Effective Activities Just Before Class

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CO/WY AAPT 2014 Spring Meeting
April 12, 2014 ★ ★ ★ University of Colorado, Boulder

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EARTH • ENERGY • ENVIRONMENT

Underwater Basket Weaving

People have long used the term "underwater basket weaving" to mean

- a trivial activity,
- an easy academic study,
- or simply a waste of time.

However, recent studies support classical claims that underwater basket weaving is an accessible and constructive outlet for creativity.

Can we offer our students similar creative activities just before class?

Motivation

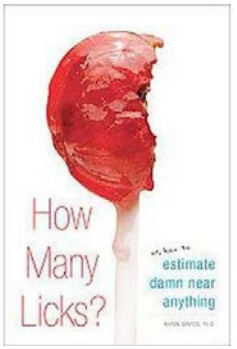
How do we motivate students to attend class, arrive on time, put away their cell phones and computers, or simply develop a better connection to our courses?

Our instructional times are usually so tightly scheduled that we have little room outside these periods to share out-of-the-box ideas with our students.

Today's "Talk"

This contributed "talk" serves to promote a dialog where we will discuss effective activities we have used that engage students in meaningful exercises during the five minutes before class begins.

Estimation Questions



Also known as “Fermi Questions”

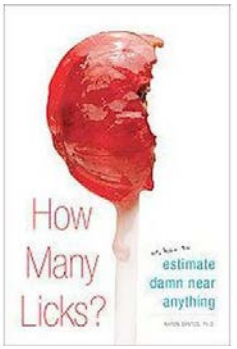
Simply “order of magnitude” approximations

How Many Licks, by Aaron Santos

Fermi Questions, by Larry Weinstein (*TPT*)

- How many teeth are in this room?
- What is the Earth’s circumference?
- How much would it cost to wrap the Statue of Liberty in wrapping paper?
- How many licks does it take to get to the Tootsie Roll center of a Tootsie Pop?
- How long will it take before the whole surface of the earth is covered in gravestones?

Estimation Questions



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How Many Licks, by Aaron Santos

Fermi Questions, by Larry Weinstein (*TPT*)

- How many teeth are in this room? Let's do this!
- What is the Earth's circumference? ~ 24,000 miles
- How much would it cost to wrap the Statue of Liberty in wrapping paper? ~$360 (p. 75)
- How many licks does it take to get to the Tootsie Roll center of a Tootsie Pop? ~ 800 licks (p. 92)
- How long will it take before the whole surface of the earth is covered in gravestones? ~ 1.1 million years (p. 118)

Figuring Physics – Paul Hewitt (*TPT*)

FIGURING PHYSICS

Wind turbines produce power by extracting energy from moving air to turn generators and generate electricity. When the wind speed doubles, the power produced

A. doubles.
B. quadruples.
C. is eight times greater.

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FIGURING PHYSICS

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C. is eight times greater.

Answer: C.

When the wind speed doubles, each kilogram of moving air has four times as much kinetic energy, *and* twice as many kilograms of air strike the turbine each second. Twice the mass of moving air per second passing through the turbine, with each unit of mass carrying four times the kinetic energy, is eight times as much kinetic energy transformed to electrical energy each second. That's **eight times as much power**.

The wind turbine cannot extract *all* of the kinetic energy from the air moving through its swept area. Why? If it could, then the air on the downwind side of the turbine would be stopped and there would be no way for the next parcel of air to come through. It so happens that the maximum efficiency of a wind turbine is 59.3%, known as the Betz limit.

HEWITT DREW IT!

JUMBLE Puzzles

JUMBLE

THAT SCRAMBLED WORD GAME
by David L. Hoyt and Jeff Knurek

Unscramble these four Jumbles,
one letter to each square,
to form four ordinary words.

BANIC

OGAME

TANEDT

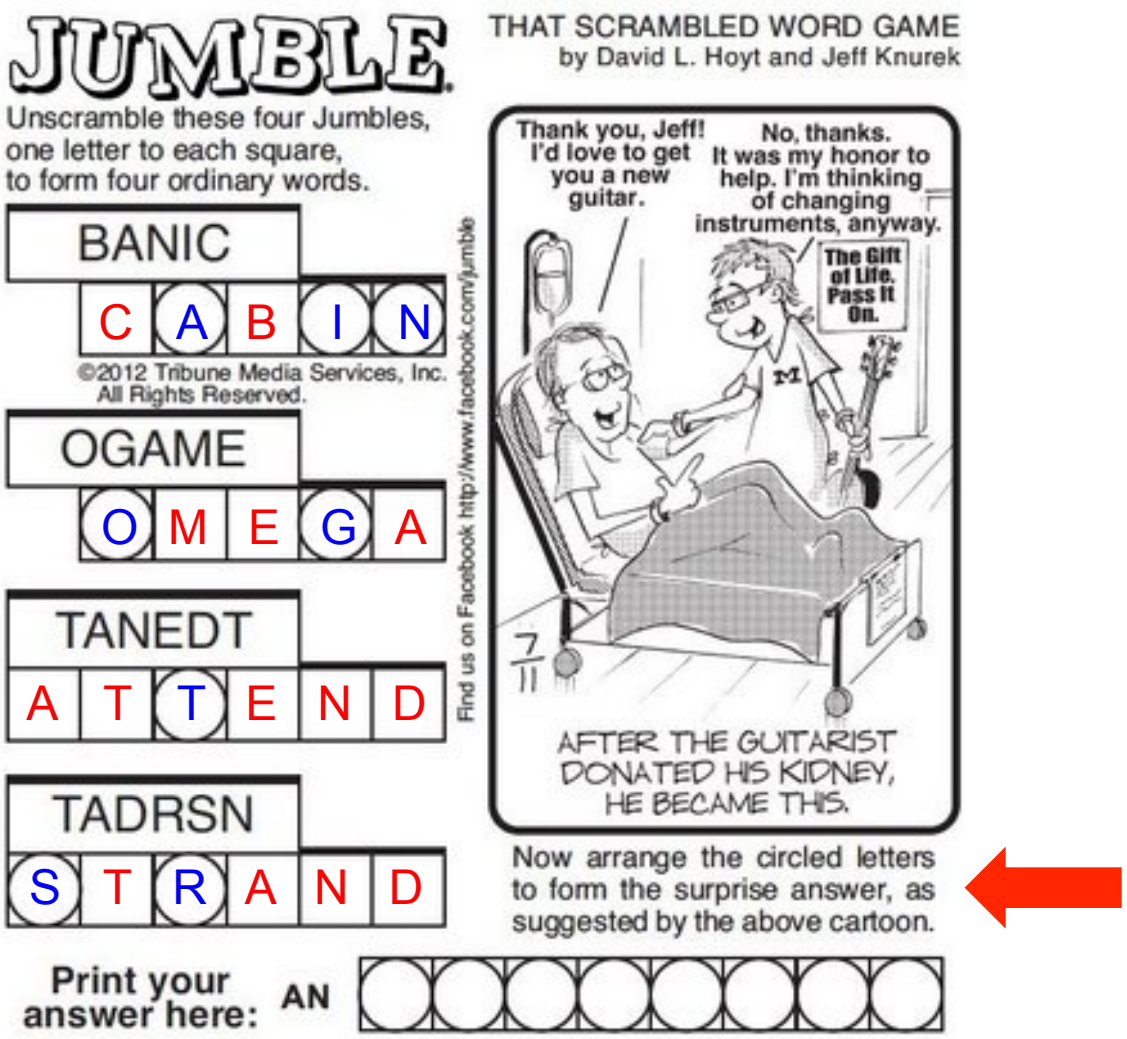
TADRSN

Find us on Facebook http://www.facebook.com/jumble

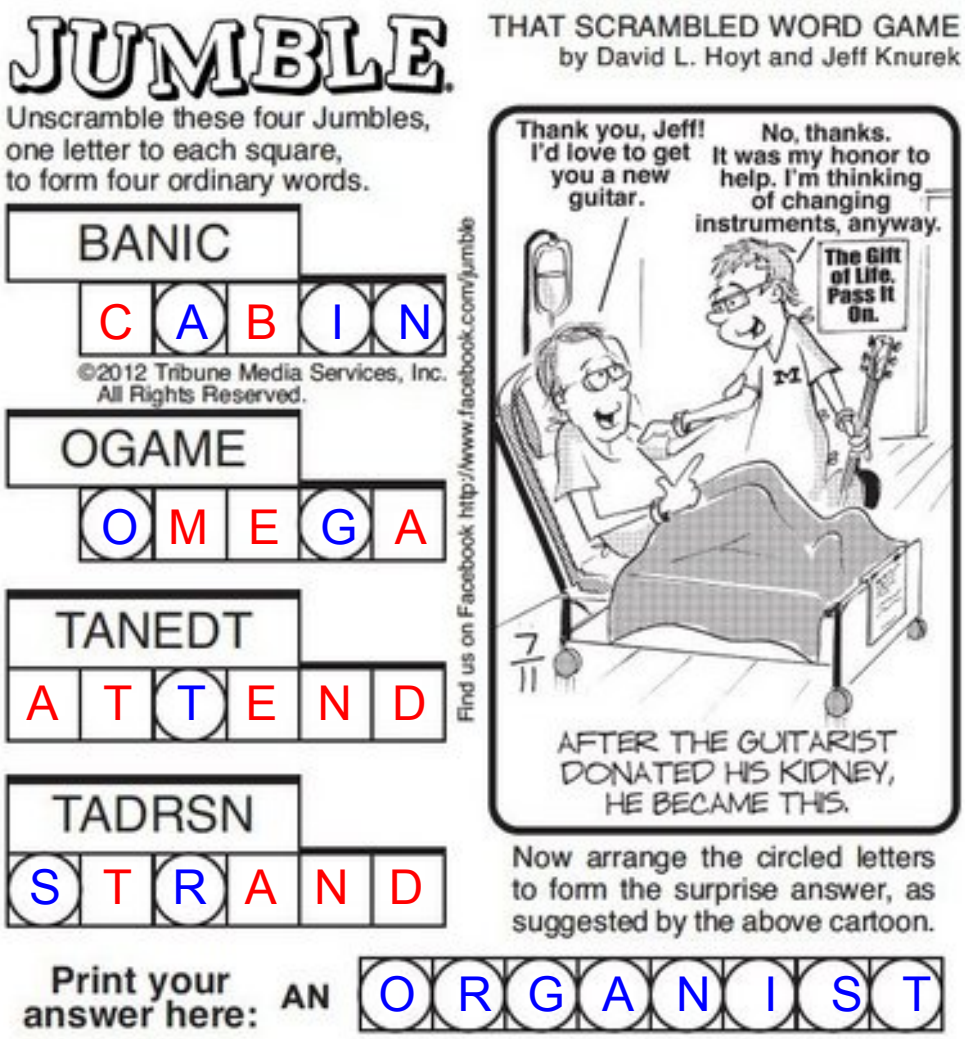
Now arrange the circled letters
to form the surprise answer, as
suggested by the above cartoon.

Print your answer here: AN

JUMBLE Puzzles



JUMBLE Puzzles

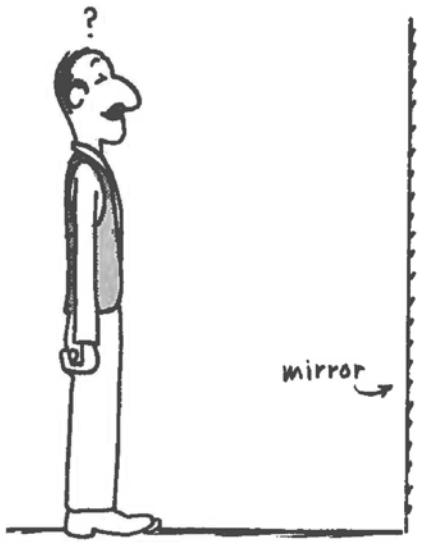


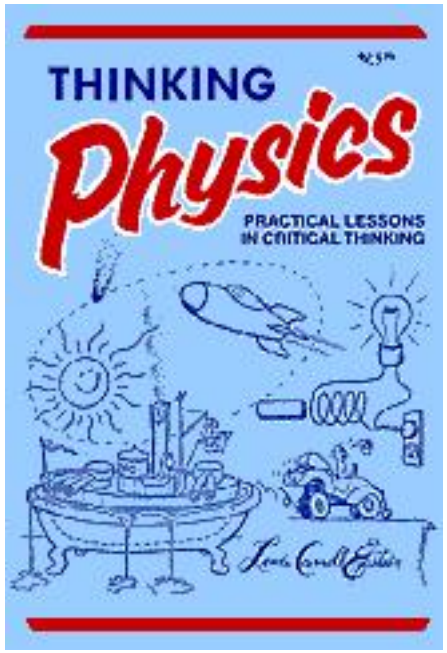
Thinking Physics – Lewis Carroll Epstein

PLANE MIRROR

What must be the minimum length of a plane mirror in order for you to see a full view of yourself?

a) One-quarter your height
b) One-half your height
c) Three-quarters your height
d) Your full height
e) The answer depends on your distance.





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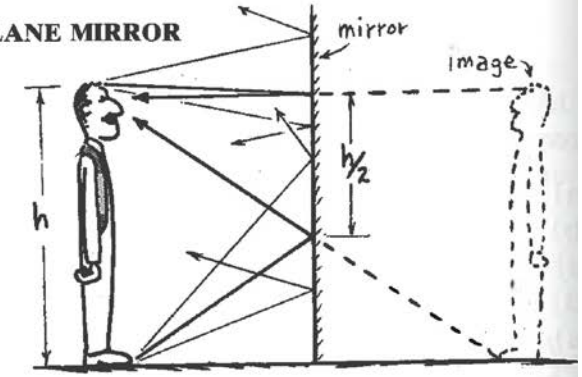
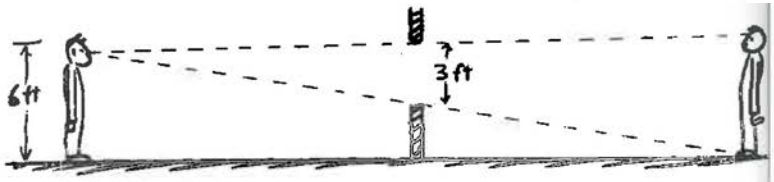
ANSWER: PLANE MIRROR



The answer is: b. Exactly one-half your height. Why? Because for reflection, the angle of incidence is equal to the angle of reflection. Consider a man standing in front of a very large mirror as shown in the sketch. The only rays of light from his shoes to encounter his eyes are those that are incident upon the mirror at a level halfway up from ground level to eye level. Rays of "shoe light" that are incident higher reflect above his eyes and rays incident lower reflect below his eyes. So the part of the mirror below the halfway level is not needed — it shows only a reflection of the floor in front of his feet. Similarly for the top part of the mirror. The only rays to reach his eyes from the top of his head are those that are incident upon the mirror halfway between the top of his head and his eye level. The part of the mirror above this is not needed. So the portion of the mirror useful for seeing his image lies halfway above his eye level to the top of his head, to halfway below his eye level to his toes — that's half his height.



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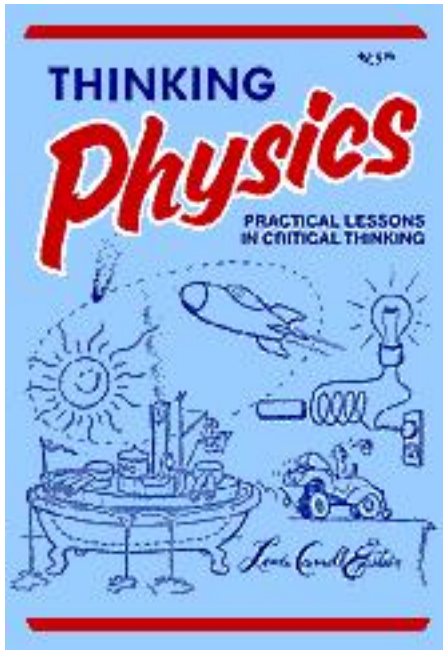
b) One-half your height



Quarter-Sheet Questions – John Hubisz

***The Physics Teacher*, Vol. 48, Issue 2, pp. 138-139 (Feb 2010)**

Students write one question (on ¼ sheet of paper) they've always wanted to ask, but never got the chance.

There are no restrictions on the type of question.

Collect papers and answer questions as you walk around the room. The name of the questioner is never revealed.

Questions fall into distinct categories: personal, factual, off-the-wall weird, straight physics, solution to a particular problem, and help with a physics concept.

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Other Ideas

Current events (New York Times, Science, etc.)

Significant achievements in the history of physics

Short biographies of famous physicists

YouTube Physics, by Diane Riendeau (*TPT*)

THE END

What **Effective Activities Just Before Class** have worked for you?