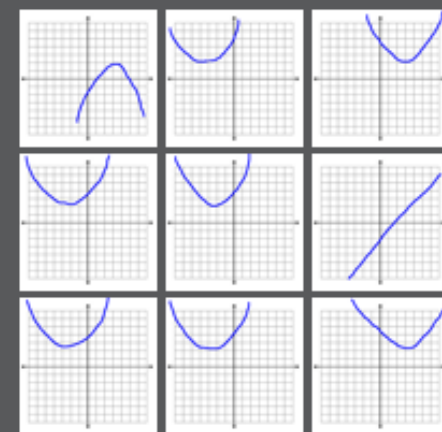
4. sketch Sketch a graph of the function $f(x) = (x - 3)^2 + 2$.

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



Round 1

9 responses



1 education

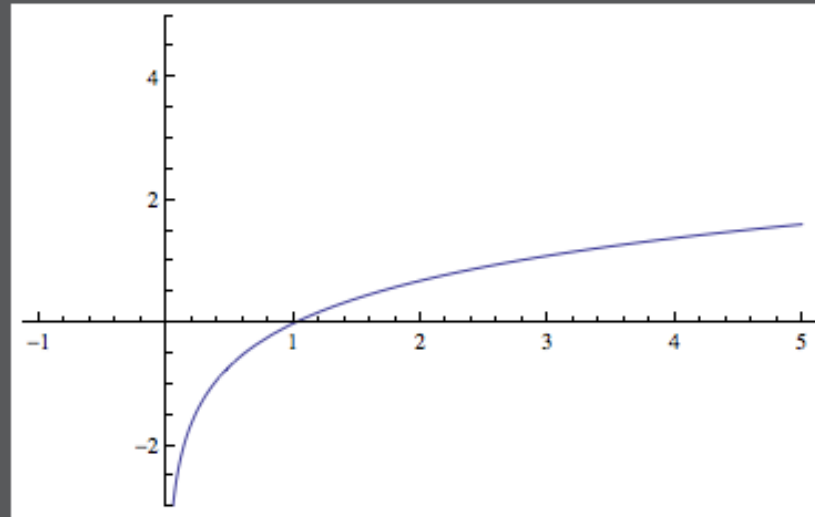
2 PI

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

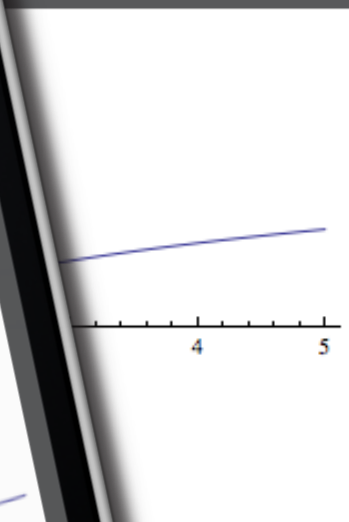
3 PI 2.0

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



1 education

3 PI 2.0

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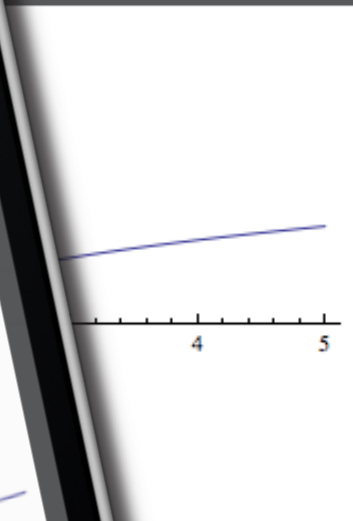
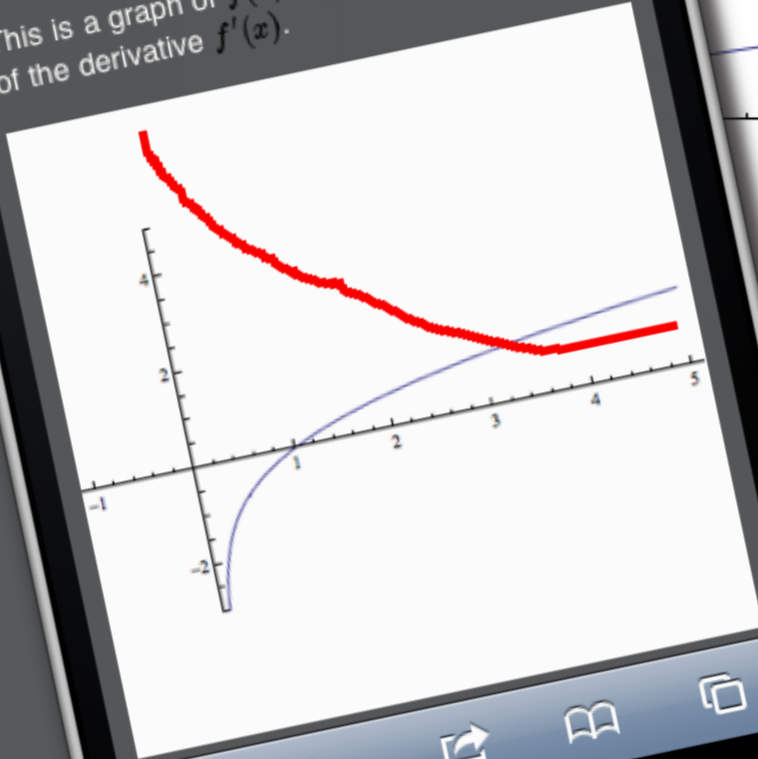
Courses Participate

ases Users Tour Help

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

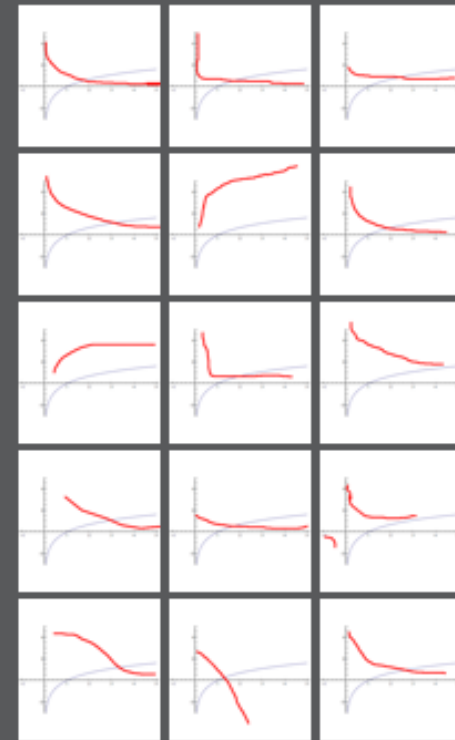


This is a graph of $f(x) = \ln x$. Sketch a graph of the derivative $f'(x)$.



Round 1

15 responses



✓ 6 get it now
✗ 0 still don't get it

1 education

3 PI 2.0

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

Carrier 9:31 PM learning catalytics skywalker.seas.harvard.edu/class_sessions/399757/review_results Google Eric Mazur | Harvard University | Log out

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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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Round 1
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- A. 61%
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- 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

Carrier 9:31 PM learning catalytics skywalker.seas.harvard.edu/class_sessions/399757/review_results Google Eric Mazur | Harvard University | Log out

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review results for session 399757 in electrostatic work and energy ii

Back to all lectures Download all results Jump to 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Round 1 74 responses, 61% correct

A. 61%
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Round 2 75 responses, 83% correct

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D. 0%
E. 0%

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Search: _____


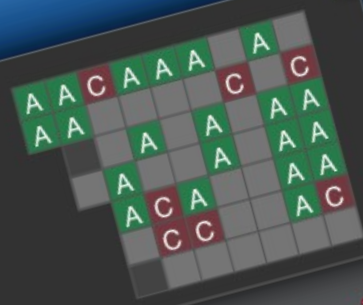
1 lecture

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. 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%

Search: _____

1 lecture

2 PI

3 PI 2.0

let system manage pairing

Leave

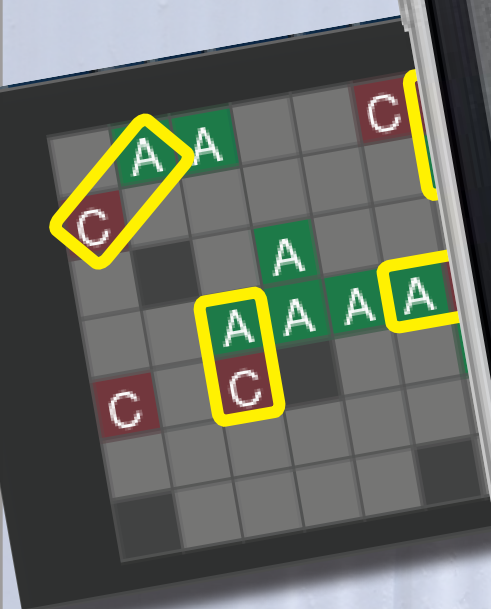
A positively charged rod is held near a neutral conducting sphere as illustrated below. A positively charged particle is moved from point A to point B at constant speed. The mechanical work required to cause this motion is



Please discuss your response with:

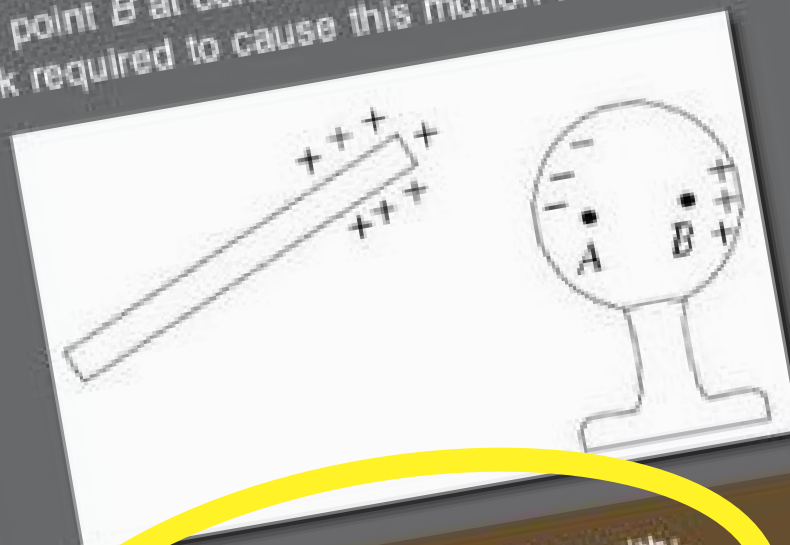
- Brian Lukoff (to your left)

I am talking to this person/people



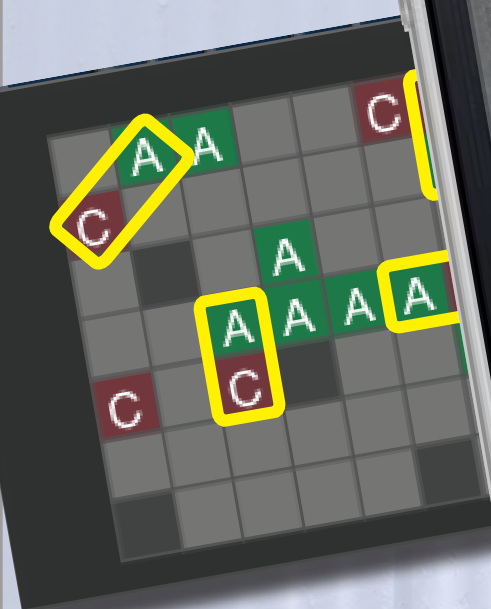
Leave

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 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 human eyes looking out. The eyes are rendered in a realistic style with detailed shading and highlights. The overall color palette is muted, with the blinds being a light beige and the window frame a dark reddish-brown.

Learning Catalytics:

- implement proven, researched pedagogy

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- **implement proven, researched pedagogy**
- **use consumer devices**

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- **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*

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National Science Foundation

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