

## Diagnostic Assessment

### Physics

1. In the language of Physics, which of these words best describes 'Heat'?
  - (a) Gas
  - (b) Wave
  - (c) Energy
  - (d) Temperature
  
2. In an automobile collision, a 44-kilogram passenger moving at 15 meters per second is brought to rest by an air bag during a 0.10-second time interval. What is the magnitude of the average force exerted on the passenger during this time?
  - a) 440 N
  - b) 660 N
  - c) 4400 N
  - d) 6600 N
  
3. The magnitude of the momentum of an object is 64.0 Kilogram • meter per second. If the velocity of the object is doubled, the magnitude of the momentum of the object will be
  - a) 32.0 kg•m/s
  - b) 64.0 kg•m/s
  - c) 128 kg•m/s
  - d) 256 kg•m/s
  
4. If a tennis ball (L) and a heavier solid ball (H) of the same size held side by side are dropped from the top of a 30 m tall tower simultaneously. When will ball H strike the ground? (Assumption: The effect of air friction is negligible.)
  - (a) Before ball H
  - (b) After ball H
  - (c) At the same time as ball H
  - (d) Cannot be predicted due to insufficient data
  
5. The gravitational force on ball H will be ..... the gravitational force on ball L.
  - (a) Greater than
  - (b) Lesser than
  - (c) Equal to
  - (d) Different from
  
- (6) In the diagram below, the upward drag force acting on a parachute is equal in magnitude, but opposite in direction to the weight of the parachutist and equipment.  
 As a result of the forces shown, the parachutist may be moving
  - (a) downward with decreasing speed
  - (b) downward at constant speed
  - (c) upward with decreasing speed
  - (d) upward with constant acceleration

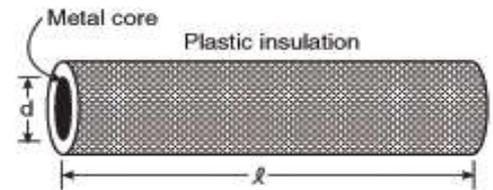


(7) Through which of the following will sound travel fastest?

- Air
- Fresh water
- Salt water
- Wood

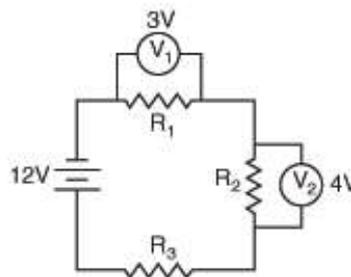
8. Plastic insulation surrounds a wire having diameter  $d$  and length  $l$  as shown below. A decrease in the resistance of the wire would be produced by an increase in the \_\_\_\_\_

- thickness of the plastic insulation
- length  $l$  of the wire
- diameter  $d$  of the wire
- temperature of the wire



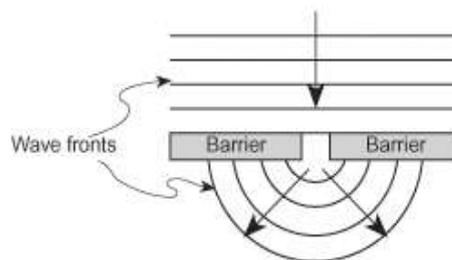
(9) The diagram below shows three resistors,  $R_1$ ,  $R_2$ , and  $R_3$ , connected to a 12-volt battery. If  $V_1$  reads 3 volts and voltmeter  $V_2$  reads 4 volts, what is the potential drop across resistor  $R_3$  ?

- 12 V
- 5 V
- 0 V
- 4 V



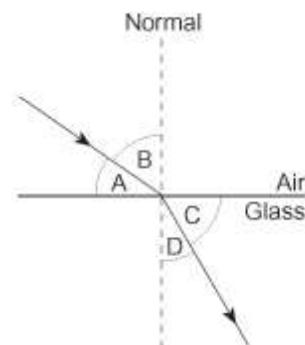
10. The diagram below shows a wave phenomenon. The pattern of waves shown behind the barriers is the result of

- reflection
- diffraction
- refraction
- absorption



11. A light ray passes from air into glass as shown in the diagram below. Which relationship represents the index of refraction of the glass?

- $\sin A / \sin C$
- $\sin A / \sin D$
- $\sin B / \sin C$
- $\sin B / \sin D$





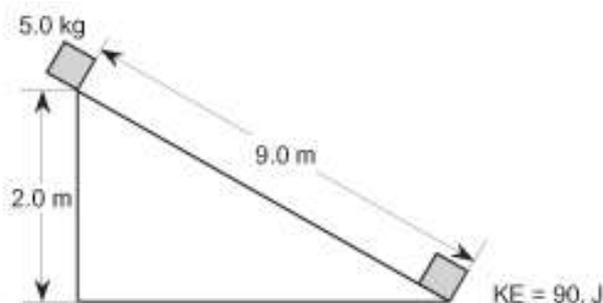
12.  $X \rightarrow Y + Z + \text{energy}$

The equation above represents a nuclear decay, in which nucleus  $X$  decays into particle  $Y$  and nucleus  $Z$  and releases energy. Which of the following can explain why energy is released in the decay?

- The mass of  $X$  is less than the sum of the masses of  $Y$  and  $Z$ .
- The mass of  $X$  is less than the difference between the masses of  $Y$  and  $Z$ .
- The mass of  $X$  is greater than the sum of the masses of  $Y$  and  $Z$ .
- The mass of  $X$  is greater than the difference between the masses of  $Y$  and  $Z$ .

13. The diagram below shows a 5.0-kilogram mass sliding 9.0 meters down an incline from a height of 2.0 meters in 3.0 seconds. The object gains 90. joules of kinetic energy while sliding. How much work is done against friction as the mass slides the 9.0 meters?

- 0 J
- 8 J
- 45 J
- 90 J



14. When a substance is heated its temperature rises. If the same amount of heat energy is given to various other substances of different sizes, shapes and material, the temperature increase will vary for every substance. Which of the following factors of the substances does the rise in temperature depend on?

- Their mass
- Their state of subdivision (i.e. single lump or small pieces)
- Their physical state
- The material they are made of

15. Two electrically neutral metal spheres,  $A$  and  $B$ , on insulating stands are placed in contact with each other. A negatively charged rod is brought near, but does *not* touch the spheres, as shown in the diagram below. How are the spheres now charged?

- $A$  is positive and  $B$  is positive.
- $A$  is positive and  $B$  is negative.
- $A$  is negative and  $B$  is positive.
- $A$  is negative and  $B$  is negative.

