College Prep Physics Name: _____
Unit 7 PreTest - Momentum

Formula's and Constants: Check the formula sheet that will go with this test.

Directions: Choose only the BEST answer to each problem.

1. The importance of a follow-through in sports is:
   a. To maximize the amount of applied force
   b. To maximize the amount of time the force is applied
   c. Use of the proper technique
   d. Decrease in the time of the impulse

2. If an object collides with a stationary object 1/3 its mass, and the two stick together after collision, the new speed is what fraction of the original speed?
   a. 1/3 b. 3/2 c. 3/4 d. 2/3

3. The unit of momentum is give as:
   a. Kg m/s b. kg m/s^2 c. N s^2 d. kg m^2 / s^2

4. Object "A" has a momentum of 40 N s. Object "B", which has the same mass, is standing motionless. Object "A" strikes Object "B" and stops. If the mass of object "B" is 8 kg, the velocity of object "B" after the collision?
   a. 5 m/s b. 10 m/s c. 60 m/s d. 360 m/s

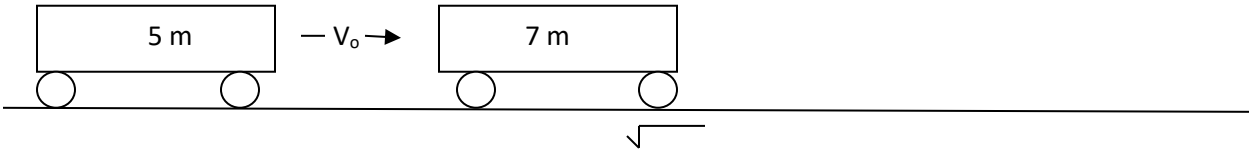
5. Billiard ball "A" collides with billiard ball "B", which is motionless on a table. During the collision, ball "A" loses 20 N s of momentum. Which of the following is a possible condition for ball "B" after the collision.
   a. m = 5 kg & v = 5 m/s
   b. m = 10 kg & v = 5 m/s
   c. m = 10 kg, v = 1.0 m/s
   d. m = 1.0 kg, v = 20 m/s

6. An 8.0 kg mass is moving at 3.0 m/s toward the right and a 6.0 kg mass is moving at 4.0 m/s toward the left on a horizontal frictionless table. If the two masses collide and remain together after the collision, their final momentum is:
   a. 1.0 kg m/s b. 24 kg m/s c. 12 kg m/s d. 0.0 kg m/s

7. If a 3.0 kg object moves 30.0 m in 3.0 seconds, its average momentum is:
   a. 60 kg m/s b. 30 kg m/s c. 10 kg m/s d. 9.0 kg m/s

8. A 5.0 kg gun recoils with a speed of 0.2 m/s as it fires a 0.001 kg bullet. What is the speed of the bullet as it leaves the gun? (neglect friction)
   a. 1.0 m/s b. 14.1 m/s c. 1000 m/s d. 10,000 m/s

9. A cart of mass 5 m has a velocity V_o before it strikes another cart of mass 7 m at rest as shown below. The two carts couple (stick together) and move off with one velocity. The new velocity = ___



a. (5/12) V_o b. (2/5) V_o c. (5/7) V_o d. 5/12 V_o e. (7/5) V_o

10. A collision is said to be INELASTIC if:
    a. the final velocities are zero
    b. the objects stick together
    c. the final energy is zero
    d. the final momentum is zero
    e. the momentum is conserved

11. A handball of mass 0.1 kg is traveling horizontally at 40 m/s, strikes a wall and rebounds at 30 m/s. What is the total change in momentum of the ball?
    a. 1.0 kg m/s b. 3.0 kg m/s c. 4.0 kg m/s d. 7.0 kg m/s

12. A mine car with a mass of 400 kg rolls with negligible friction on a horizontal track with a speed of 10 m/s. A 100 kg stunt man drops straight down a distance of 5 meters and lands in the car. How fast will the car be moving after his happens?
    a. 2.5 m/s b. 7.5 m/s c. 8.0 m/s d. 10 m/s

13. A ball of mass 0.40 kg is dropped from a height of 20 meters. What is momentum the it strikes the ground? (neglect friction):
    a. 7.9 kg m/s b. 8.0 kg m/s c. 78.4 kg m/s d. 156.8 kg m/s

14. A toy rocket of mass 300 grams achieves a velocity of 25 m/s after 2 seconds when fired straight up. What average thrust force does the rocket engine exert?
    a. 3.75 N b. 7.5 N c. 50 N d. 3750 N

15. A fire hose is turned onto a door of a burning building in order to knock the door down. This requires a force of 700 N. If the hose delivers 35 liters per second, what is the minimum velocity of the stream needed, assuming the water doesn't bounce back?
    a. 15 m/s b. 20 m/s c. 40 m/s d. 50 m/s

16. Most automobiles now have airbags installed on their dashboards as a safety measure. The impact of a collision causes the bag to inflate, and it then cushions a passenger's head when he is thrown forward in the car. Suppose such a bag could lengthen the collision time between one's head and the dashboard by a factor of 100. What effect would this have on the force exerted on your head?

    a. The force would not be reduced, but the energy transferred to your head would be.
    b. The force would be reduced by a factor of about 3
    c. The force would be reduced by a factor of about 10
    d. The force would be reduced by a factor of about 100
    e. The force would be reduced by a factor of about 1000

17. A 100 kg linebacker moving at 2.4 m/s tackles head-on an 80 kg halfback running at 3.0 m/s. Neglecting the effects due to digging in of cleats, (basically friction):
    a. the linebacker will drive the halfback backwards
    b. the halfback will drive the linebacker backwards
    c. neither player will drive the other backwards
    d. this is an example of an elastic collision

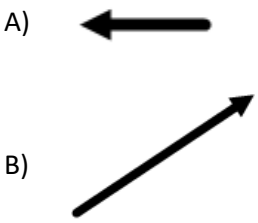
18. A small car meshes with a large truck in a head-on collision. Which of the following statements concerning the magnitude of the average collision force is correct?
    a. The small car and the truck experience the same size average force.
    b. It is impossible to tell since masses and velocities are not given
    c. The truck experiences the greater size average force
    d. The small car experiences the greater size average force

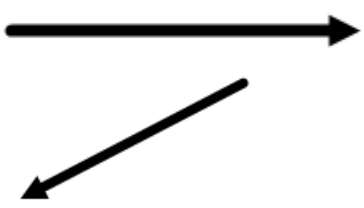
19. A 2000 kg car, traveling to the right at 30 m/s, collides with a brick wall and comes to rest in 1.0 seconds. The average force the car exerts on the wall is:
    a. 12,000 N to the right
    b. 300,000 N to the right
    c. 60,000 N to the right
    d. none of the above

20. A golf ball traveling 3.0 m/s to the right collides in a head-on collision with a stationary bowling ball in a friction-free environment. If the collision is almost perfectly elastic, the speed of the golf ball immediately after the collision is:
    a. slightly greater than 3 m/s
    b. equal to 3 m/s
    c. much less than 3 m/s
    d. slightly less than 3 m/s

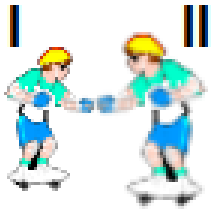
21. A 6.0 kg mass moving to the right with a speed of 5 m/s collides head-on with a stationary 3.0 kg mass. If the collision is perfectly inelastic, what is the velocity of the masses after the collision? (neglect the effects of friction)
    a. 3.3 m/s to the right
    b. 30 m/s to the right
    c. 2 m/s to the right
    d. zero, since the collision is inelastic

22. The momenta of two different objects are presented by on the diagram. Which of the following is the net momentum of the system of two objects?





23. A stationary skateboarder **I** with a mass of 80 kg pushes a stationary skateboarder **II** with a mass of 60 kg. After the push the skateboarder II moves with a velocity of 4 m/s to the right. What is the velocity of the skateboarder I?
    A) 3 m/s to the left
    B) 5 m/s to the left
    C) 1 m/s to the right
    D) 3 m/s to the right



24. A tennis ball approaches a racket with a momentum of 3 kg·m/s and bounces back with a momentum of 7 kg·m/s after the collision with the racket. What is the change in momentum of the tennis ball?
    A) 3 kg m/s
    B) 4 kg m/s
    C) 7 kg m/s
    D) 10 kg m/s

25. A 4 kg object moves at a constant velocity 3 m/s to the right and collides with a 2 kg object moving at a velocity 6 m/s to the left. Which of the following statements is correct?
    A) The total momentum before and after the collision is 12 kg·m/s
    B) The total momentum before and after the collision is 24 kg·m/s
    C) The total momentum before and after the collision is 54 kg·m/s
    D) The total momentum before and after the collision is zero