Conceptual Physics Self Test Chapter 7   Name _____

_____ 1.   Which has more momentum, a sports car going 30 mph or the same car going 60 mph?
             a.   the car moving at 30 mph
             b.   the car moving at 60 mph
             c.   both the same

_____ 2.   Momentum refers to
             a.   things which are moving
             b.   things which are not moving
             c.   both a and b
             d.   neither

_____ 3.   The momentum change of an object is equal to the
             a.   force acting on the object
             b.   velocity change of the object
             c.   impulse acting on it
             d.   object's mass times the force acting on it

_____ 4.   In order to increase the momentum of a golf ball, a person could
             a.   hit it harder
             b.   increase the time of the club's contact with the ball
             c.   follow through on the swing
             d.   all of these

_____ 5.   Which can produce a greater change in momentum?
             a.   a force of 5.0 N applied to an object for 5.0 s
             b.   a force of 10.0 N applied to an object for 2.5 s
             c.   both the same

_____ 6.   Which has the greatest momentum
             a.   a truck at rest
             b.   a falling leave
             c.   a wound up spring
             d.   a person walking

_____ 7.   The product of force and time is:
             a. impulse   b. equal to the change in momentum   c. both   d. neither

_____

The following situation is for questions 8 – 11. Identical cars A and B are traveling side by side with equal speeds. Car A runs into a haystack and stops. Car B runs into a brick wall and stops.

_____ 8.   Which car loses more momentum?
             a. A   b. B   c. both the same

_____ 9.   Which car stops in the shorter time?
             a. A   b. B   c. both the same

_____ 10.   Which car experiences the greater impulse?
             a. A   b. B   c. both the same

_____ 11.   Which car experiences the greater force?
             a. A   b. B   c. both the same

_____ 12.   Two objects, A and B have the same size and shape, but A is twice as heavy as B. When they are dropped
             simultaneously from a high window, they reach the ground at the same time, but A has a higher
             a. speed   b. acceleration   c. momentum   d. all of these   e. none of these

The following situation is for questions 13 – 15. A Volkswagen and a Hummer are being crash tested. Traveling at the same speed they run head-on into a cement wall.

_____ 13. Which experiences the greater force?
            a. Hummer   b. Volkswagen   c. both the same

_____ 14. Which experiences the greater impulse?
            a. Hummer   b. Volkswagen   c. both the same

_____ 15. Which experiences the greater change in momentum?
            a. Hummer   b. Volkswagen   c. both the same

The following situation is for questions 16 – 20. Two identical carts of mass, m, are on the track (assume no friction). Cart A is moving with speed v toward stationary cart B. Upon impact the carts bounce off each other.

_____ 16. Before the collision the momentum of the system of the two carts is
            a. 0   b. .5 mv   c. mv   d. 2 mv

_____ 17. After the collision the momentum of the system of the two carts is
            a. 0   b. .5 mv   c. mv   d. 2 mv

_____ 18. After the collision the velocity of cart A is:
            a. 0   b. .5 v   c. v   d. 2v

_____ 19. After the collision the velocity of cart B is:
            a. 0   b. .5 v   c. v   d. 2v

_____ 20. This collision is (choose one or more)
            a. elastic   b. inelastic   c. bouncy   d. sticky

The following situation is for questions 21 – 25. Two identical carts of mass, m, are on the track (assume no friction). Cart A is moving with speed v toward stationary cart B. Upon impact the carts stick together.

_____ 21. Before the collision the momentum of the system of the two carts is
            a. 0   b. .5 mv   c. mv   d. 2 mv

_____ 22. After the collision the momentum of the system of the two carts is
            a. 0   b. .5 mv   c. mv   d. 2 mv

_____ 23. After the collision the velocity of the joined carts (A + B) is
            a. 0   b. .5 v   c. v   d. 2v

_____ 24. This collision is (choose one or more)
            a. elastic   b. inelastic   c. bouncy   d. sticky

_____ 25. Momentum is conserved in all collisions where no external forces are acting
      a.   when heat is generated
      b.   in elastic collisions
      c.   in inelastic collisions
      d.   in noisy collisions
      e.   in collisions where the objects change shape
      f.   all of these

Questions/Problems

26. Cart A is twice as massive as Cart B. Cart A, moving at 0.48 m/s strikes Cart B which is at rest. The two carts stick together. What is their speed after the collision?

27. Cart A with a mass of 1.0 kg moves with a speed of 6.0 m/s toward Cart B, mass of 2.0 kg, which is at rest. After the collision Cart A rebounds with a speed of – 2.0 m/s and Cart B moves forward with a speed of 4.0 m/s. Show that momentum is conserved in this collision.

28. A car of mass 2000. kg is moving at 24 m/s. Esmerelda, the driver, pushes the brake pedal which applies a force of 4000 N to stop the car. How much time is needed to stop the car?

29. Dingle and Dimwood are standing still on roller skates facing each other. Dim is larger and stronger than Dingle. They push on each other's hands and move away from each other.

    a.   Which person experiences the larger force?

    b.   Which person experiences the larger impulse

    c.   Which person experiences the larger acceleration?

    d.   What is their momentum when standing still?

    e.   They push off of each other and move in opposite directions. What is their total momentum now?

    f.   If Dingles mass is 50. kg and Dim's is 75 kg, how fast does Dingle move after the "push off" if Dim moves at 3.5 m/s?

30. Esmerelda is standing still on her brand new roller blades. She throws a 1.0 kg package at 10 m/s to her friend. What is Esmerelda's recoil velocity if her mass is 40. kg?

31. An 800 kg car traveling at 10 m/s is hit from behind by a 2400 kg truck traveling at 14 m/s   The vehicles stick together and continue moving forward. How fast will the truck/car combo be going after the rear-end collision? (Ignore friction)

32. What is the difference between an elastic collision and an inelastic collision?