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Learning Catalytics Workshop



ICTCM 2017

Chicago, IL, 11 March 2017



Learning Catalytics Workshop



@eric_mazur

ICTCM 2017
Chicago, IL, 11 March 2017











1 education

2 PI

3 PI 2.0

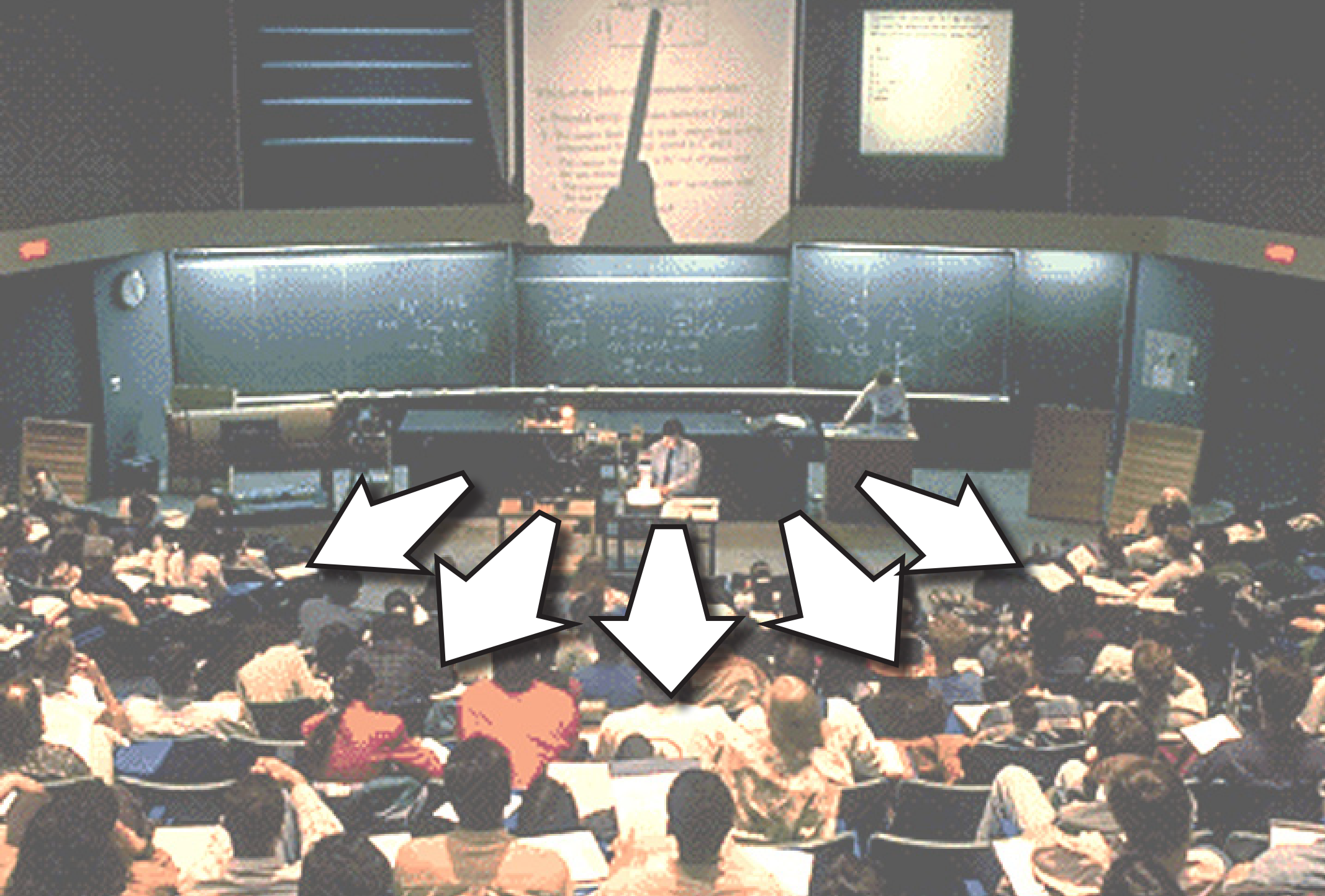


1 education

2 PI

3 PI 2.0





The result?

EDUCACION

Lack of learning

EDUCACION

Lack of learning

Lack of retention





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

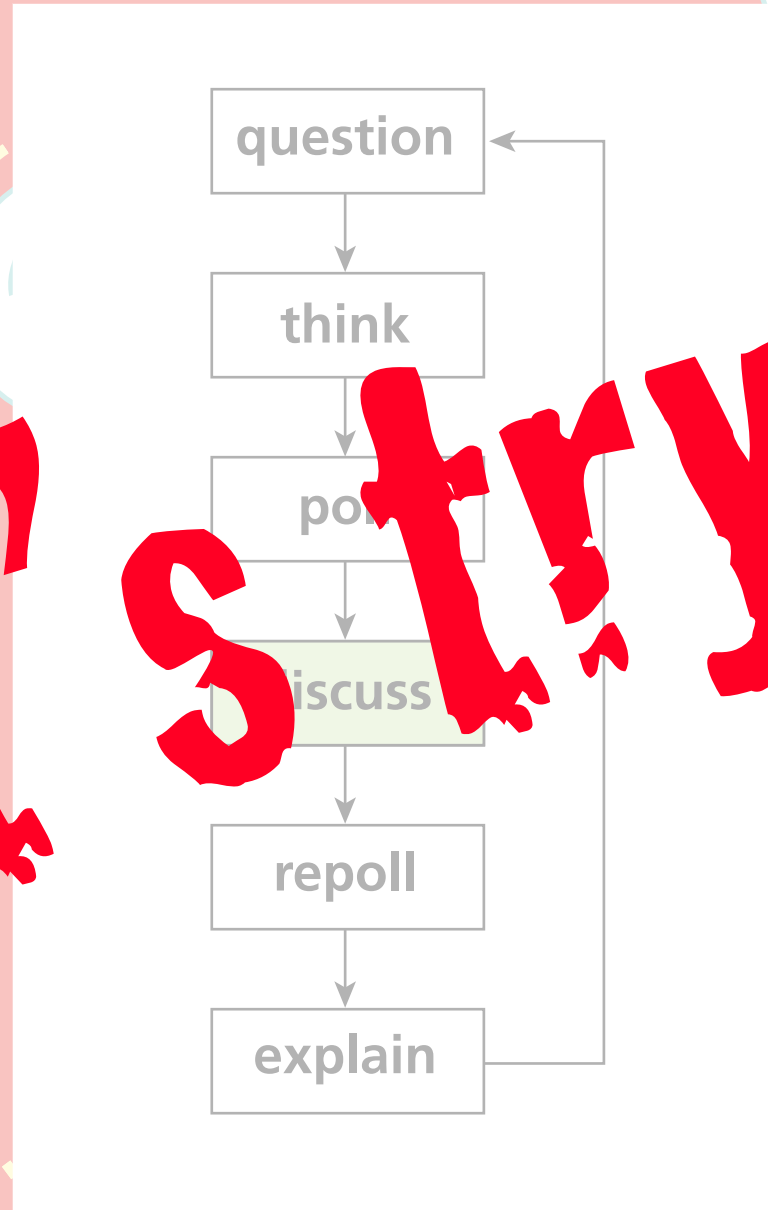
poll

discuss

repoll

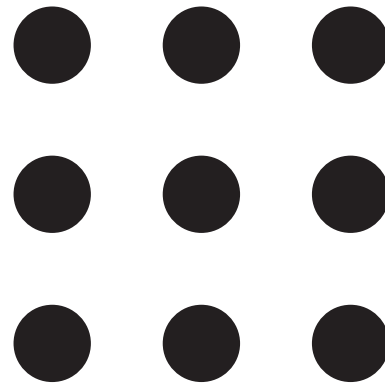
explain

ACTION

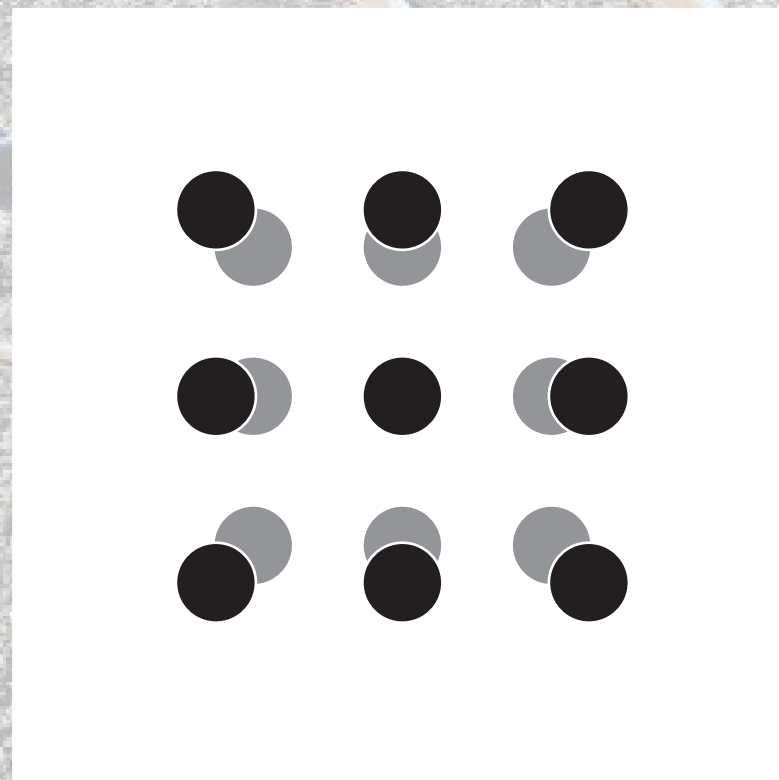


An aerial photograph of a railway track that has been laid out in a series of sharp, wavy curves. The track is composed of metal rails and wooden sleepers, resting on a bed of dark gravel. The surrounding area is covered in green grass. The text "thermal expansion" is overlaid in the center of the image, indicating the reason for the track's wavy design.

thermal expansion



1 LCatalytics.com **2** sign up code DEMO **3** ID 123456



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all of them



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



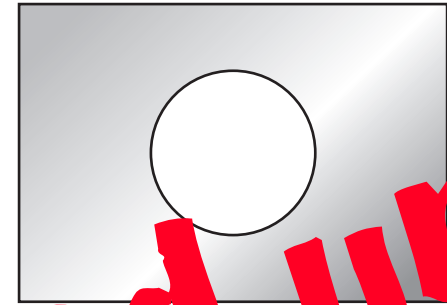
Consider a rectangular metal plate with a circular hole in it.



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!

Before I tell you the answer...

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...

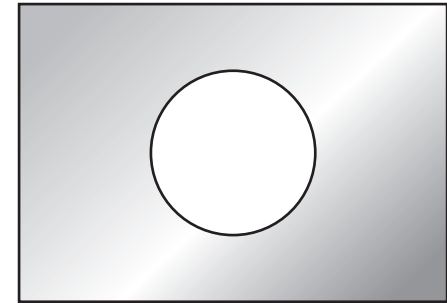
- 1. made a commitment**
- 2. externalized your answer**
- 3. moved from the answer/fact to reasoning**

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**

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.**

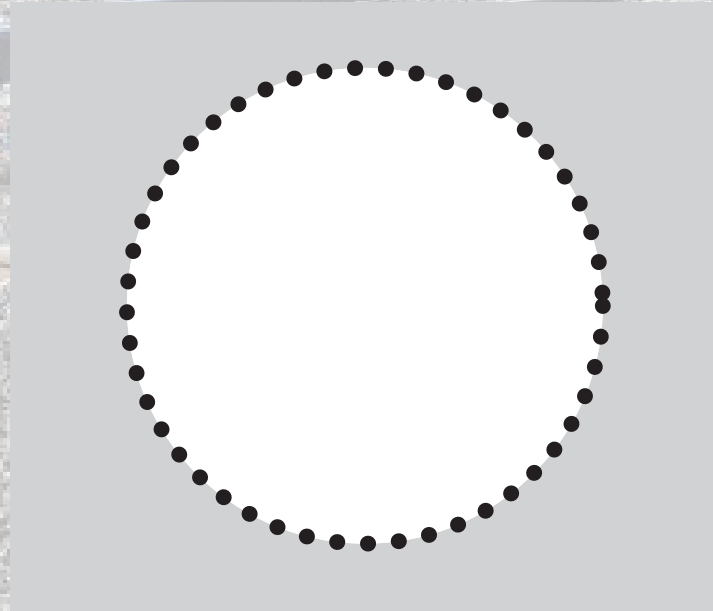
Consider a rectangular metal plate with a circular hole in it.



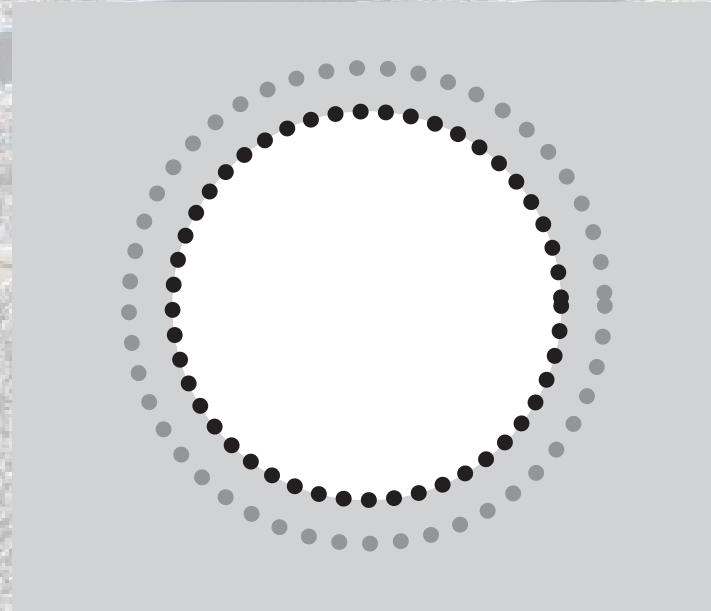
When the plate is uniformly heated, the diameter of the hole

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

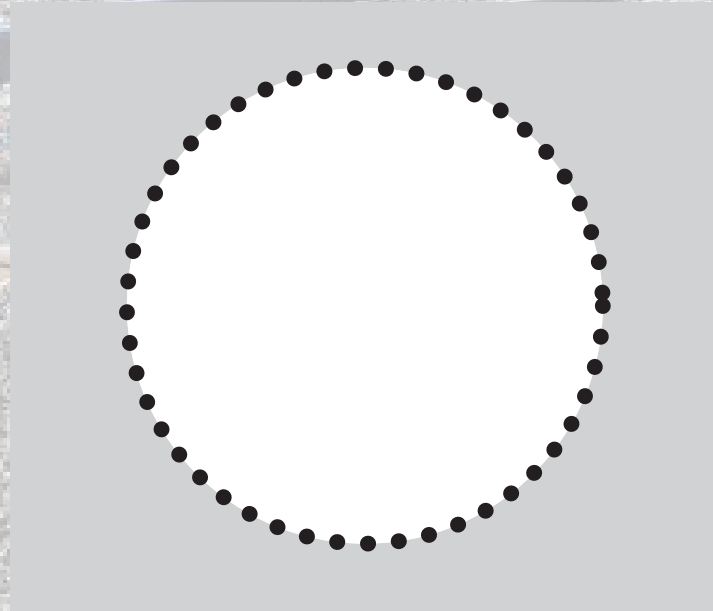
consider atoms at rim of hole



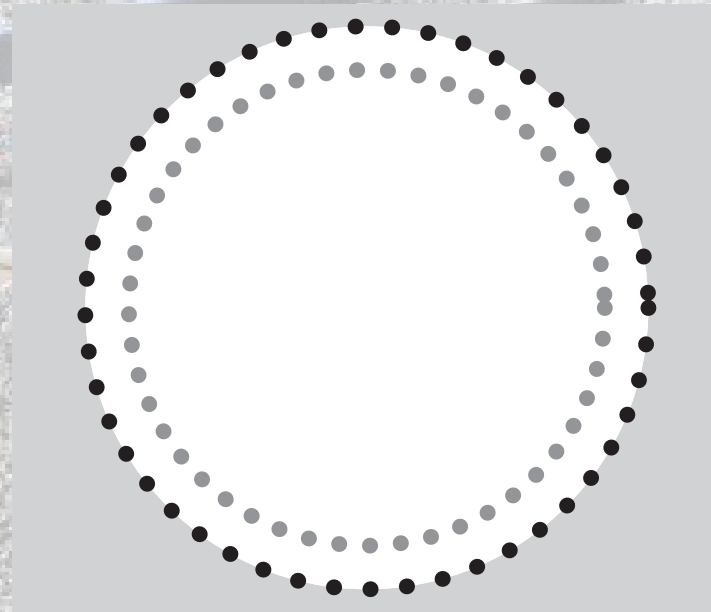
consider atoms at rim of hole



consider atoms at rim of hole



consider atoms at rim of hole



consider atoms at rim of hole

you won't forget this

Peer

back to PI

INSTRUCTION

1 education

2 PI

An abstract graphic with a light red background and a purple vertical stripe on the left. The word 'Peer' is written in a large, white, sans-serif font. A dashed yellow line with arrowheads at both ends forms a loop around the first 'e'. A dotted blue line starts from the right side of the 'Peer' and extends diagonally down towards the word 'INSTRUCTION'.

Peer

INSTRUCTION

1 education

2 PI



Peer

Higher learning gains

INSTRUCTION

1 education

2 PI

The background features a large, light blue word 'Peer' with a dashed yellow line forming a circle around the 'ee'. Below it, the word 'INSTRUCTION' is written in a light blue, spaced-out font. Two red arrows point towards the center: one from the top right and one from the bottom left. The text 'Higher learning gains' and 'Better retention' is written in a bold, red, sans-serif font, slanted upwards from left to right.

Higher learning gains

Better retention

INSTRUCTION

feedback

1 lecture

2 PI

3 PI 2.0



1991

1 lecture

2 PI

3 PI 2.0



1993



1998





1 lecture

2 PI

3 PI 2.0



How do I...

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

learning | catalytics

1 lecture

2 PI

3 PI 2.0

Use intelligent algorithms and data analytics to...

- **improve questioning**
 - **manage discussions**
 - **facilitate time management/flow**
- learning | catalytics

- 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. $\text{Assets} = \text{Liabilities} + \text{Owners' equity}$
 - b. $\text{Liabilities} = \text{Assets} + \text{Owners' equity}$
 - c. $\text{Owner's equity} = \text{Assets} + \text{Liabilities}$
 - d. $\text{Revenue} = \text{Assets} - \text{Liabilities}$
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. depreciation?

extensible plug-in architecture for question types

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical, data collection
- ranking, priority
- region (select point on image)
- sketch, composite sketch
- highlight passage

Sample question types:

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4. direction
prevailing

4. 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 lecture

3 PI 2.0

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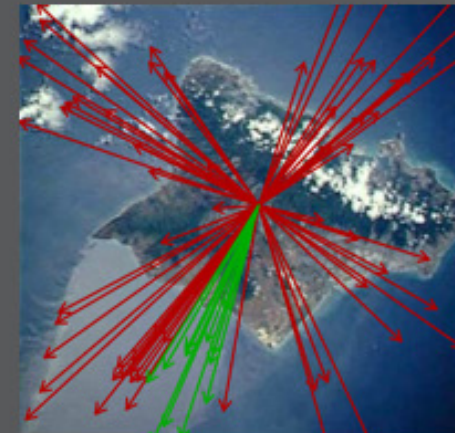
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4. direction
prevailing

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

[Deliver](#)[Show all results](#)**Round 1**

77 responses, 16% correct



✓ 17 get it now

✗ 3 still don't get it

1 lecture

3 PI 2.0

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optics i

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Jump to ▼

1

2

3

4

5

6

7

8

9

10

11

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 lecture**2** PI**3** PI 2.0

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optics i

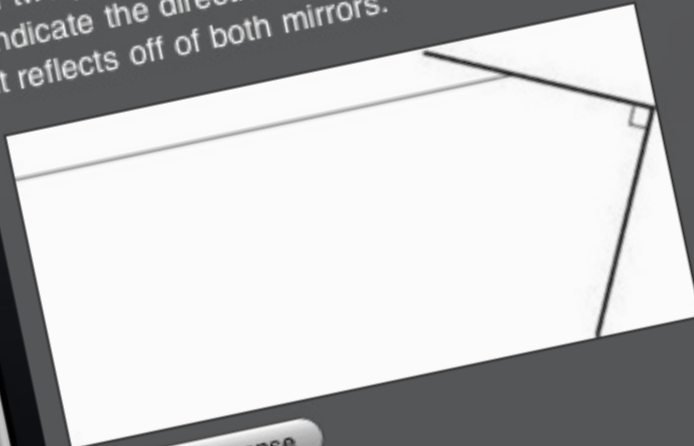
current session: **766079** | 69 students[Map](#) [Show floating session ID](#) [Edit](#) [Delete](#)

6 7 8 9 10 11 12 13 14 15

perpendicular mirrors as shown below.

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

Light enters horizontally into the combination of two perpendicular mirrors as shown below. Indicate the direction of the incident light after it reflects off of both mirrors.



Submit response

[Switch to text response](#)[feedback & support](#)**1** lecture**3** PI 2.0

learning | catalytics

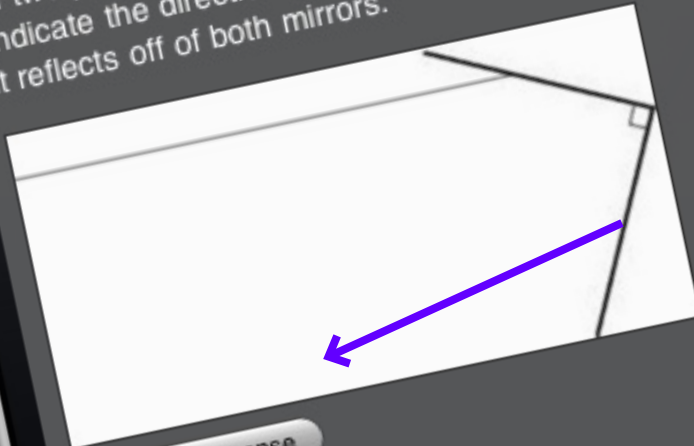
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6 7 8 9 10 11 12 13 14 15

pendicular mirrors as shown below.

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Light enters horizontally into the combination of two perpendicular mirrors as shown below. Indicate the direction of the incident light after it reflects off of both mirrors.

[Submit response](#)[Switch to text response](#)[feedback & support](#)**1** lecture**3** PI 2.0

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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

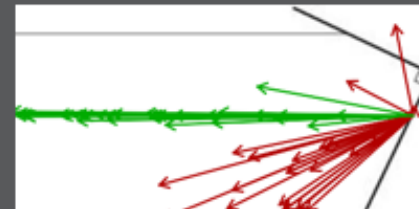


perpendicular mirrors as shown below.

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

Round 1

57 responses, 58% correct



feedback & support

1 lecture

3 PI 2.0

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optics i

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

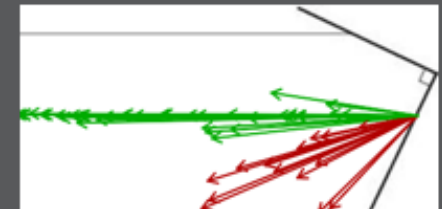
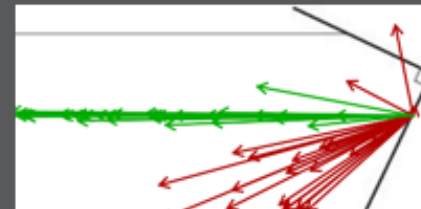


57 responses, 58% correct

Round 2



51 responses, 73% correct



✓ 8 get it now

✗ 0 still don't get it



feedback & support

1 lecture

3 PI 2.0

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical, data collection
- ranking, priority
- region (select point on image)
- sketch, composite sketch
- highlight passage

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

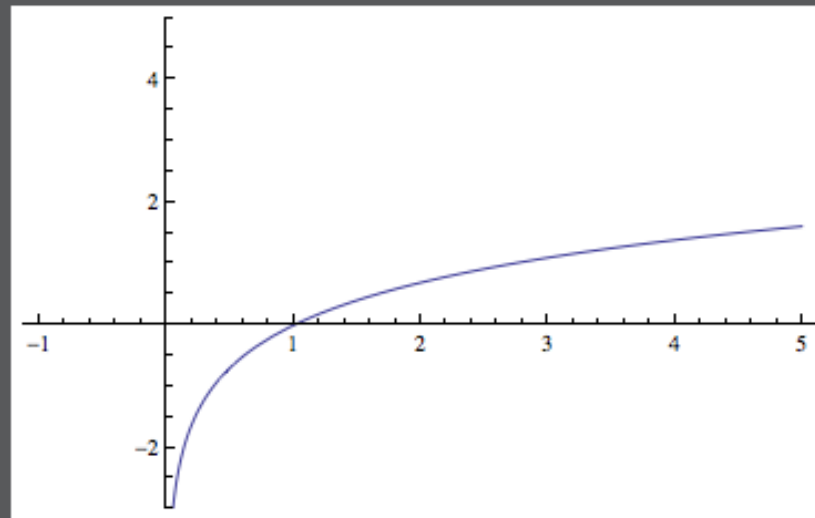
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- direction
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- highlight passage

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

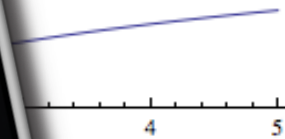
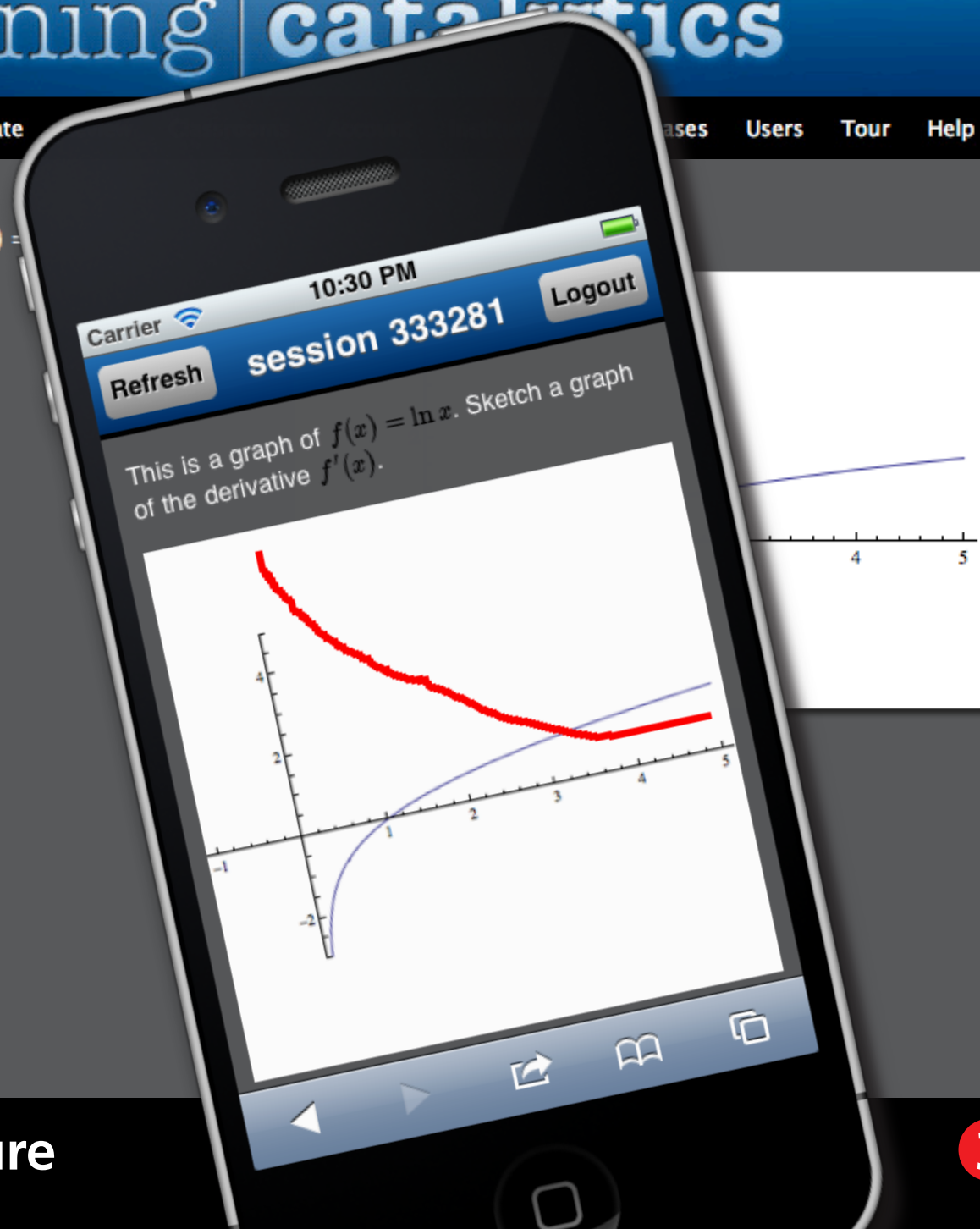


1 lecture

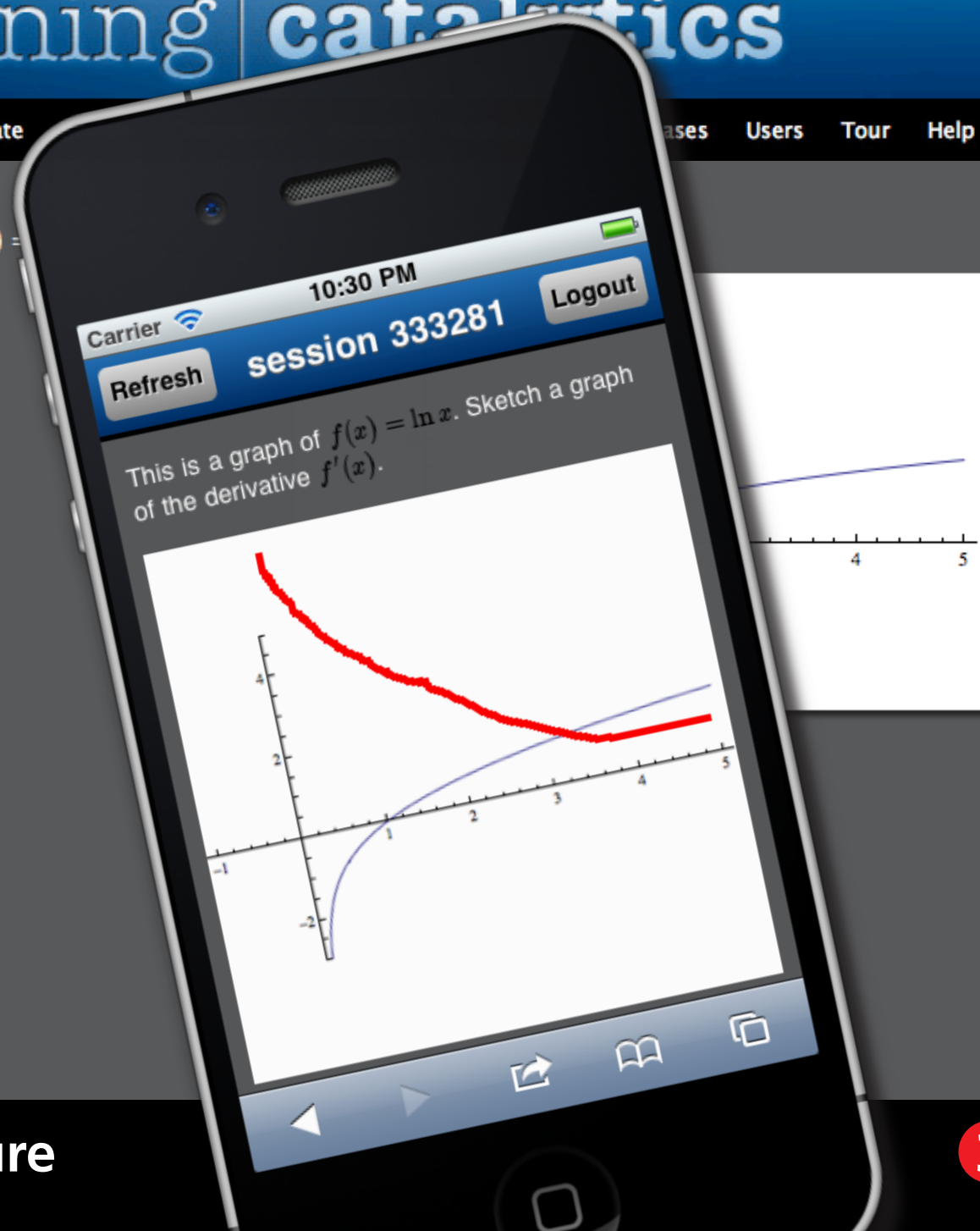
2 PI

3 PI 2.0

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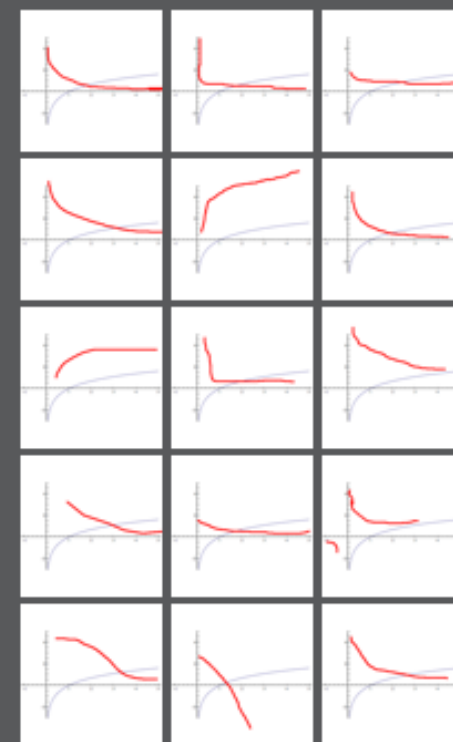
[Courses](#) [Participate](#)[ases](#) [Users](#) [Tour](#) [Help](#)This is a graph of $f(x) =$ **1** lecture**3** PI 2.0

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[Courses](#) [Participate](#)[ases](#) [Users](#) [Tour](#) [Help](#)This is a graph of $f(x) =$ 

Round 1

15 responses



✓ 6 get it now
✗ 0 still don't get it

1 lecture

3 PI 2.0

Sample question types:

- direction
- mathematical expression
- long answer, short answer, word cloud
- numerical data collection
- ranking priority
- region (select point on image)
- sketch, composite sketch
- highlight passage



1 lecture

2 PI

3 PI 2.0



human interaction

1 lecture

2 PI

3 PI 2.0

Carrier 9:31 PM 100%

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review results for session 399757 in electrostatic work and energy ii

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

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



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. 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

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

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 at constant speed. 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: _____

Carrier 9:31 PM 100%

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Round 1
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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:

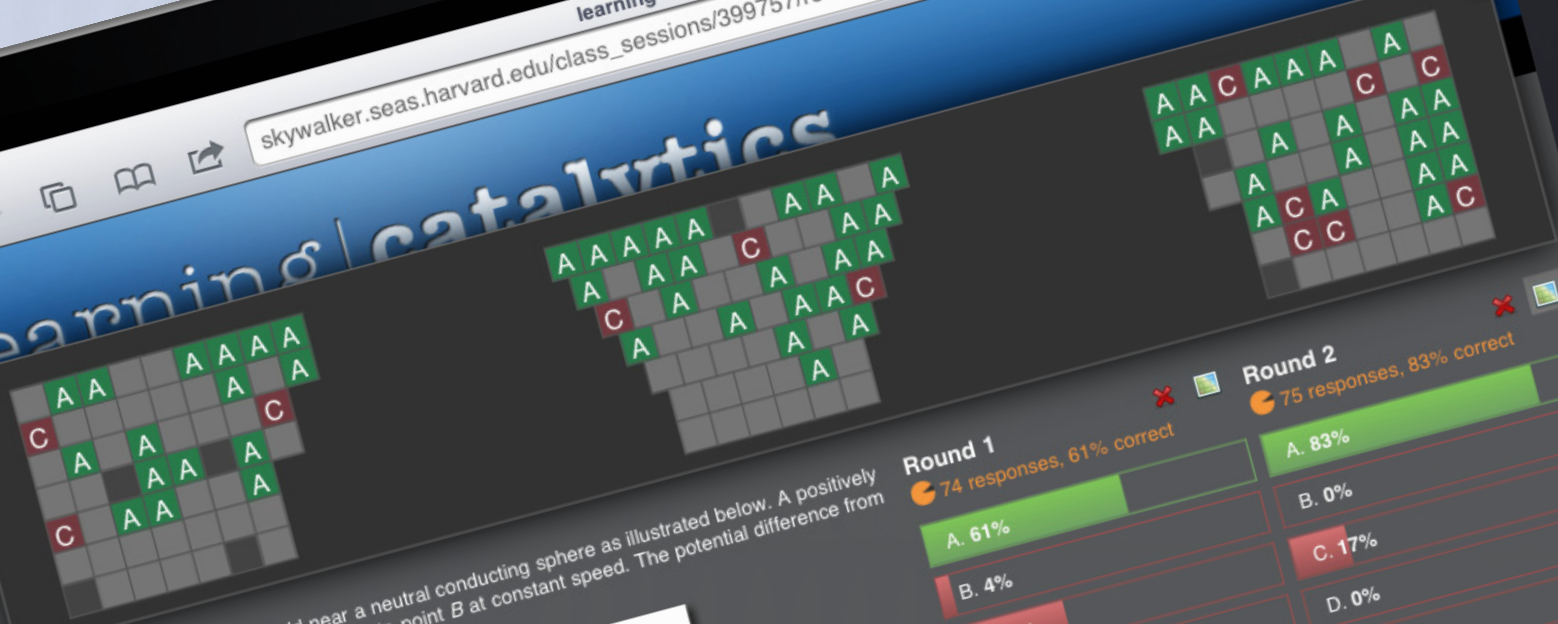
1 lecture

2 PI

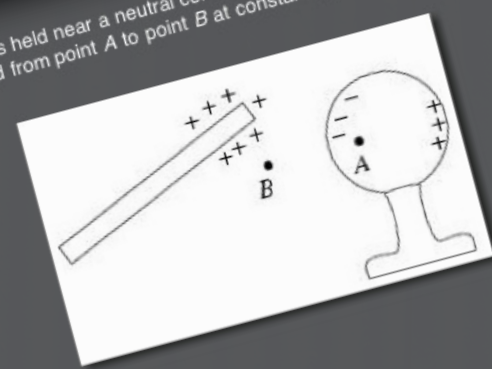
3 PI 2.0

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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 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

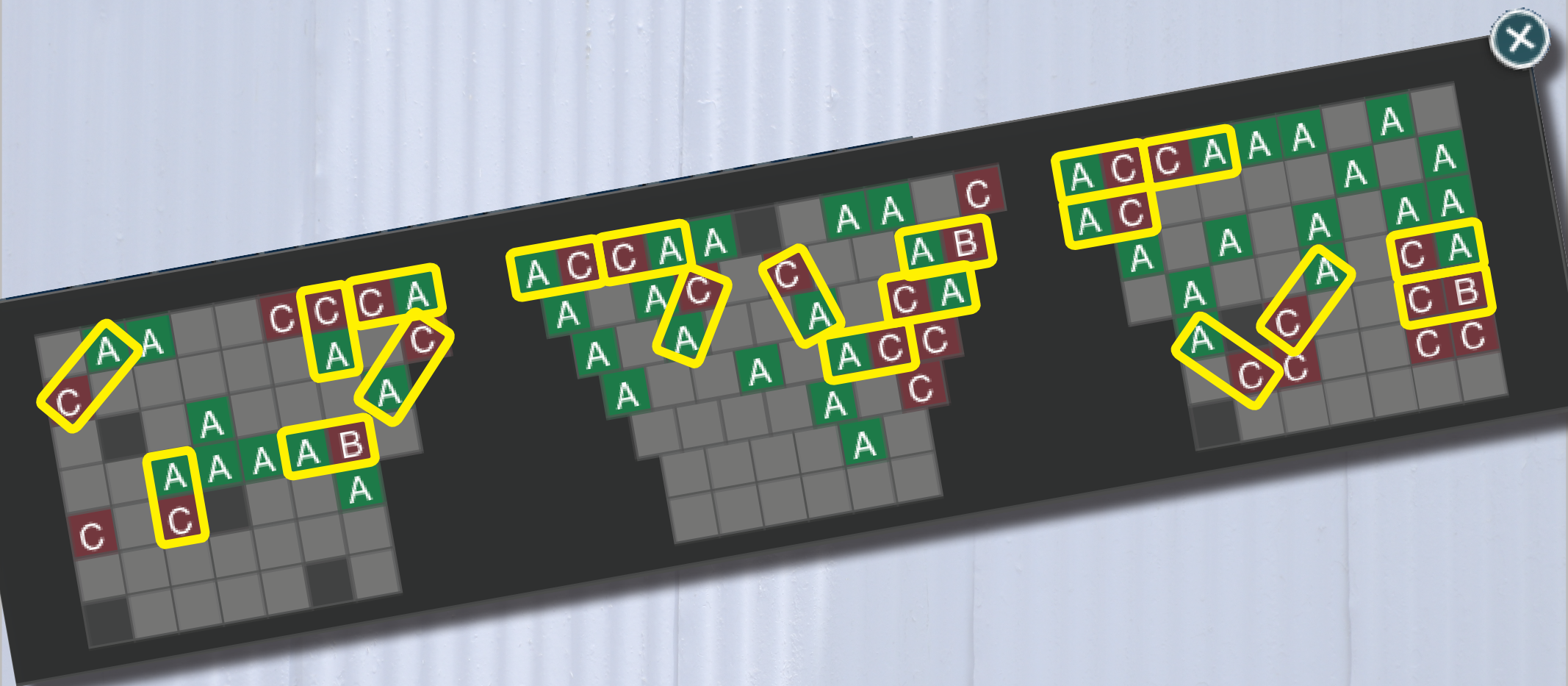
A. 61%
B. 4%
C. 35%
D. 0%
E. 0%

Round 2
75 responses, 83% correct

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

Search:

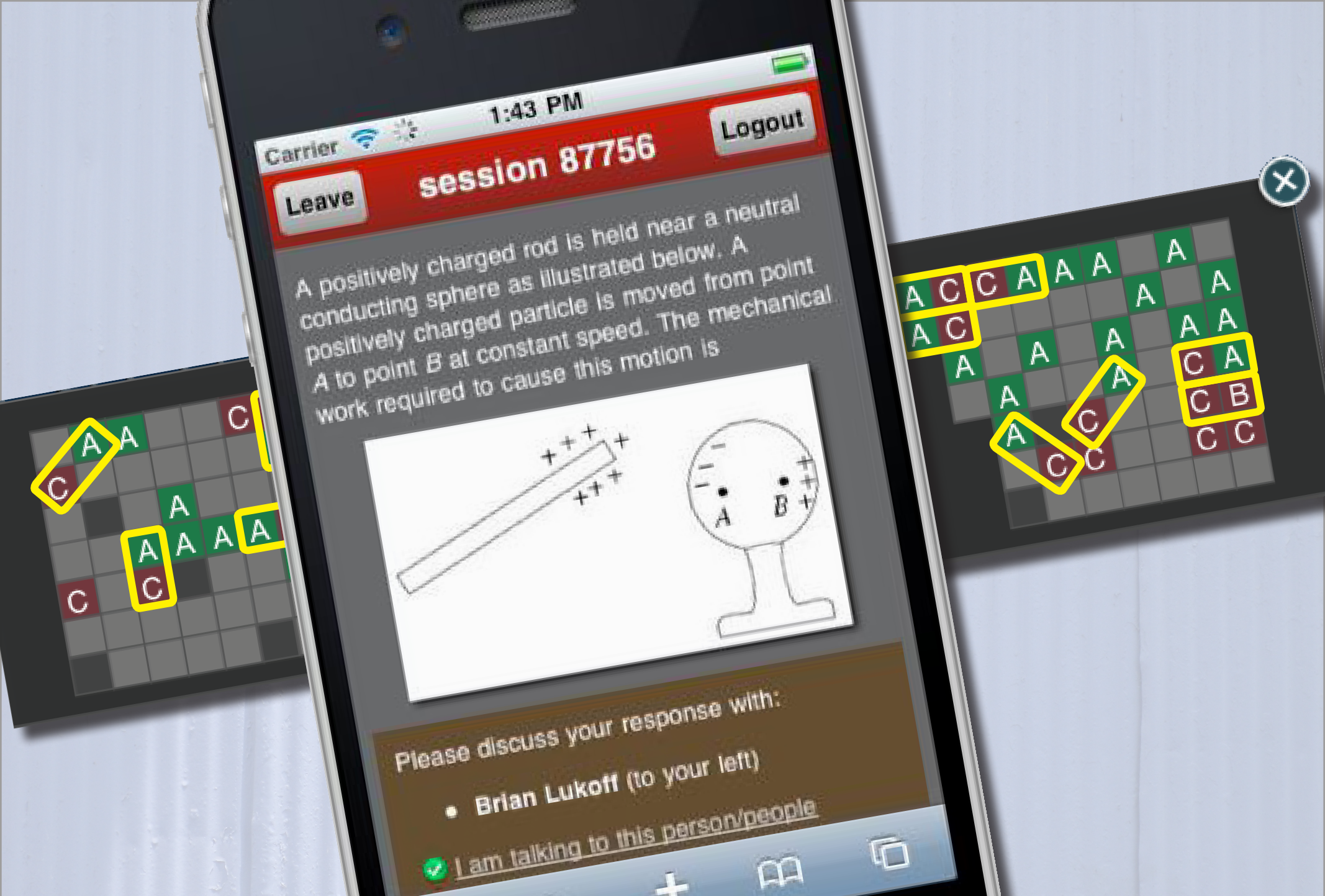
let system manage pairing



1 lecture

2 PI

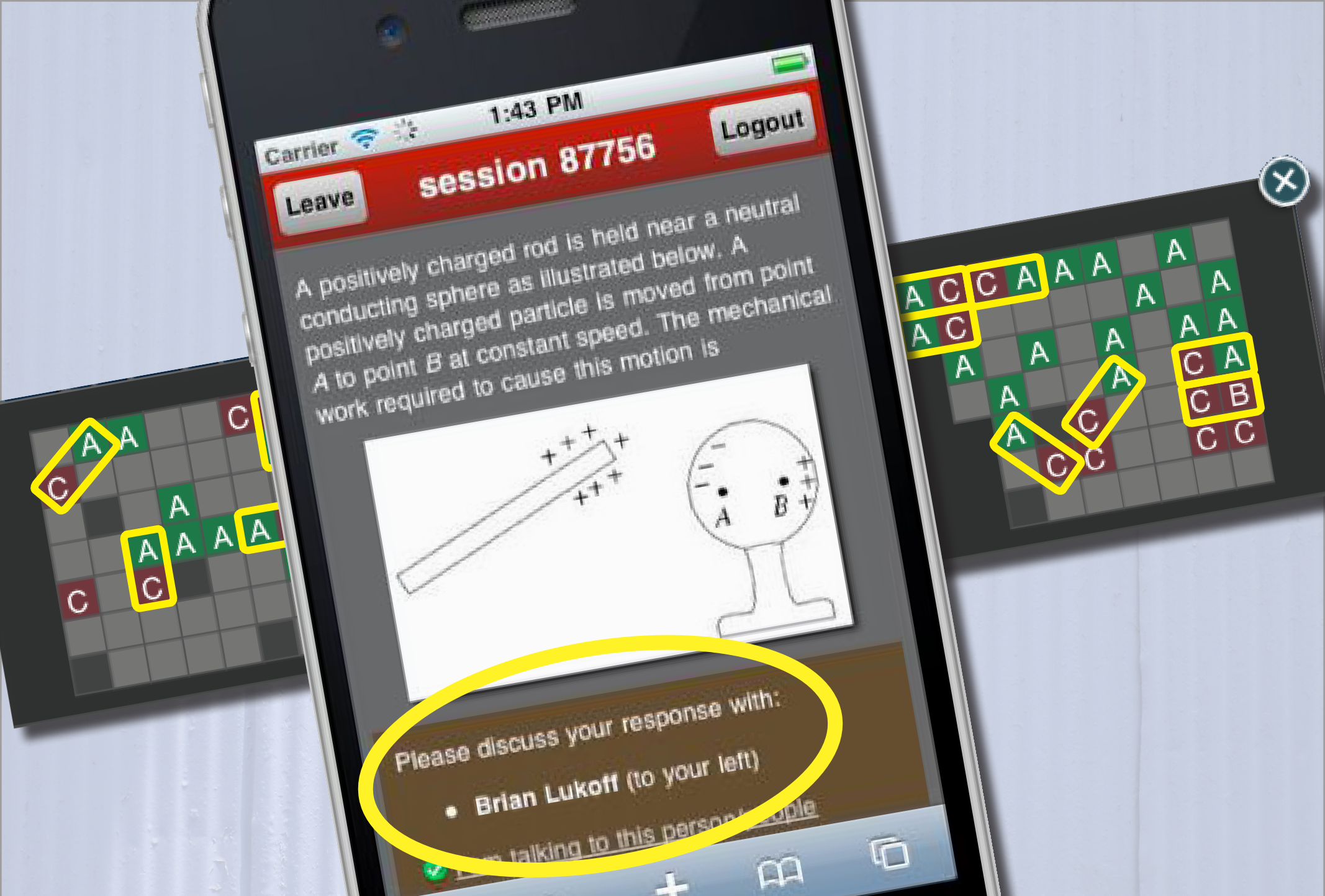
3 PI 2.0



1 lecture

2 PI

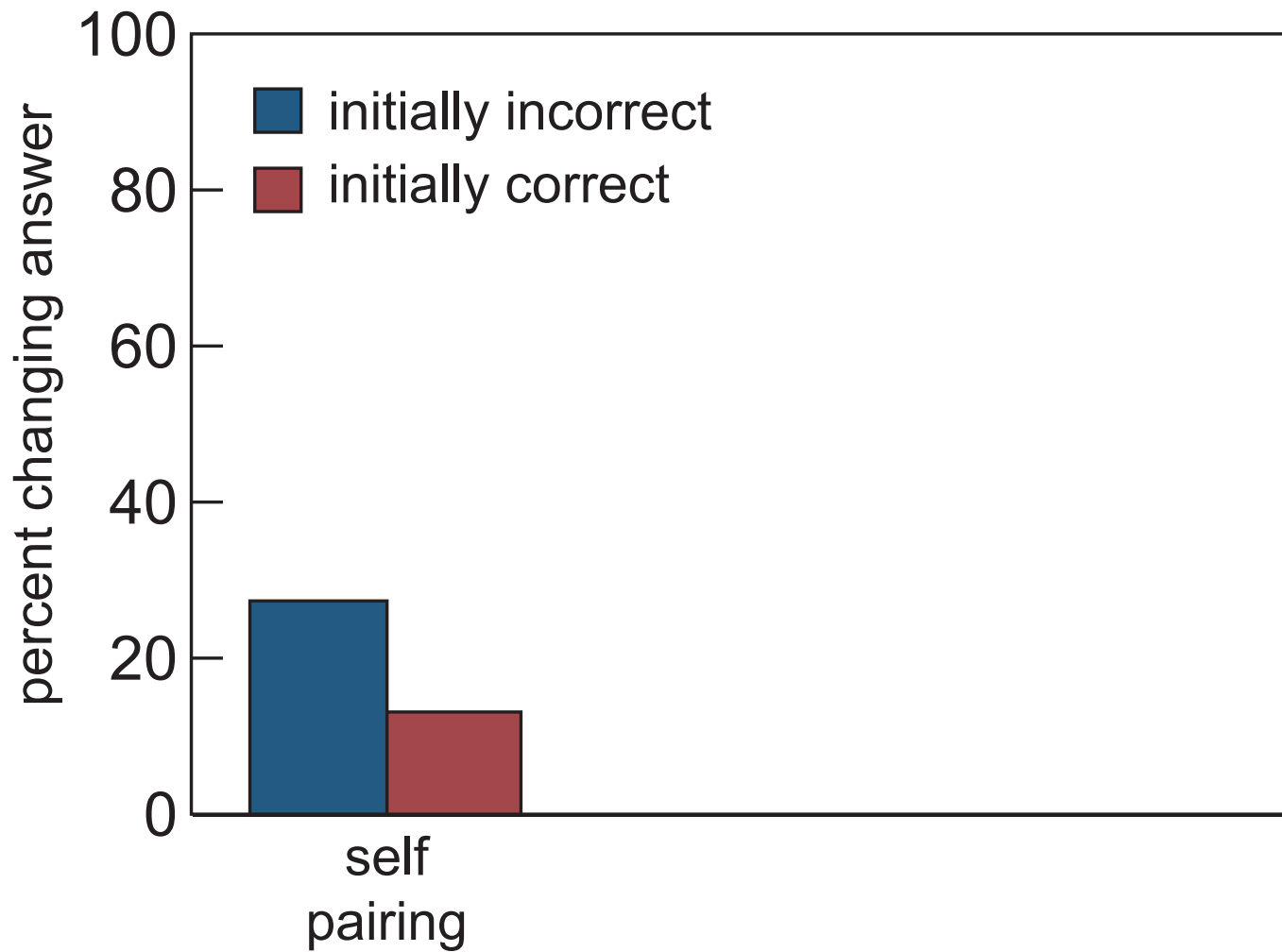
3 PI 2.0

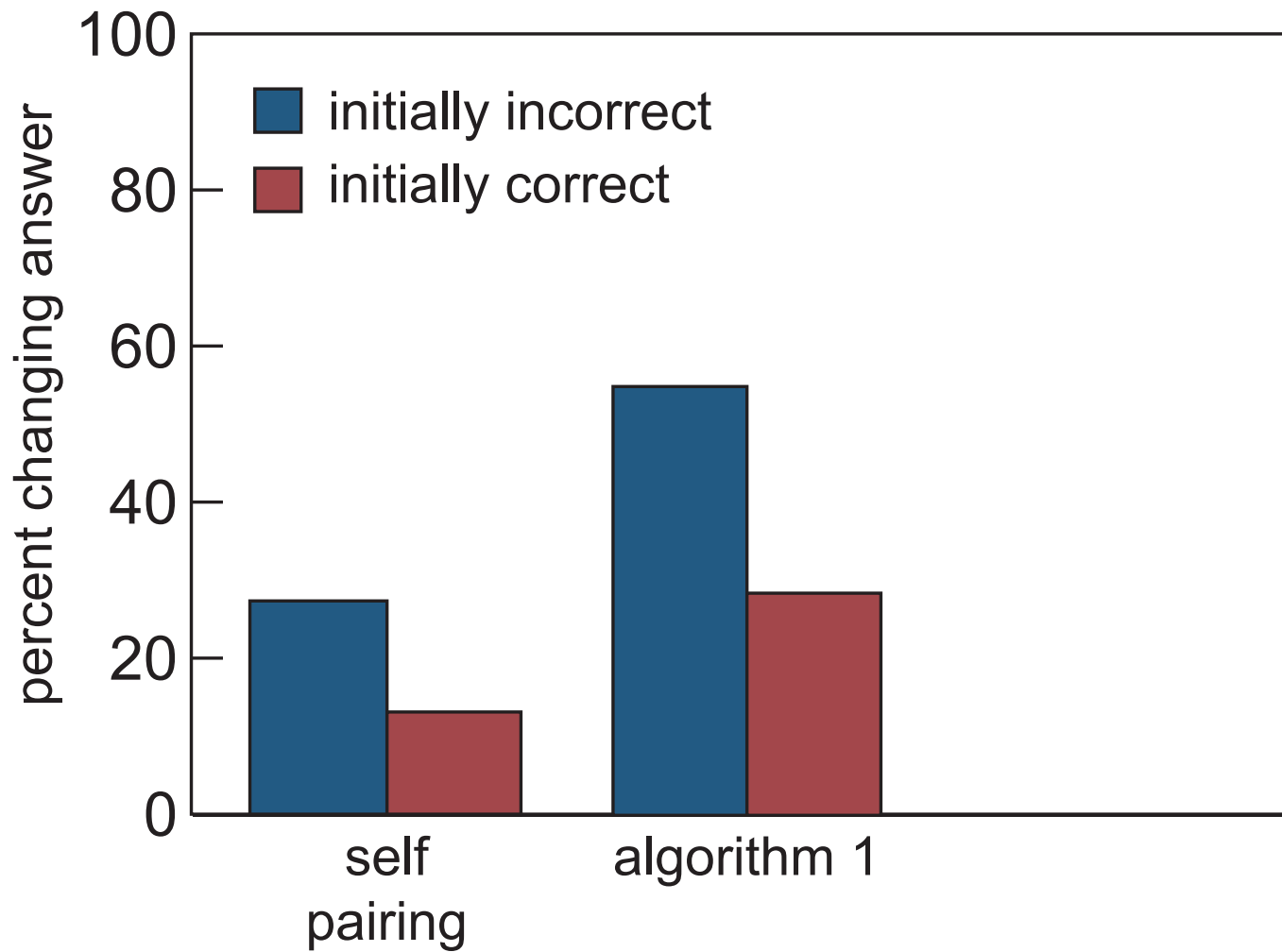


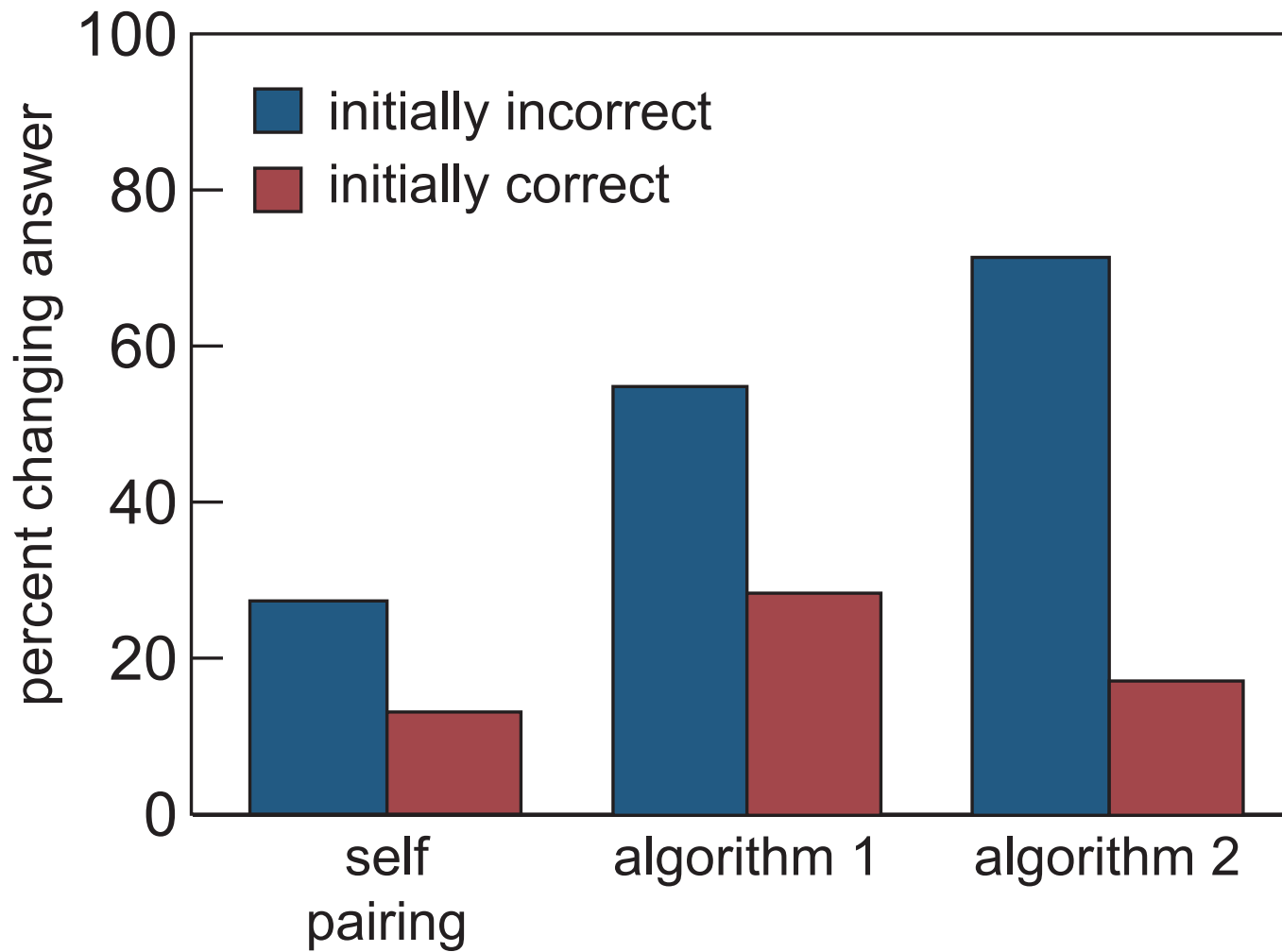
1 lecture

2 PI

3 PI 2.0









1 lecture

2 PI

3 PI 2.0



Education is not just about:

- **transferring information**
- **getting students to do what we do**



Education is not just about:

- **transferring information**
- **getting students to do what we do**

discovery & exploration a must!



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*



not technology, but pedagogy matters

1 education

2 PI

3 PI 2.0

IMMEDIATE FEEDBACK ASSESSMENT TECHNIQUE (IF AT)













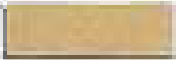






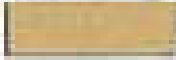





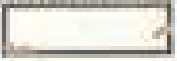

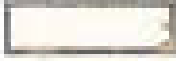
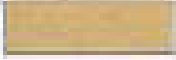

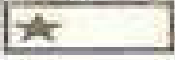





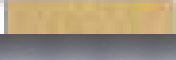
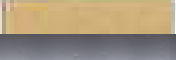
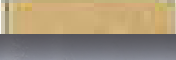
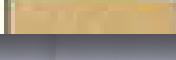
Name Team #3

Test # 1

Subject _____

Total 23

SCRATCH OFF COVERING TO EXPOSE ANSWER

	A	B	C	D	Score
1.					<u>4</u>
2.					<u>2</u>
3.					<u>4</u>
4.					<u>1</u>
5.					<u>4</u>
6.					<u>4</u>
7.					<u>0</u>
8.					<u>4</u>
9.					_____
10.					_____

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