

Why you can pass tests and *still* fail in the real world



CDIO Annual Meeting
Harvard University
Cambridge, MA, 12 June 2013



Why you can pass tests and *still* fail in the real world



@eric_mazur

CDIO Annual Meeting
Harvard University
Cambridge, MA, 12 June 2013



kosten

1. die Kosten (*pl.*)
2. kostbar

455

krank

1. die Krankheit, —, —en

COW

377

magnificent
glor

1. magnifice
2. master

430

das Kind, —(e)s, —er

1. kindisch
2. kindlich

der Kellner, —s, —

1. der Keller, —s, —

kennen

kannte-gekantt *irreg.*

1. kennen-lernen
2. erkennen
3. bekannt
4. der Bekannte (*adj.* as *n.*)

07

outh

verba

vet!

kosten

1. die Kosten (*pl.*)
2. kostbar

krank

die Krankheit, —, —en

kennen

1. kannte-gekant
2. erkennen
3. bekannt
4. der Bekannte (*adj.*, as n.)



**35% retained
after 1 week**



**we only guarantee
they'll pass the test**





5-minute university



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

...
...
...
...
...

...
...
...
...
...

...
...
...
...
...

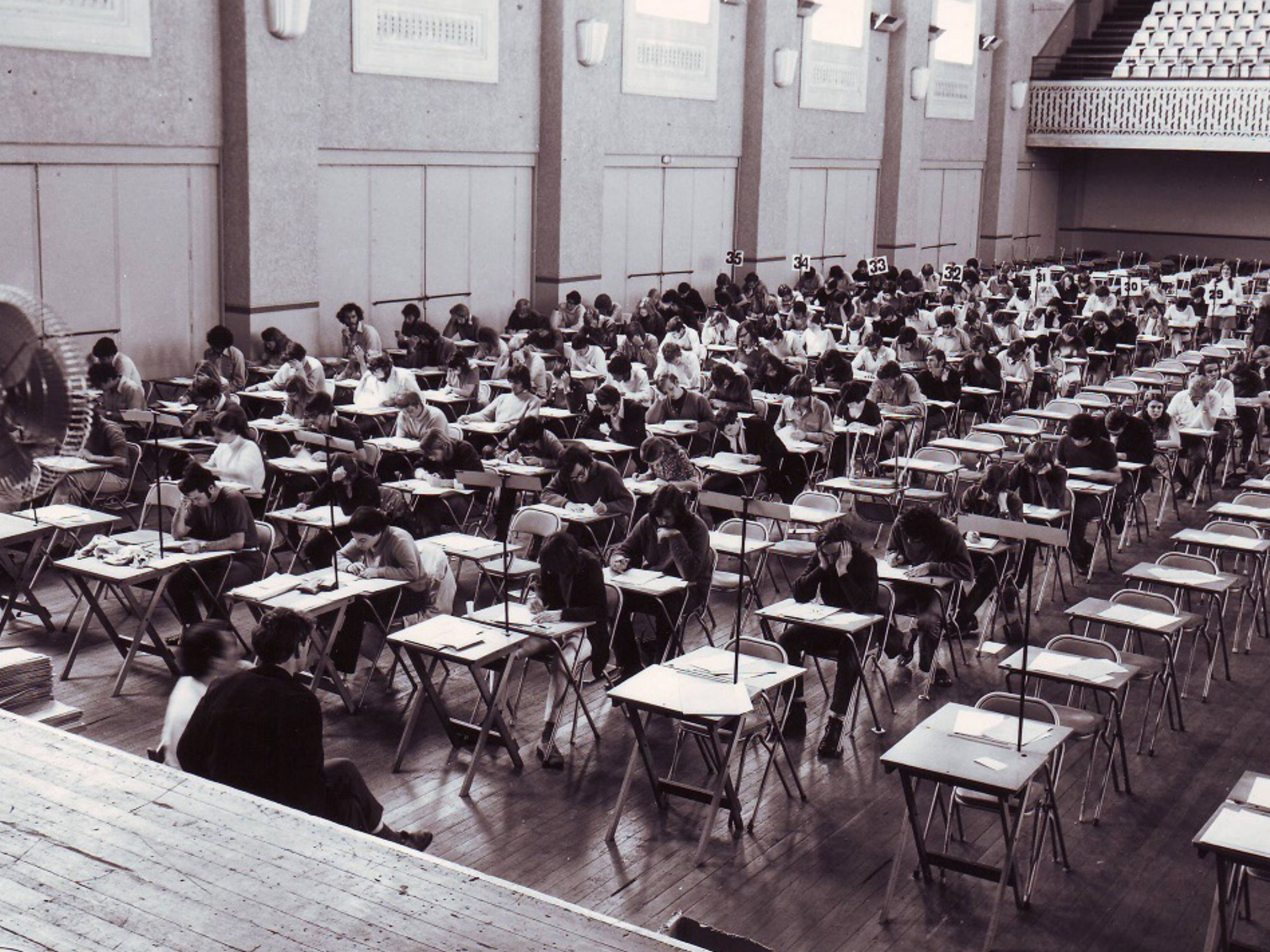
...
...
...
...
...


...
...
...
...
...

...
...
...
...
...

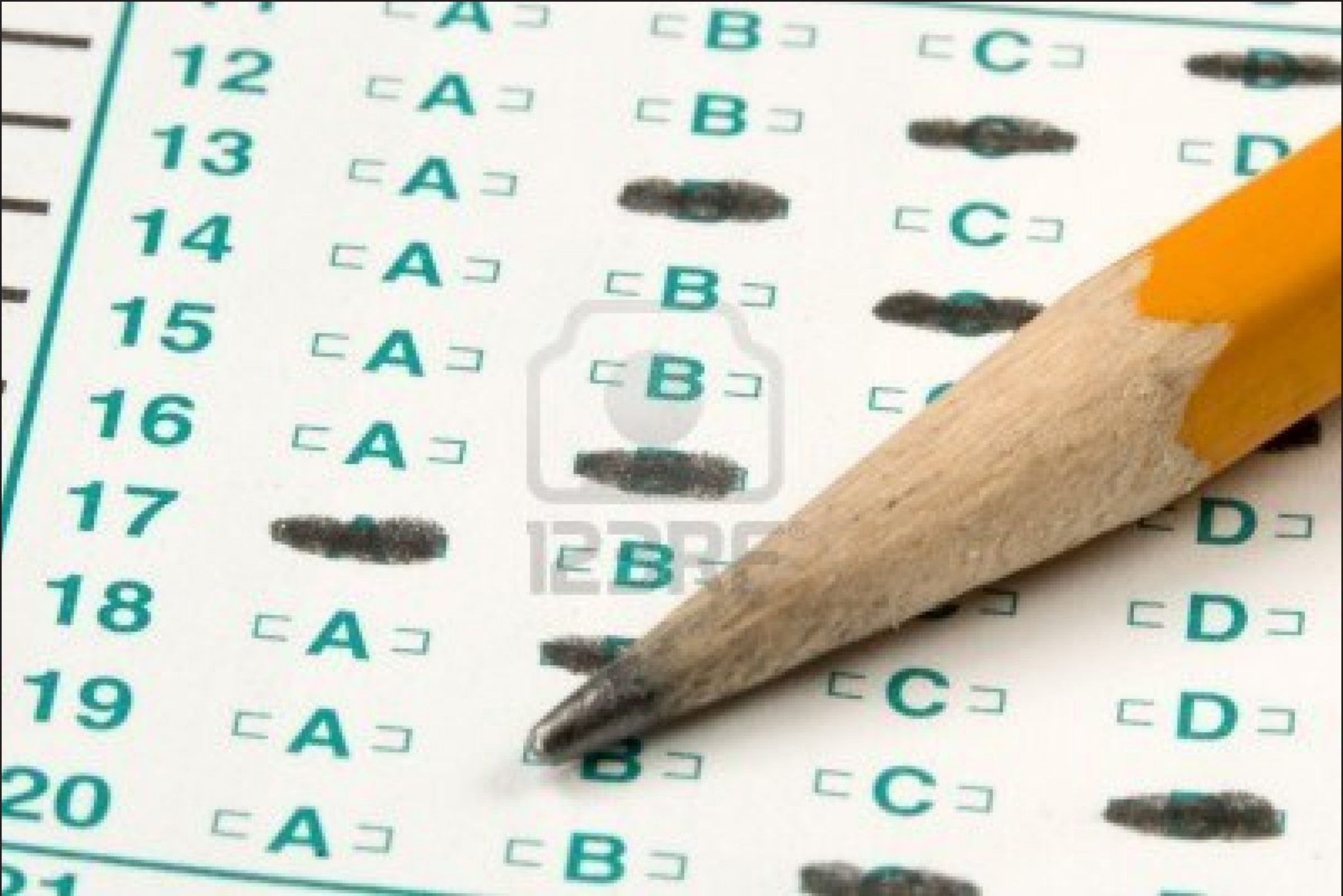








**assessment focussed on ranking and classifying,
not on developing 21st century skills**



1 what

2 how

3 when

what is the meaning/definition of...?

EDUCACION

inauthentic problem solving

EDUCACION

problem

EDUCACION

problem

outcome

EDUCACION

problem

outcome

KNOWN

EDUCACION

problem

solution

outcome

KNOWN

EDUCACION

problem

solution

outcome

UNKNOWN

KNOWN

EDUCACION

problem

solution

outcome

UNKNOWN → KNOWN

problem

problem

solution

outcome

UNKNOWN

KNOWN

problem

procedure

KNOWN

problem

solution

outcome

UNKNOWN

KNOWN

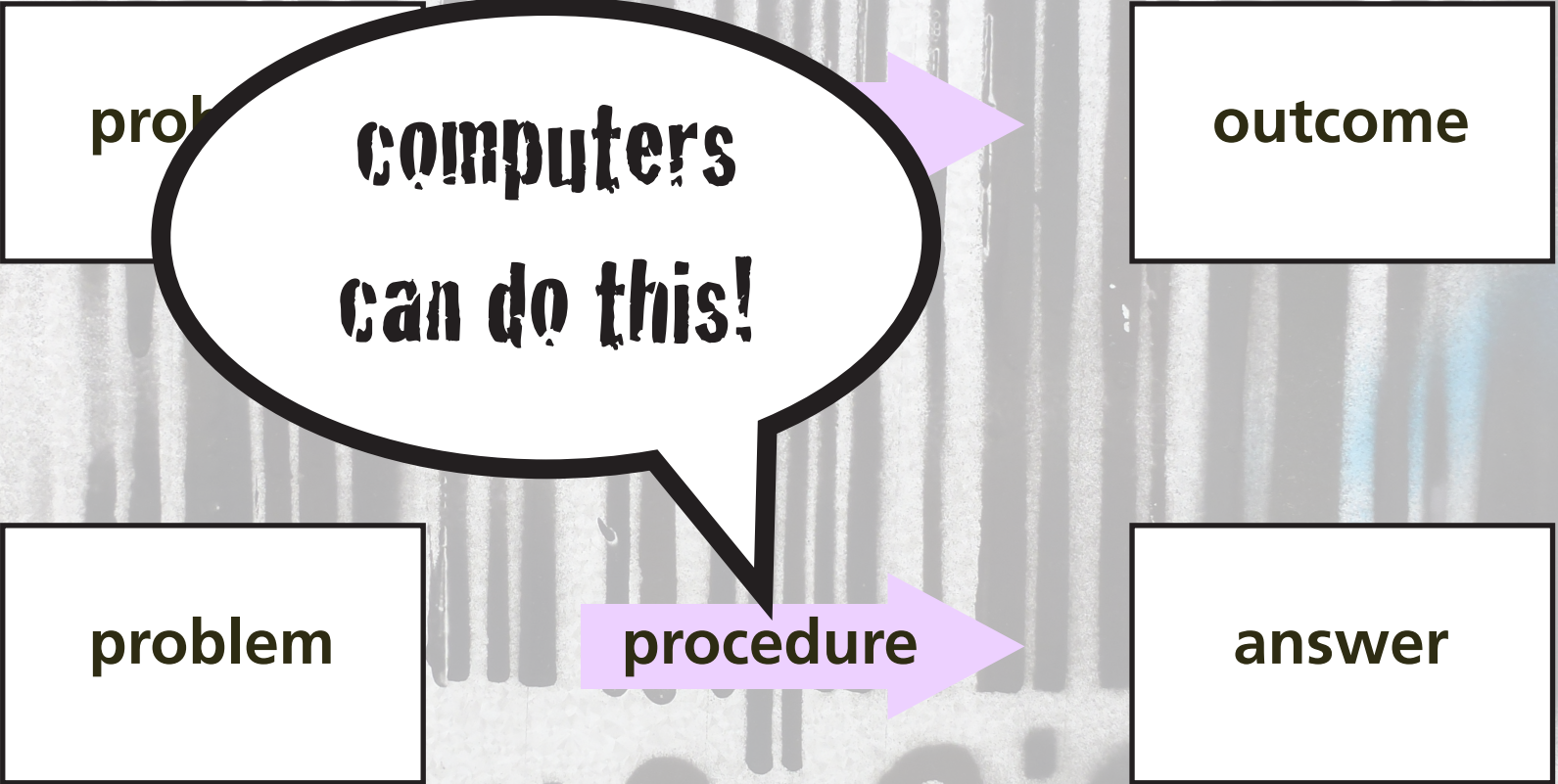
problem

procedure

answer

KNOWN

UNKNOWN







1 what

problem

solution

outcome

problem

pre... ver

REAL
problem solving

problem

approach 1

approach 3

approach 2

outcome

EDUCACION

problem

approach 1

approach 3

approach 2

outcome

grading incompatible with real problem solving



1 what

2 how



isolation

1 what

2 how



open-book exam

1 what

2 how

Google™

1 what

2 how



1 what

2 how

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.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>4</u>
2.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>2</u>
3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>4</u>
4.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>1</u>
5.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>4</u>
6.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>4</u>
7.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>0</u>
8.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<u>4</u>
9.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u> </u>
10.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u> </u>

1 what

2 how



1 what

2 how

session 445949

This is the team round. If you respond to a question, it will count for your entire team (you, Brent Jones, Beth Sawyer, and team should respond to each question (otherwise it will count as multiple attempts).



Jump to ▾

1

2

[+ Show my team's responses](#)

6x-6

Brian Lukoff

6x

Brent Jones

6x-6

Beth Sawyer

6x^2-6

Kip Harmon

expression question

What is the derivative of $f(x) = 3x^2 - 6x$?

Submit response

For example, enter x^2 for x^2 , $\ln(y) - \sin(x)$ for $\ln y - \sin x$, $x/(y+1)$ for $\frac{x}{y+1}$, $(1/2)x$ for $\frac{1}{2}x$, etc.

0/2 questions attempted, 0/0 possible points so far in team round [Score details](#)

Current team: Blue team [Change team](#)

[Change seat](#)

[Send a message to the instructor](#)

[Join](#)

1 what

2 how



1 what

2 how

④ We will use spherical coordinates:

$0 \leq \rho \leq 4$, $0 \leq \theta \leq 2\pi$, $0 \leq \varphi \leq \pi$. The integral is thus:

$$\int_{\rho=0}^4 \int_{\theta=0}^{2\pi} \int_{\varphi=0}^{\pi} (\rho \cos \varphi) (\rho^2 \sin \varphi) d\varphi d\theta d\rho$$

$$= \left\{ \int_{\rho=0}^4 \rho^3 d\rho \right\} \left\{ \int_{\theta=0}^{2\pi} d\theta \right\} \left\{ \int_{\varphi=0}^{\pi} \sin(2\varphi) d\varphi \right\} = \boxed{0}$$

Since the third integral equals 0.

⑤ Direction vectors for the plane are

$$(1) \quad (1) \quad (0) \quad (0) \quad (1) \quad (-1)$$

1 what

2 how

3 when

high-stakes examinations promote cramming



1 what

2 how

3 when



information stored in short-term memory



1 what

2 how

3 when

no retention

information stored in short-term memory

no transfer

1 what

2 how

3 when

④ We will use spherical coordinates:

$0 \leq \rho \leq 4$, $0 \leq \theta \leq 2\pi$, $0 \leq \phi \leq \pi$. The integral is thus:

$$\int_{\rho=0}^4 \int_{\theta=0}^{2\pi} \int_{\phi=0}^{\pi} (\rho \cos \phi) (\rho^2 \sin \phi) d\phi d\theta d\rho$$

high-stakes assessment:

silent killer of educational innovation

$$= \left\{ \int_{\rho=0}^4 \rho^3 d\rho \right\} \left\{ \int_{\theta=0}^{2\pi} d\theta \right\} \left\{ \frac{1}{2} \int_{\phi=0}^{\pi} \sin(2\phi) d\phi \right\} = \boxed{0}$$

Since the third integral equals 0.

⑤ Direction vectors for the plane are

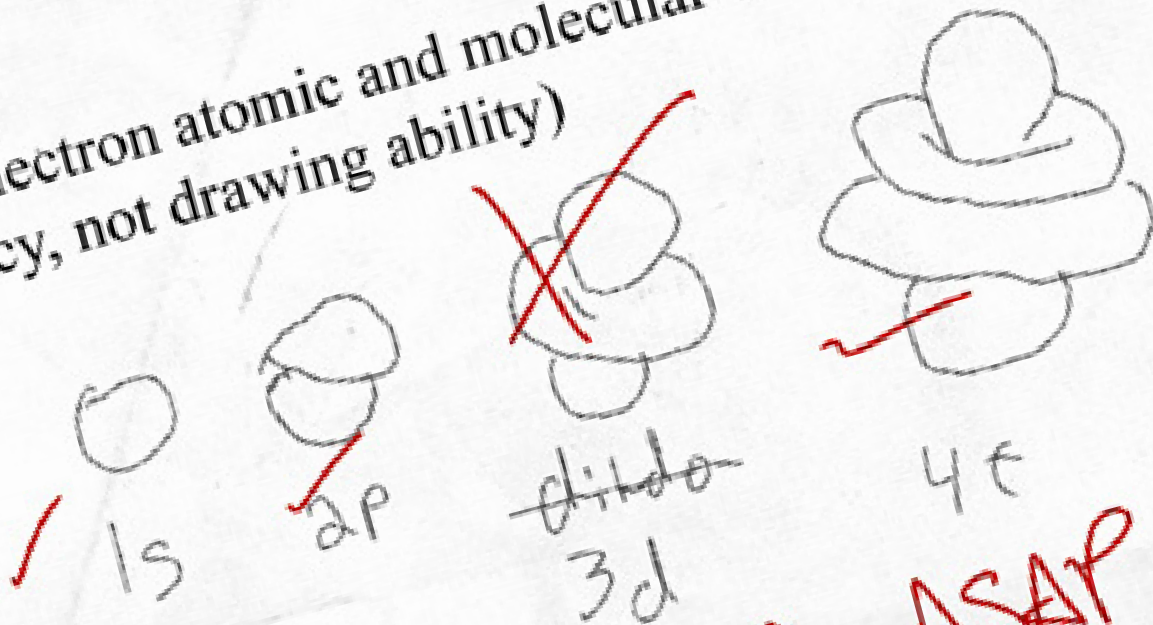
$(1) \quad (1) \quad (0) \quad (0) \quad (1) \quad (-1)$

chemical (what
m + proportion of plev
related, I saw my T.A., Jimmy, kissing
chemical reaction does one of two things to involved substance

MICK INFRONT OF
UNWEAVING A WHITE
VICTORIAN SECRET
A CREDIT
inappropriate

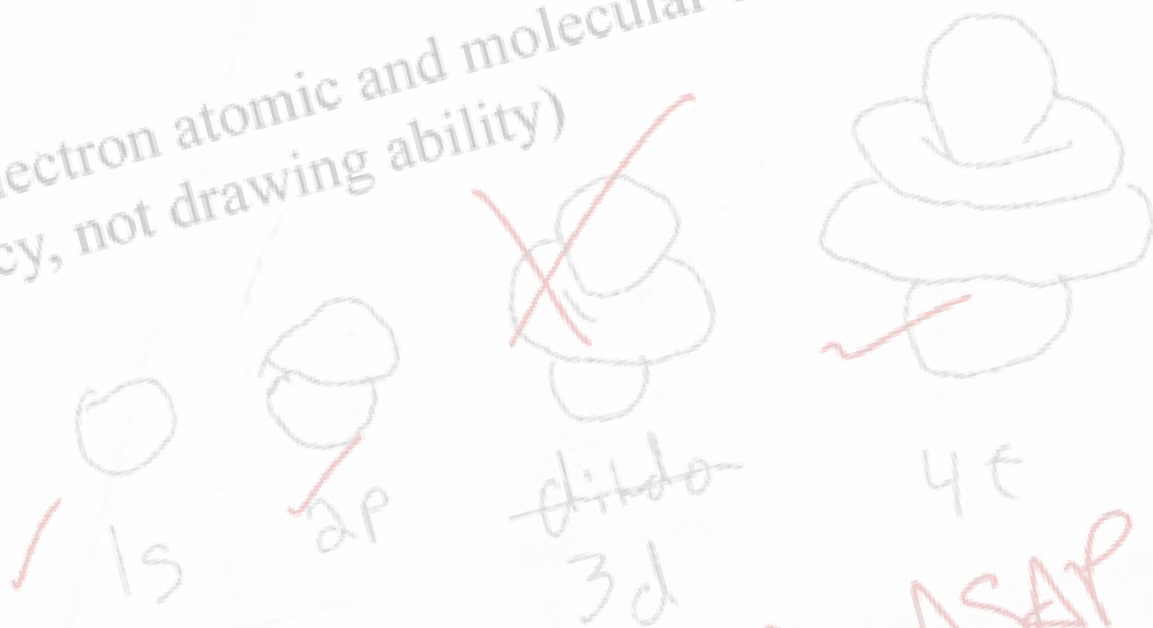
INCREASES OR DECREASES THE
ENERGY OF THE SUBSTANCE
THE FORM OF HEAT OR LIGHT

a representation of electron atomic and molecular orbitals 1s, 2p, 3d and 4f.
more not based on accuracy, not drawing ability)



soo me
ASAP

grades: measure of standing relative to others



1 what

2 how

3 when

grades: measure of standing relative to others

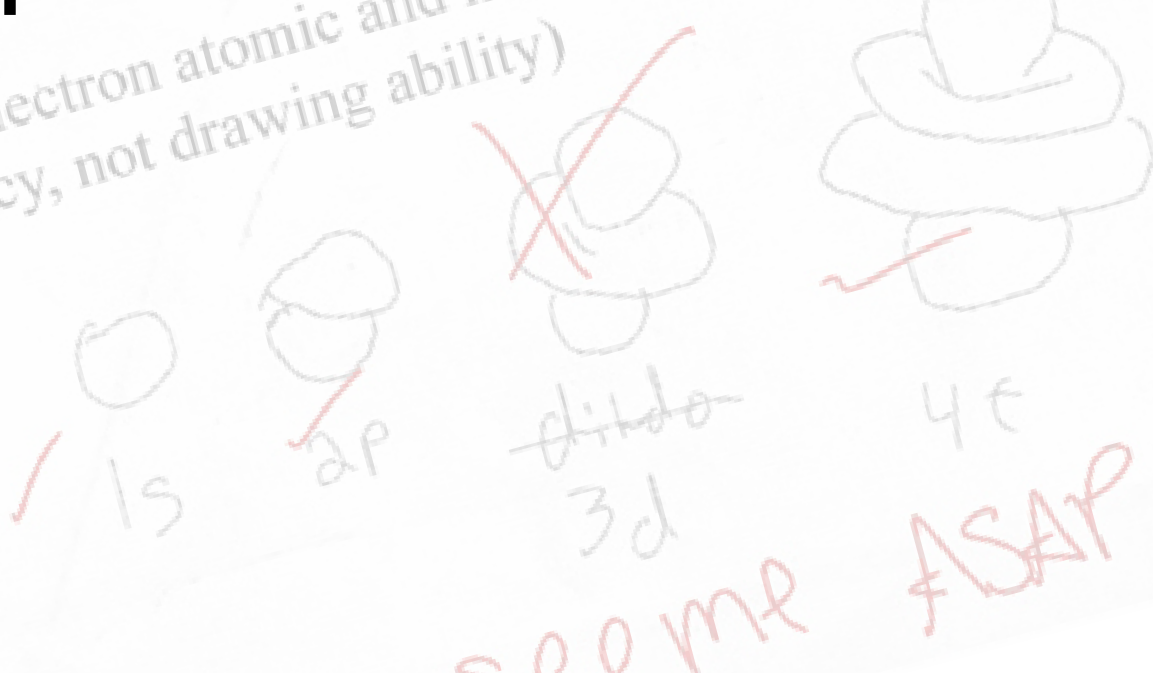
feedback: reflection on what has been learnt



soo me

ASAP

peer- and self-assessment



1 what

2 how

3 when

Calibrated Peer Review

cpr.molsci.ucla.edu

1 what

2 how

3 when

Calibrated Peer Review

- upload work

cpr.molsci.ucla.edu

1 what

2 how

3 when

Calibrated Peer Review

- upload work
- rubric-based scoring of 3 calibrated pieces

cpr.molsci.ucla.edu

1 what

2 how

3 when

Calibrated Peer Review

- upload work
- rubric-based scoring of 3 calibrated pieces
- scoring of work by 3 peers

cpr.molsci.ucla.edu

1 what

2 how

3 when

Calibrated Peer Review

- upload work
- rubric-based scoring of 3 calibrated pieces
- scoring of work by 3 peers
- scoring of own work

cpr.molsci.ucla.edu

1 what

2 how

3 when



A large, empty classroom with rows of desks and chairs. The room has a light blue floor with yellow and red lines. The walls are light-colored wood paneling. The text "rethink assessment" is overlaid in the center in a large, bold, black font with a blue outline.

**rethink
assessment**



...so it supports learning

A large, empty classroom with rows of desks and chairs. The room has a light blue floor with yellow and red lines. The walls are light-colored wood paneling. There are several doors in the background. The text is overlaid on the image.

...so it supports learning

- focus on skills, not content**

A large, empty classroom with rows of desks and chairs. The room has a light blue floor with yellow and red lines. The walls are light-colored wood paneling. There are several doors in the background. The text is overlaid on the image.

...so it supports learning

- focus on skills, not content**
- change assessment environment**

A large, empty classroom with rows of desks and chairs, suggesting a focus on learning environment. The room has a blue floor with yellow and red lines, and a wooden wall with a whiteboard and doors in the background.

...so it supports learning

- focus on skills, not content**
- change assessment environment**
- encourage ownership of learning**



mazur.harvard.edu

Follow me!  [eric_mazur](https://twitter.com/eric_mazur)

The background of the slide features a close-up of a person's face, specifically their eyes and nose, looking through horizontal window blinds. The blinds are partially open, creating a grid-like pattern over the face. The lighting is soft, and the colors are muted, with the person's skin appearing pale and the eyes a light, hazy blue. The overall mood is contemplative and focused.

More details this afternoon:

Show case (including RAA demo)

3 pm, Pierce Hall 301

Must bring web-enabled device

mazur.harvard.edu

Follow me!  [eric_mazur](https://twitter.com/eric_mazur)