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PEER INSTRUCTION: DISCUSSION AND "BRAINS-ON" DEMONSTRATION

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Conference of Physics Department Chairs
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OUTLINE

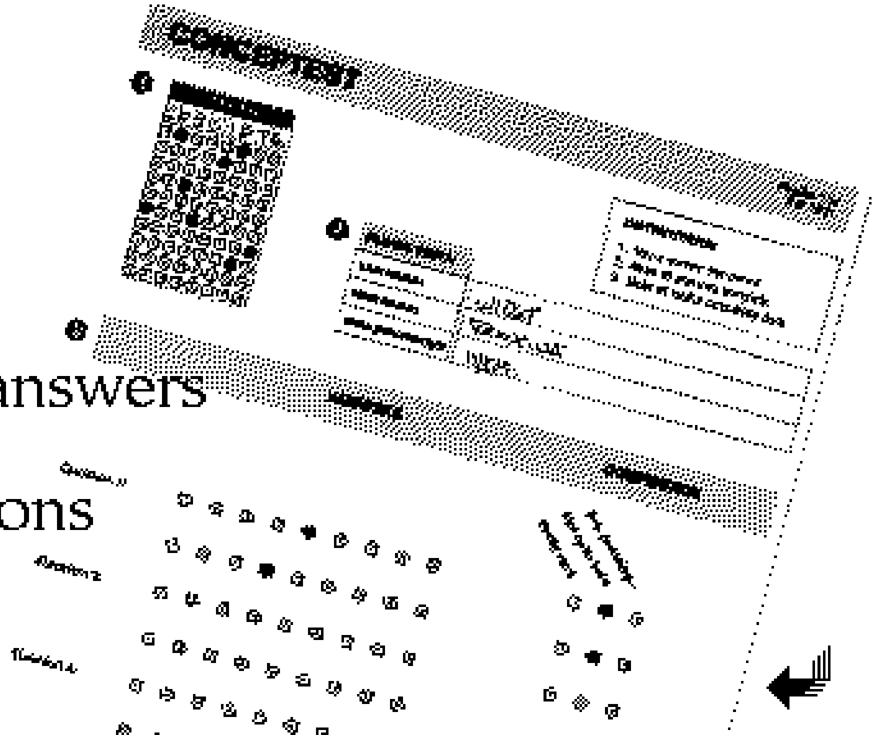
1. Feedback
2. ConcepTests
3. Problems with problems
4. Discussion

FEEDBACK

Methods:

- show of hands
- scanning forms
- palmtops / calculators
- flashcards

FORMS



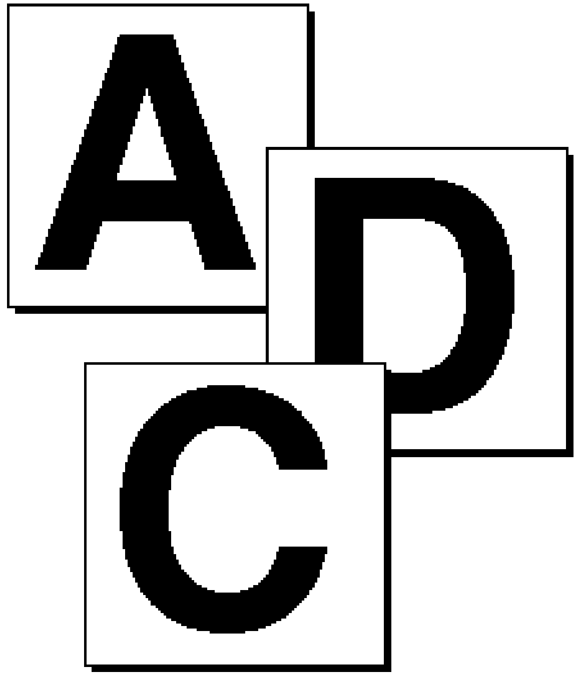
- record of answers
- test questions

CLASSTALK

HP95LX

FLASHCARDS

- simple & cheap
- effective



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Question 1

The specific heat at constant volume for a monatomic crystal approaches zero at low temperature even though the specific heat for a monatomic gas remains $\frac{3}{2}k$ per atom. Why is this so?

1. Potential energy doesn't play a role for the monatomic gas, but it does for the crystal.

2. The particles are indistinguishable in the gas, but not in the crystal.

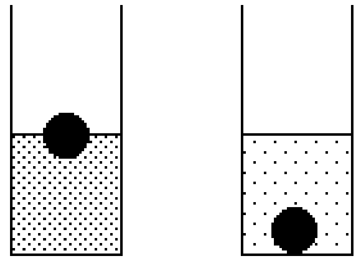
3. The energy difference between allowed states for the crystal is much larger than it is for the atoms.

Message 1

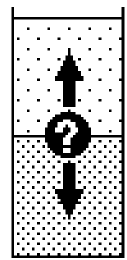
It's easy to engage the audience!

Question 2

Consider an object that floats in water but sinks in oil. When the object floats in water, half of it is submerged.



If we slowly pour oil on top of the water so it completely covers the object, the object



1. moves up.
2. stays in the same place.
3. moves down.

Message 2

It's easy to make simple demonstrations fascinating!

Question 3

When we hold a page of printed text in front of a mirror, the text on the image in the mirror runs from right to left.

Why is it that right and left are interchanged and not top and bottom? Because

1. the mirror is oriented vertically,
2. we have two eyes in the horizontal plane,
3. the Earth's gravitation is directed downwards,
4. a habit we have when looking at images in a mirror,
5. of some other reason.

Message 3

It's "simple" only if you know the answer!

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The problem with problems

On a Saturday afternoon, you are pulling into a parking lot with unmetered spaces. You circle around but there are no empty spots. You decide to wait at one part of the lot from where you can see (and command) about 20 spaces.

How would you go about figuring out how long you will have to wait before someone will free up a space?

Requires assumptions
Requires developing a model
Requires applying that model

The problem with problems

On a Saturday afternoon, you are pulling into a parking lot with unmetered spaces. You circle around but there are no empty spots. You decide to wait at one part of the lot from where you can see (and command) about 20 spaces. On average people shop for about 2 hours.

How long will you have to wait before someone will free up a space?

Requires developing a model
Requires applying that model

The problem with problems

On a Saturday afternoon, you are pulling into a parking lot with unmetered spaces. You circle around but there are no empty spots. You decide to wait at one part of the lot from where you can see (and command) about 20 spaces. On average people shop for about 2 hours.

If people leave at regularly spaced intervals, how long will you have to wait before someone will free up a space?

Requires applying a model

The problem with problems

On a Saturday afternoon, you are pulling into a parking lot with unmetered spaces. You circle around but there are no empty spots. You decide to wait at one part of the lot from where you can see (and command) about 20 spaces. On average people shop for about 2 hours.

How long will you have to wait before someone will free up a space?

Requires using a calculator

$$t_{wait} = \frac{T_{shop}}{N_{spaces}}$$

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