

Example Clicker Questions

From Stephanie Chasteen

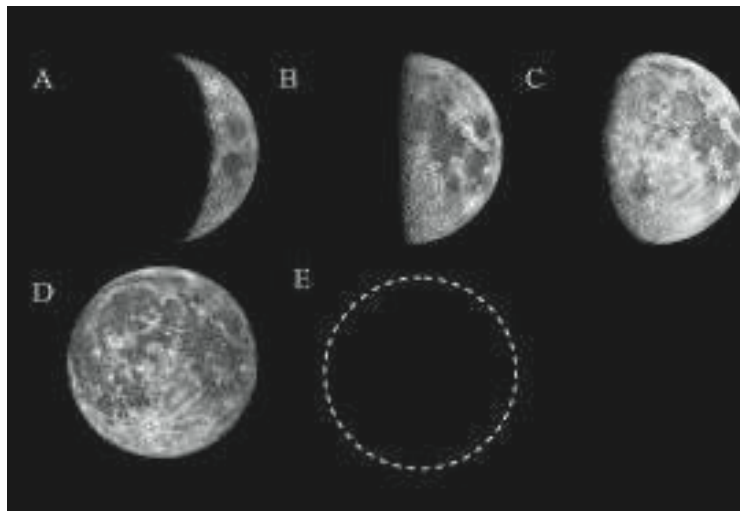
The gentle art of questioning; Writing great clicker questions

1. Using images
2. Conceptual examples based on student difficulties
3. Surveys
4. Reasoning behind the answer is what we're looking for / more than one right answer
5. Application of an idea to a situation

Group 1

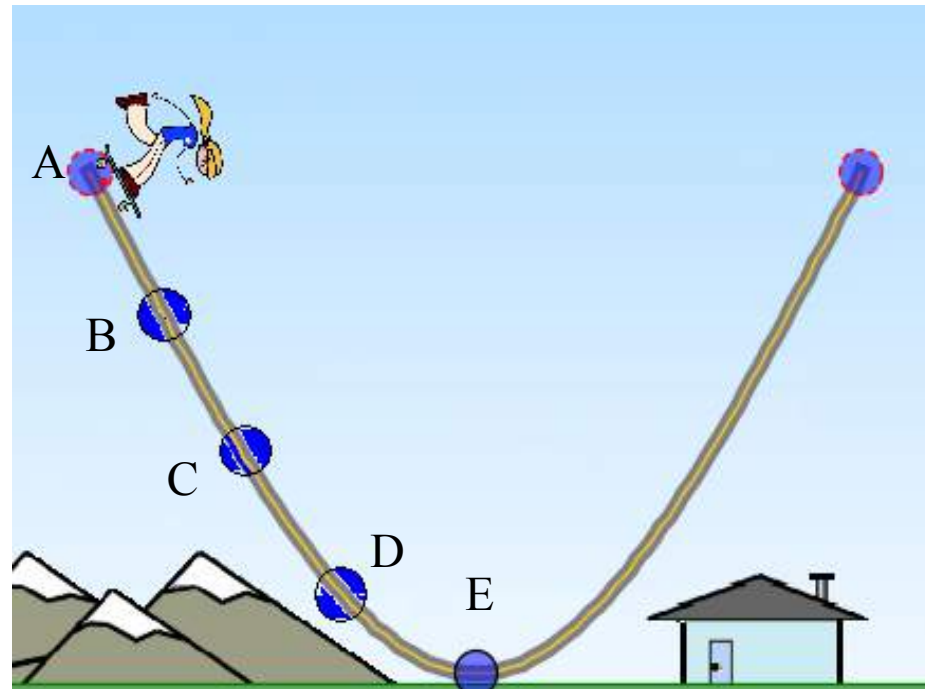
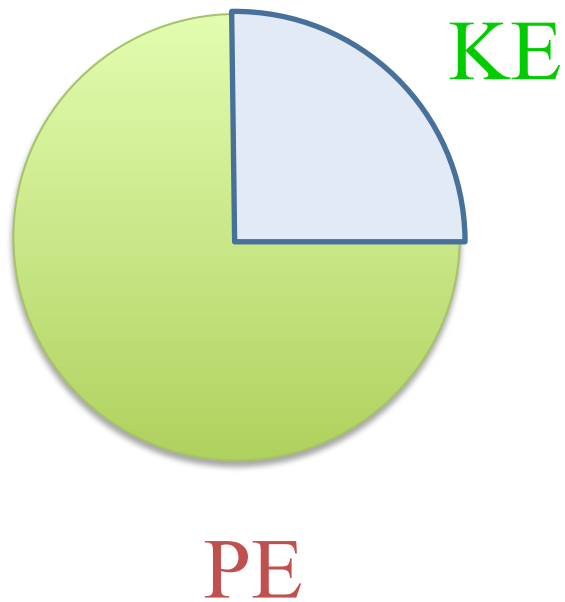
What is a common or unifying theme in this set of questions? (You may list more than one but I have just one in mind)

You look to the eastern horizon as the Moon is rising and discover that it is in the new moon phase. Later that same day when the moon is setting, **which of the moon phases shown below would the Moon have looked like?**



Center for Astronomy Education, Ed Prather

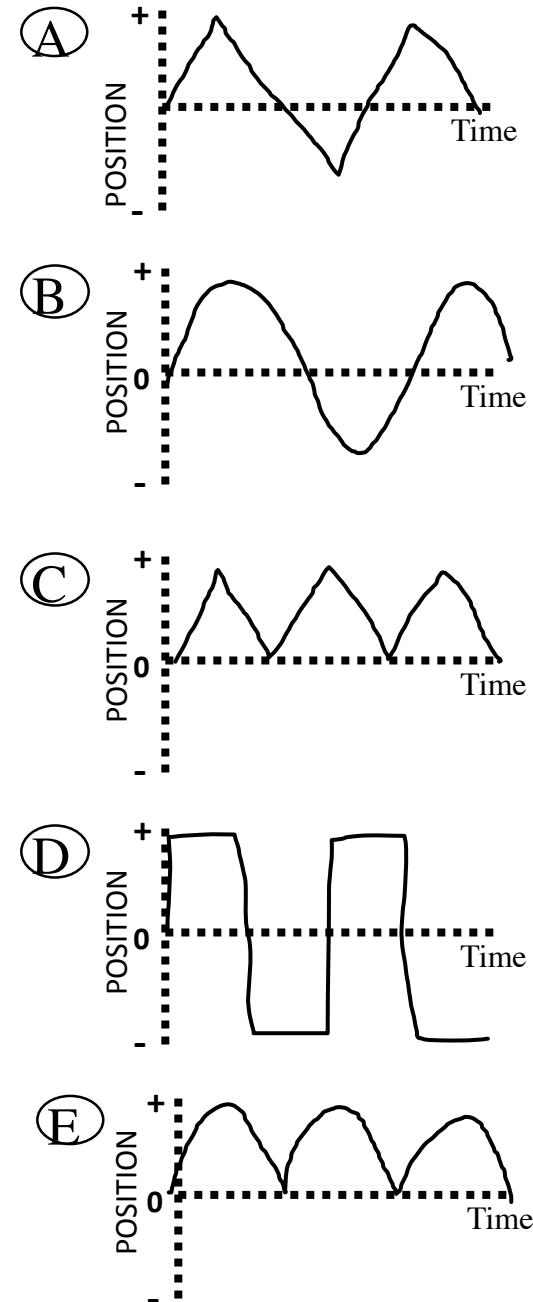
The pie graph shows the energy of the Skater, **where could she be on the track?**



Consider a mass hanging on a spring. The mass is started in motion by pulling it down a small distance below the equilibrium position and releasing it. The displacement is zero whenever the mass is at its equilibrium position.

Individually draw the graphs that best match your prediction for the **position**, **velocity**, and **acceleration** of the mass after it is released.

Choose the position-time graph that is closest to your thinking.

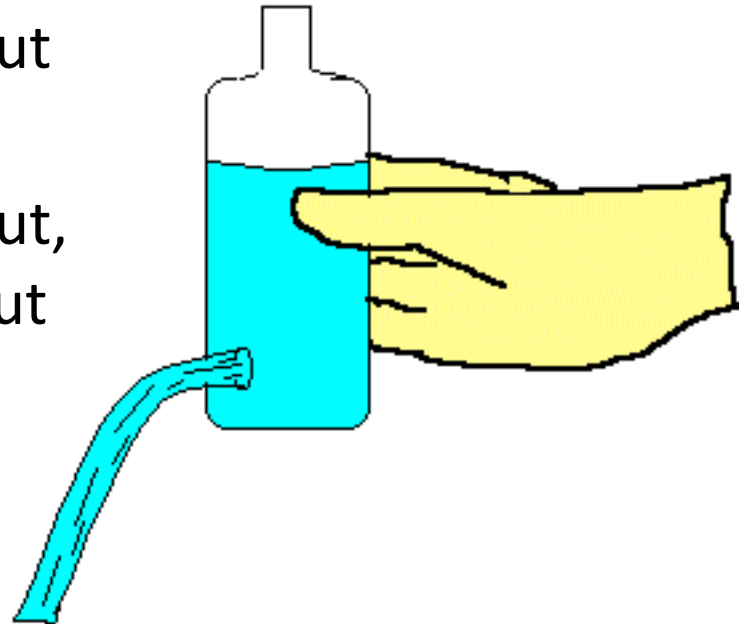


Group 2

What is a common or unifying theme in this set of questions? (You may list more than one but I have just one in mind)

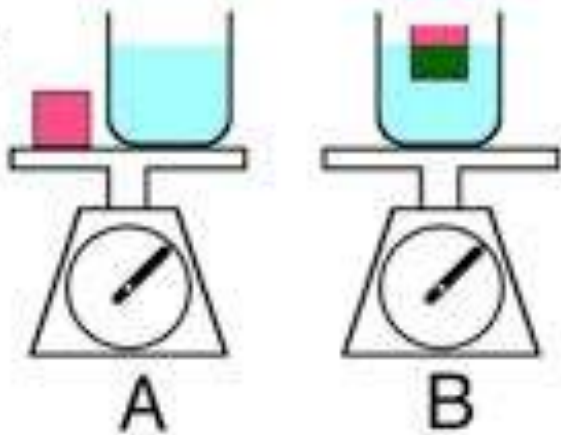
I poke a hole in the bottom of a plastic water bottle. **What will happen if I drop the bottle?**

- A. The water will continue to pour out and down
- B. The water will continue to pour out, but the stream will aim straight out
- C. The water will just pour out more slowly, but still aimed down
- D. The water will no longer pour out



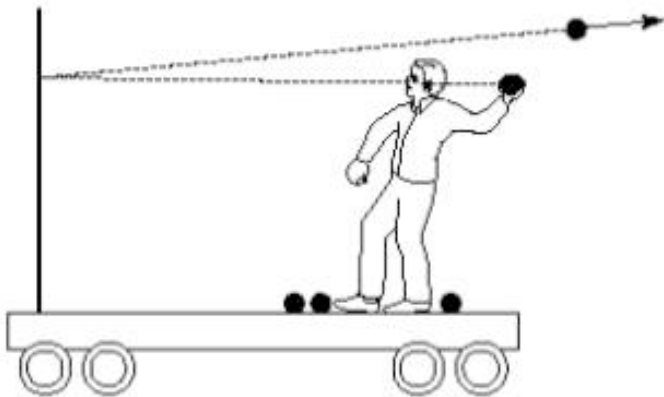
Due to the absence of pressure, the water will not pour out, so the answer is D. Research shows that having students predict the outcome of a demonstration before doing it increases their learning. This is an example of a discrepant event used in this style.

A block and a beaker of water are placed side-by-side on a scale (case A). The block is then placed into the beaker of water, where it floats (case B). **How do the two scale readings compare?**



1. Scale A reads more than scale B.
2. Scale A reads the same as scale B.
3. Scale A reads less than scale B.
4. Not enough information.

You're on a cart, initially at rest, throwing balls at a partition that is rigidly mounted on the front of the cart. If the balls bounce straight back, as in the figure, then is the cart put in motion?



- A. Yes, left
- B. Yes, right
- C. No
- D. Don't know

Group 3

What is a common or unifying theme in this set of questions? (You may list more than one but I have just one in mind)

Do you think that nuclear power is too dangerous to be used in the U.S.?

- A. Yes
- B. No
- C. I'm not sure

Which of the following are you least comfortable using to solve problems?

- A. Kinematics
- B. Newton's Laws
- C. Work-Energy Theorem
- D. Momentum-Impulse Theorem
- E. Angular Momentum-Angular Impulse Theorem

Is anybody in your immediate family, including you, color blind?

- A. Yes, red/green
- B. Yes, yellow/blue
- C. Yes, but a different type of color blindness
- D. No
- E. I'm not sure

Group 4

What is a common or unifying theme in this set of questions? (You may list more than one but I have just one in mind)

This one is a bit trickier. Hint: What do the answer choices have in common? What do they require students to do?

A block m sits on a rough surface, with a spring attached and extended. As the block moves up the incline a small distance, how many forces are exerted on the block?

- A. One force
- B. Two forces
- C. Three forces
- D. Four forces
- E. Five forces
- F. Six forces
- G. Seven forces
- H. More than seven forces
- I. Impossible to determine
- J. None of the above

Which of the following are ambiguous? Choose ALL that apply.

- A. Origin
- B. Function
- C. Equilibrium
- D. $f(x)$
- E. x
- F. M
- G. $\sin^{-1}(x)$
- H. Relationship
- I. Power
- J. None of these

If you want to do as little work as possible while carrying a heavy box, should you be careful not to let it move up and down as you walk?

- A. Yes
- B. No
- C. It depends

Note: You could also embed reasoning in the answers: (A) Yes, because work depends on the path, (B), Yes, because your muscles burn more calories, etc.

Group 5

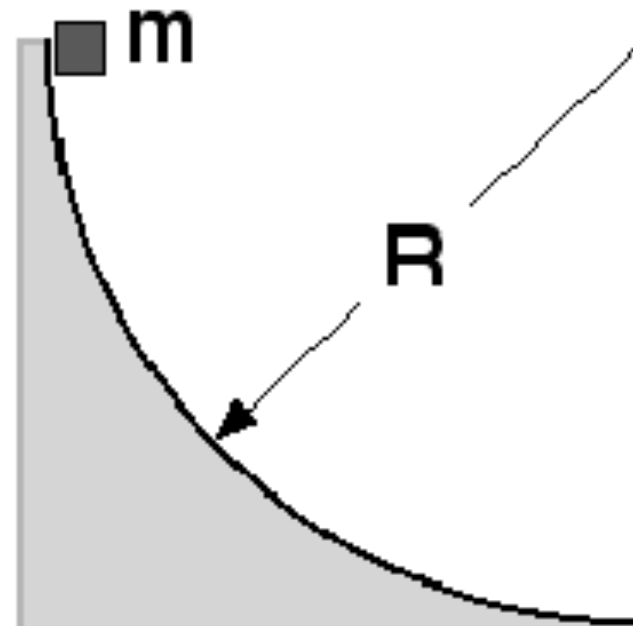
What is a common or unifying theme in this set of questions? (You may list more than one but I have just one in mind)

To minimize the work you do getting a heavy bag of groceries from the first floor to the second floor of a building, should you

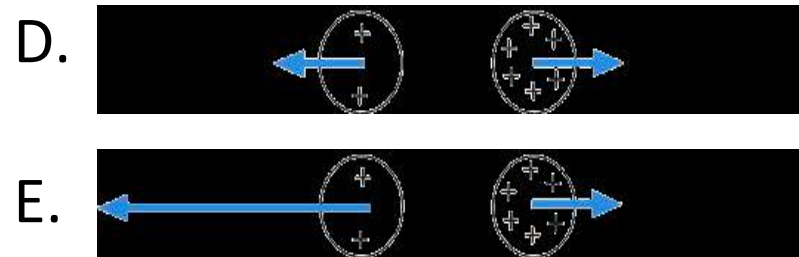
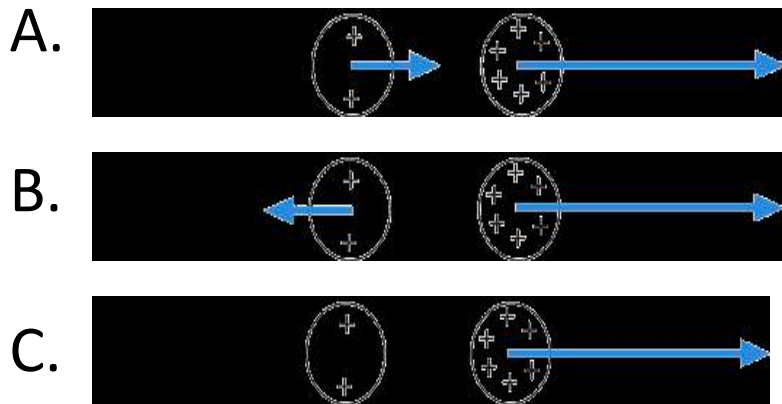
- A. carry the bag up the stairs?
- B. carry the bag up in an elevator?
- C. put the bag on the floor of an elevator, ride up with it, and then pick up the bag again?
- D. carry the bag up a ramp?
- E. put the bag in a cart and push it up a ramp?

b) A mass m slides down a frictionless circular track of radius R . Which of the following would let you most efficiently find its angular velocity relative to the center of curvature when it reaches the bottom?

- 1) Kinematics only
- 2) $F = ma$ or Newton's laws
- 3) Work-energy theorem
- 4) Impulse-momentum theorem
- 5) Angular impulse-angular momentum theorem
- 6) More than one of the above
- 7) None of the above



The diagrams below show two uniformly charged spheres. The charge on the right sphere is 3 times as large as the charge on the left sphere. Which force diagram best represents the magnitudes and directions of the electric forces on the two spheres?



Two identical steel balls are released from rest from the same height and travel along tracks as shown and labeled below. Which ball reaches the end of its track first?



- A. The ball on track A.
- B. The ball on track B.
- C. Neither; it's a tie.
- D. Not enough information.