Physics Attitudes, Skills, & Knowledge Survey (PASKS)
Form 2 - Short

Directions to Students:

Do not open this booklet until you are told to do so. Please respond to the following items by marking the best answer on your answer sheet using a #2 pencil. Please do not write on this survey. Scratch paper will be provided on request. If you do not understand what is being asked in an item, please ask the survey administrator for clarification.

Calculators not permitted.

Arizona Collaborative for Excellence in the Preparation of Teachers
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1. Which best describes your race or ethnic background?

   A. American Indian
   B. Asian/Pacific Islander
   C. Hispanic
   D. Black
   E. White

2. What is the highest level of education your mother obtained?

   A. did not finish high school
   B. high school graduate
   C. some education after high school
   D. college graduate
   E. I don’t know

3. What is the highest level of education your father obtained?

   A. did not finish high school
   B. high school graduate
   C. some education after high school
   D. college graduate
   E. I don’t know

Use the following key to indicate to what degree you agree with items 4 – 11.

A. strongly agree B. agree C. don't know D. disagree E. strongly disagree

4. I like physics.

5. If given a choice, I would not study physics.

6. Hypotheses are derived from controlled observations of nature.

7. A hypothesis is a prediction of what will be observed in the future.

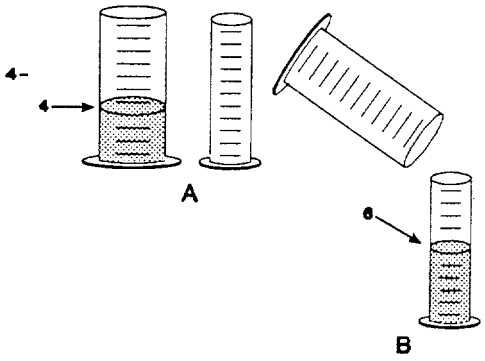
8. Hypotheses/theories can be disproved beyond any doubt.

9. A well-supported hypothesis becomes a theory.

10. Explanations that seem reasonable and make intuitive sense need not be tested.

11. To conclude that a hypothesis has been “supported” or “not supported,” one must first compare observations with expectations.

12. To the right are drawings of a wide and a narrow cylinder. The cylinders have equally spaced marks on them. Water is poured into the wide cylinder up to the 4th mark (see A). This water rises to the 6th mark when poured into the narrow cylinder (see B).



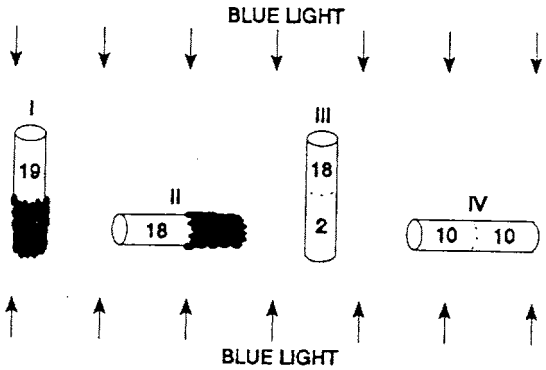
Both cylinders are emptied (not shown) and water is poured into the wide cylinder up to the 6th mark. How high would this water rise if it were poured into the empty narrow cylinder?

A. to about 8
B. to about 9
C. to about 10
D. to about 12
E. none of these answers is correct

13. because

A. the answer can not be determined with the information given.
B. it went up 2 more before, so it will go up 2 more again.
C. it goes up 3 in the narrow for every 2 in the wide.
D. the second cylinder is narrower.
E. one must actually pour the water and observe to find out.

14. Twenty fruit flies are placed in each of four glass tubes. The tubes are sealed. Tubes I and II are partially covered with black paper; Tubes III and IV are not covered. The tubes are placed as shown. Then they are exposed to blue light for five minutes. The number of flies in the uncovered part of each tube is shown in the drawing.



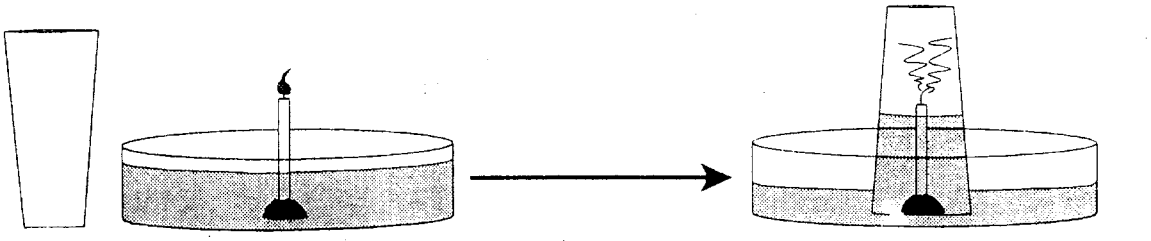
These data show that these flies respond to (respond means move to or away from):

A. blue light but not gravity
B. gravity but not blue light
C. both blue light and gravity
D. neither blue light nor gravity

15. because

A. some flies are in both ends of each tube.
B. the flies need light to see and must fly against gravity.
C. the flies are spread about evenly in Tube IV and in the upper end of Tube III.
D. most flies are in the lighted end of Tube II but do not go down in Tubes I and III.
E. most flies are in the upper end of Tube I and the lighted end of Tube II.

16. The figure below at the left shows a drinking glass and a burning birthday candle stuck in a small piece of clay standing in a pan of water. When the glass is turned upside down, put over the candle, and placed in the water, the candle quickly goes out and water rushes up into the glass (as shown at the right).



This observation raises an interesting question: Why does the water rush up into the glass?

Here is a possible explanation. The flame converts oxygen into carbon dioxide. Because oxygen does not dissolve rapidly into water but carbon dioxide does, the newly-formed carbon dioxide dissolves rapidly into the water, lowering the air pressure inside the glass.

Suppose you have the materials mentioned above plus some matches and some dry ice (dry ice is frozen carbon dioxide). Using some or all of the materials, how could you test this possible explanation?

A. Saturate the water with carbon dioxide and redo the experiment noting the amount of water rise.
B. The water rises because oxygen is consumed, so redo the experiment in exactly the same way to show water rise due to oxygen loss.
C. Conduct a controlled experiment varying only the number of candles to see if that makes a difference.
D. Suction is responsible for the water rise, so put a balloon over the top of an open-ended cylinder and place the cylinder over the burning candle.
E. Redo the experiment, but make sure it is controlled by holding all independent variables constant; then measure the amount of water rise.

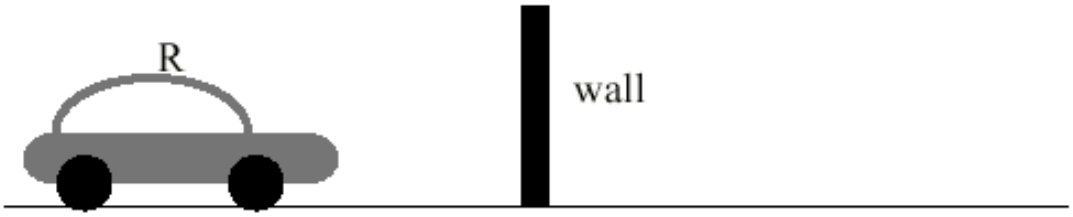
17. What result of your test (mentioned in #16 above) would show that your explanation is probably wrong?

A. The water rises the same as it did before.
B. The water rises less than it did before.
C. The balloon expands out.
D. The balloon is sucked in.

19. An airplane is flying at a speed of 170 meters per second (m/s) relative to the ground. A flight attendant is walking at a speed of 2 meters per second to the rear of the plane. Relative to the ground, the flight attendant has a speed of

A. 2 m/s
B. 168 m/s
C. 170 m/s
D. 172 m/s

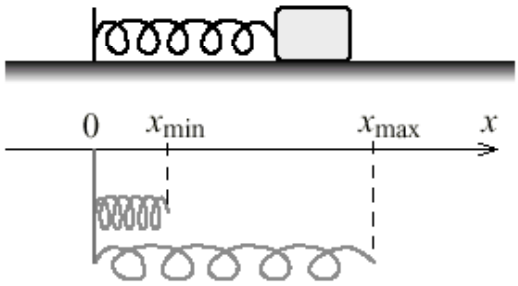
20. A car manufacturer carries out a series of tests on a new model. Two cars, P and Q, of equal mass, moving at the same speed, are on a collision course as shown below. A third car, R, of the same mass as the others and moving at the same speed, is on a collision course with an immovable wall of very high mass, as shown below. In both cases the cars come to rest after collision.



The amount of kinetic energy transformed into energy of deformation and heat in the case of car P is:

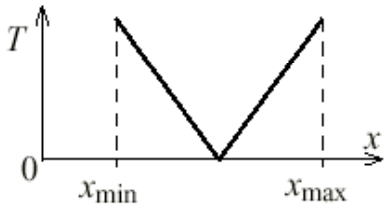
A. greater than that of car R.
B. equal to that of car R.
C. less than that of car R.
D. not possible to determine because of insufficient information.

21. A block oscillates with negligible friction on the end of a spring as shown in the figure below. The minimum and maximum lengths of spring as it oscillates are, respectively, x_{min} and x_{max}.

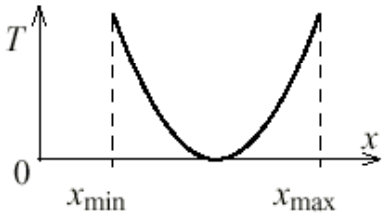


Which one of the following graphs represents the total energy (T) of the block and spring system as a function of x?

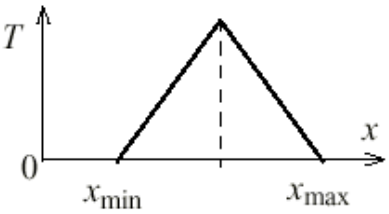
A.



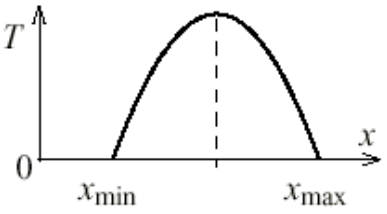
B.



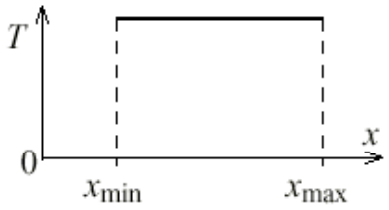
C.



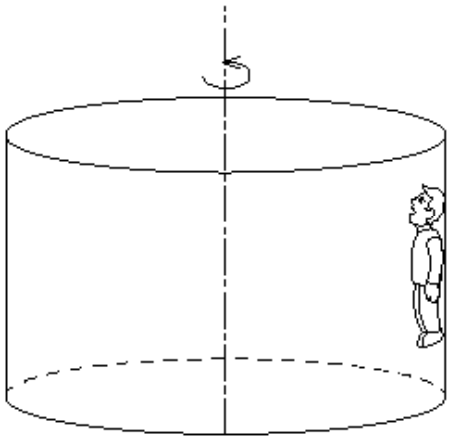
D.



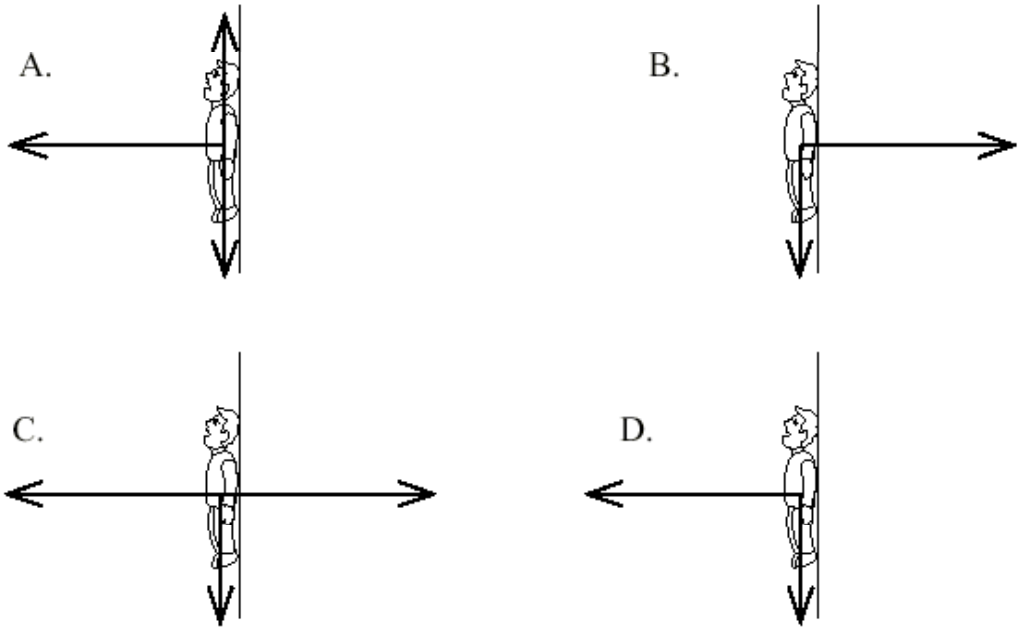
E



22. The figure below shows an amusement park ride. As the ride starts to rotate about its central vertical axis the floor drops slowly but the rider does not. The rider is pressed against the rough inside wall of the rotating cylinder and remains at rest with respect to the wall. The rider's feet are not in contact with the floor.



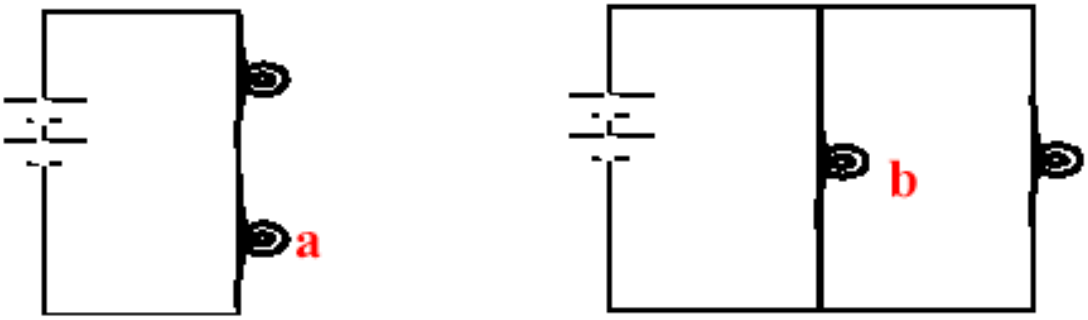
Which of the following diagrams best represents the real forces acting on the rider?



23. Two electrically charged particles held close to each other are released. As the particles move the speed of each increases. Therefore, their charges have:

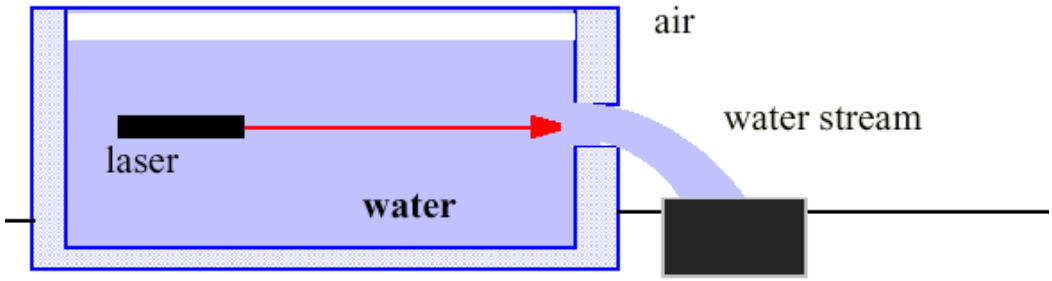
A. the same sign
B. opposite signs
C. not enough information given

24. The two circuits shown have identical bulbs and batteries. Compared to bulb “a,” bulb “b” will be:



A. brighter and draw more current from the battery.
B. brighter and draw less current from the battery
C. brighter and draw the same amount of current from the battery as “a”
D. fainter and draw more current from the battery
E. fainter and draw less current from the battery

25. An aquarium filled with water is being emptied through a hole in its side. A steady stream of water flows into the bowl as shown. A laser light source submerged in the water shines through the hole. The path that the laser light beam will follow after it exits the hole is:



A. straight through the water into the air, because light always travels in a straight line through transparent media.
B. straight, because laser beams are highly energetic, and can penetrate media of any density.
C. bent slightly upward away from the table top after the light emerges at water-air interface in the water stream
D. contained inside the water stream due to total internal reflection.
E. contained inside the water stream because the light beam follows the shape of the medium in which it originates.