

## UNIT VIII Practice Questions

- Which of the following statements are **true** about momentum?
  - Momentum is a vector quantity.
  - An object with mass will always have momentum.
  - An object which is moving at a constant speed has momentum.
  - An object is traveling eastward and slowing down; its momentum is westward.
  - The momentum of an object never changes.
  - The momentum of an object varies directly with the speed of the object.
  - Two objects of different mass are moving at the same speed; the more massive object will have the greatest momentum.
  - A less massive object can never have more momentum than a more massive object.
  - An object with a changing speed will have a changing momentum.
- Which of the following statements are **true** about impulse?
  - Impulse is a force.
  - Objects involved in collisions encounter impulses.
  - The *Newton* is the unit for impulse.
  - An object which experiences an impulse will definitely experience a momentum change.
  - In a collision, the impulse experienced by an object is equal to its momentum change.
  - A force of  $100\text{ N}$  acting for  $0.1\text{ seconds}$  would provide as much impulse as a force of  $5\text{ N}$  acting for  $2.0\text{ seconds}$ .
- Which of the following objects have momentum?
  - An electron is orbiting the nucleus of an atom.
  - A UPS truck is stopped in front of the school building.
  - A Yugo (a compact car) is moving with a constant speed.
  - A small flea walking with constant speed across Fido's back.
  - The high school building parked in the middle of town.
- A truck driving along a highway road has a large quantity of momentum. If it moves at the same speed but now has twice as much mass, its momentum is now \_\_\_\_\_.
  - zero
  - quadrupled
  - doubled
  - unchanged
- TRUE or FALSE:**

A ball is dropped from the same height upon various flat surfaces. For the same collision time, impulses are greater when the ball bounces the highest it can.

  - True
  - False

6. Consider a karate expert. During a talent show, she executes a swift blow to a cement block and breaks it with her bare hand. During the collision between her hand and the block, the \_\_\_\_.
- time of impact on both the block and the expert's hand is the same
  - force on both the block and the expert's hand have the same magnitude
  - impulse on both the block and the expert's hand have the same magnitude
  - all of the above.
  - none of the above.
7. It is possible for a rocket to accelerate in outer space because \_\_\_\_.
- there is no air in space to hold the rocket back
  - there is no friction in space to hold the rocket back
  - the rocket pushes gas out the back and the gas pushes the rocket forward
  - ... nonsense! Rockets can't accelerate in outer space.
8. In order to catch a ball, a baseball player naturally moves his or her hand backward in the direction of the ball's motion once the ball contacts the hand. This habit causes the force of impact on the player's hand to be decreased because \_\_\_\_.
- the momentum change is decreased
  - the time of impact is increased
  - the time of impact is decreased
  - none of these
9. Suppose that Paul D. Trigger fires a bullet from a gun. The speed of the bullet leaving the muzzle will be the same as the speed of the recoiling gun \_\_\_\_.
- because momentum is conserved
  - because velocity is conserved
  - because both velocity and momentum are conserved
  - Nonsense! The speed of the bullet is greater than the speed of the gun.
10. Suppose that you're driving down the highway and a moth crashes into the windshield of your car. Which undergoes the greater change in momentum?
- the moth
  - your car
  - both the same
11. Suppose that you're driving down the highway and a moth crashes into the windshield of your car. Which undergoes the greater force?
- the moth
  - your car
  - both the same
12. Suppose that you're driving down the highway and a moth crashes into the windshield of your car. Which undergoes the greater impulse?
- the moth
  - your car
  - both the same

13. Suppose that you're driving down the highway and a moth crashes into the windshield of your car. Which undergoes the greater acceleration?  
 a. the moth                      b. your car                      c. both the same
14. In a physics experiment, two equal-mass carts roll towards each other on a level, low-friction track. One cart rolls **rightward** at  $2\text{ m/s}$  and the other cart rolls **leftward** at  $1\text{ m/s}$ . After the carts collide, they couple (attach together) and roll together with a speed of \_\_\_\_\_.  
 a.  $0.5\text{ m/s}$                       b.  $0.33\text{ m/s}$                       c.  $0.67\text{ m/s}$                       d.  $1.0\text{ m/s}$                       e. none of these
15. Cars are equipped with padded dashboards. In collisions, the padded dashboards would be safer than non-padded ones because they \_\_\_\_\_. List all that apply.  
 a. increase the impact time                      b. decrease an occupant's impulse  
 c. decrease the impact force                      d. none of the above
16. A  $4\text{ kg}$  object has a momentum of  $12\text{ kgm/s}$ . The object's speed is \_\_\_\_\_  $\text{m/s}$ .  
 a. 3                      b. 4                      c. 12                      d. 48                      e. none of these.
17. A wad of chewed bubble gum is moving with 1 unit of momentum when it collides with a heavy box that is initially at rest. The gum sticks to the box and both are set in motion with a **combined momentum** that is \_\_\_\_\_.  
a. less than 1 unit     b. 1 unit                      c. more than 1 unit                      d. not enough information
18. A large force acting for a long amount of time on a small mass will produce a relatively \_\_\_\_\_.  
a. small velocity change                       b. large velocity change  
c. small momentum change                      d. small acceleration
19. A  $5\text{ N}$  force is applied to a  $3\text{ kg}$  ball to change its velocity from  $+9\text{ m/s}$  to  $+3\text{ m/s}$ . The momentum change of the ball will be \_\_\_\_\_.  
a. -2.5                      b. -10                       c. -18                      d. -45                      e. none of these
20. A  $5\text{ N}$  force is applied to a  $3\text{ kg}$  ball to change its velocity from  $+9\text{ m/s}$  to  $+3\text{ m/s}$ . The impulse experienced by the ball is \_\_\_\_\_.  
a. -2.5                      b. -10                       c. -18                      d. -45                      e. none of these