

# Physics Attitudes, Skills, & Knowledge Survey (PASKS) Form 1

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.



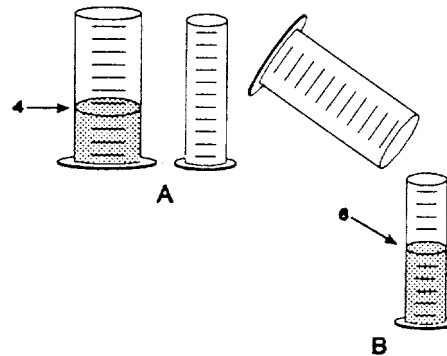
Arizona Collaborative for Excellence in the Preparation of Teachers  
Supported by the National Science Foundation under Grant DUE-0084434  
September, 2000

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 – 10.

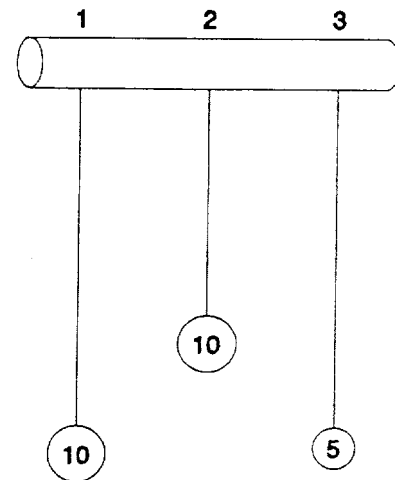
- A. strongly agree   B. agree   C. don't know   D. disagree   E. strongly disagree
4. Learning physics is mostly memorization.
  5. The primary goal of modern physics is to explain natural phenomena.
  6. A conclusion is a statement of what was observed in an experiment.
  7. To be scientific, hypotheses must be testable.
  8. A well-supported theory becomes a law.
  9. Current scientific theories portray nature more accurately than those they replaced.
  10. Scientists think atoms exist primarily because they have seen them through powerful microscopes.

11. 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, and water is poured into the narrow cylinder up to the 11th mark. How high would this water rise if it were poured into the empty wide cylinder?

- A. to about  $7 \frac{1}{2}$   
 B. to about 9  
 C. to about 8  
 D. to about  $7 \frac{1}{3}$   
 E. none of these answers is correct
12. because
- A. the ratios must stay the same.  
 B. one must actually pour the water and observe to find out.  
 C. the answer can not be determined with the information given.  
 D. it was 2 less before so it will be 2 less again.  
 E. you subtract 2 from the wide for every 3 from the narrow.
13. At the right are drawings of three strings hanging from a bar. The three strings have metal weights attached to their ends. String 1 and String 3 are the same length. String 2 is shorter. A 10 unit weight is attached to the end of String 1. A 10 unit weight is also attached to the end of String 2. A 5 unit weight is attached to the end of String 3. The strings (and attached weights) can be swung back and forth and the time it takes to make a swing can be timed.



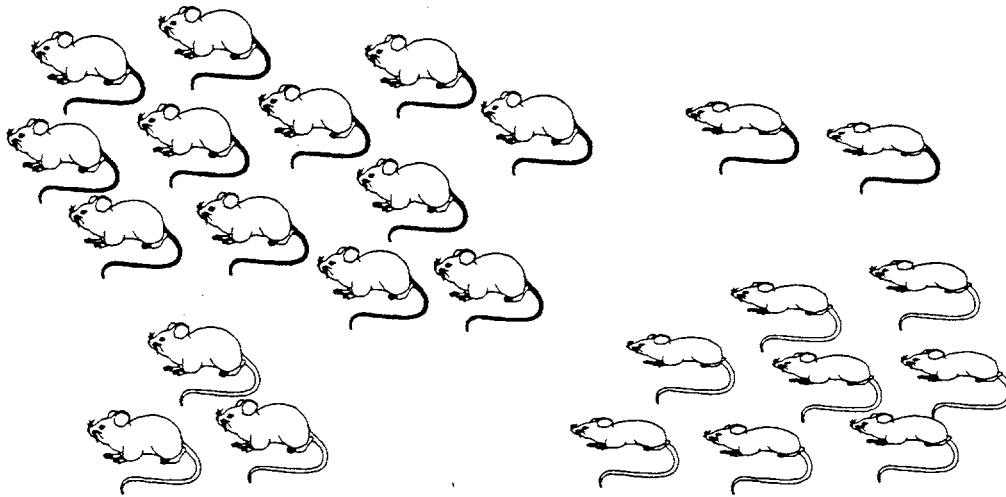
Suppose you want to find out whether the length of the string has an effect on the time it takes to swing back and forth. Which strings would you use to find out?

- A. only one string  
 B. all three strings  
 C. 2 and 3  
 D. 1 and 3  
 E. 1 and 2

14. because

- A. you must use the longest strings.
- B. you must compare strings with both light and heavy weights.
- C. only the lengths differ.
- D. to make all possible comparisons.
- E. the weights differ.

15. Farmer Brown was observing the mice that live in his field. He discovered that all of them were either fat or thin. Also, all of them had either black tails or white tails. This made him wonder if there might be a link between the size of the mice and the color of their tails. So he captured all of the mice in one part of his field and observed them. Below are the mice that he captured.



Do you think there is a link between the size of the mice and the color of their tails?

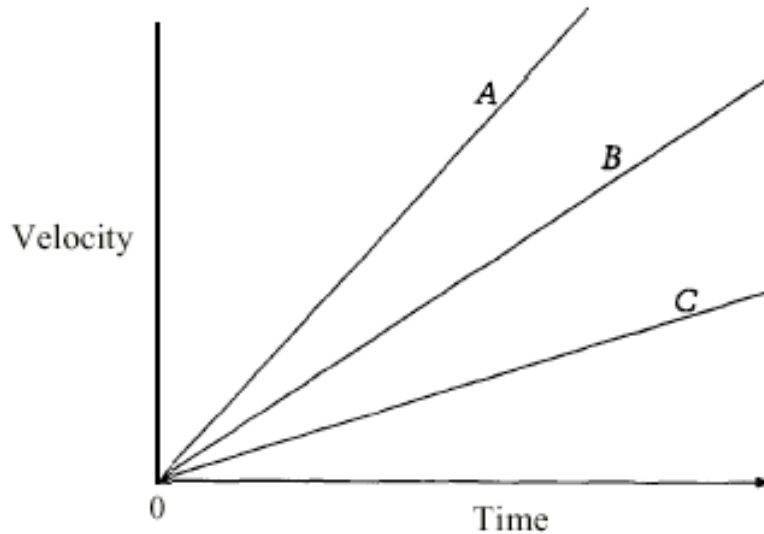
- A. appears to be a link
- B. appears not to be a link
- C. can not make a reasonable guess

16. because

- A. there are some of each kind of mouse.
- B. there may be a genetic link between mouse size and tail color.
- C. there were not enough mice captured.
- D. most of the fat mice have black tails while most of the thin mice have white tails.
- E. as the mice grew fatter, their tails became darker.

Questions 17 – 18 refer to the following information:

A graph of velocity as a function of time when the same net force is applied to three different objects (A, B, and C) is shown below.

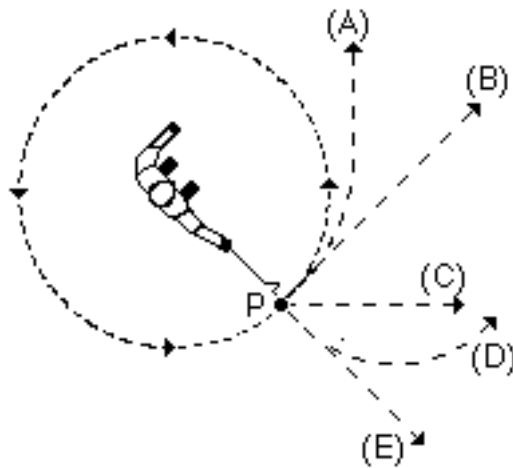


17. Which object has the greatest acceleration?
- A. A
  - B. B
  - C. C
  - D. They all have the same acceleration
18. Which object has the greatest mass?
- A. A
  - B. B
  - C. C
  - D. They all have the same mass
19. A woman traveling in a train watches a train on an adjacent track go past her window. The time the other train takes to completely pass her depends on all of the following except:
- A. the speed of the train on which the woman is traveling.
  - B. the speed of the other train.
  - C. the length of the train on which the woman is traveling.
  - D. whether the trains are traveling in the same direction or in opposite directions.

20. When a small volume of water is boiled, a large volume of steam is produced because:
- A. the molecules are further apart in steam than in water.
  - B. water molecules expand when heated.
  - C. the change from water to steam causes the number of molecules to increase.
  - D. atmospheric pressure works more on water molecules than on steam molecules.
  - E. water molecules repel each other when heated.
21. Two metal balls are the same size but one weighs twice as much as the other. The balls are dropped from the roof of a single story building at the same instant in time. The time it takes the balls to reach the ground will be:
- A. about half as long for the heavier ball as for the lighter one.
  - B. about half as long for the lighter ball as for the heavier one.
  - C. about the same for both balls.
  - D. considerably less for the heavier ball, but not necessarily half as long.
  - E. considerably less for the lighter ball, but not necessarily half as long.
22. The two metal balls of the previous problem roll off a horizontal table with the same speed. In this situation:
- A. both balls hit the floor at approximately the same horizontal distance from the base of the table.
  - B. the heavier ball hits the floor at about half the horizontal distance from the base of the table than does the lighter ball.
  - C. the lighter ball hits the floor at about half the horizontal distance from the base of the table than does the heavier ball.
  - D. the heavier ball hits the floor considerably closer to the base of the table than the lighter ball, but not necessarily at half the horizontal distance.
  - E. the lighter ball hits the floor considerably closer to the base of the table than the heavier ball, but not necessarily at half the horizontal distance.
23. A stone dropped from the roof of a single story building to the surface of the Earth:
- A. reaches a maximum speed soon after release and then falls at a constant speed thereafter.
  - B. speeds up as it falls because the gravitational attraction gets considerably stronger as the stone gets closer to the Earth.
  - C. speeds up because of an almost constant force of gravity acting upon it.
  - D. falls because of the natural tendency of all objects to rest on the surface of the Earth.
  - E. falls because of the combined effects of the force of gravity pushing it downward and the force of the air pushing it downward.

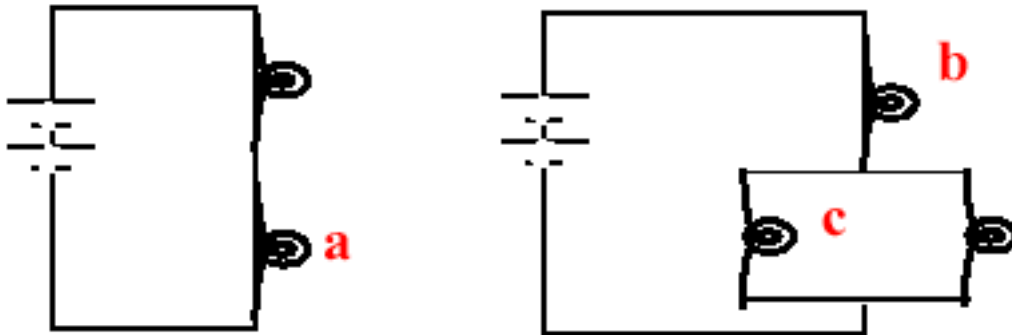
24. A large truck collides head-on with a small compact car. During the collision:
- A. the truck exerts a greater amount of force on the car than the car exerts on the truck.
  - B. the car exerts a greater amount of force on the truck than the truck exerts on the car.
  - C. neither exerts a force on the other, the car gets smashed simply because it gets in the way of the truck.
  - D. the truck exerts a force on the car but the car does not exert a force on the truck.
  - E. the truck exerts the same amount of force on the car as the car exerts on the truck.

25. A steel ball is attached to a string and is swung in a circular path in a horizontal plane as illustrated in the figure to the right. At the point P indicated in the figure, the string suddenly breaks near the ball. If these events are observed from directly above as in the figure, which path would the ball most closely follow after the string breaks?



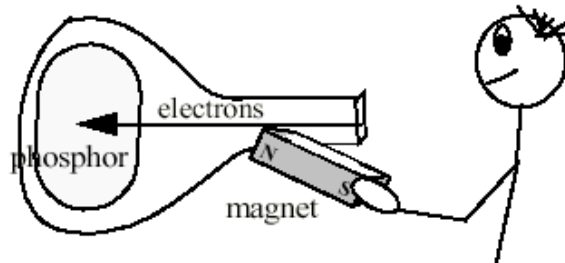
- A. A
  - B. B
  - C. C
  - D. D
  - E. E
26. Two electrically charged particles held close to each other are released. As they move, the force on each particle increases. Therefore, the particles have
- A. the same sign.
  - B. opposite signs.
  - C. not enough information given.

27. In the two circuits shown, rank the three labeled bulbs, a, b and c, in order of decreasing bulb brightness.



- A. a, b, c  
 B. b, c, a  
 C. c, b, a  
 D. c, a, b  
 E. b, a, c
28. The image viewed on your TV picture tube arises from a stream of high speed electrons striking the phosphor coating on the inside front end of the picture tube. The kinetic energies of the electrons striking the phosphor coated glass are converted into light which produces the TV image you view. What, if anything, would happen if you held a bar magnet near the side of the picture tube of your TV as shown?

TV Picture Tube



- A. Electrons would be attracted toward the magnet.  
 B. Electrons would be repelled from the magnet.  
 C. Electrons would be deflected either upward or downward.  
 D. Electron speeds toward the phosphor would increase.  
 E. Electric charges are not affected by magnets.