Name: Key Class: Date: _____ ID: A

Physics - Chpt 6 Test

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

C 1. Which has more momentum, a large truck moving at 30 miles per hour or a small truck moving at 30 miles per hour?
   a. Both have the same momentum.
   b. The small truck
   c. The large truck

B 2. A table tennis ball launcher is fired. Compared to the force on the ball, the force on the launcher is
   a. larger.
   b. the same.
   c. smaller.

E 3. A collision is considered elastic if
   a. there is no lasting deformation.
   b. the objects don't stick together.
   c. the objects that collide don't get warmer.
   d. after the collision, the objects have the same shape as before the collision.
   e. all of the above

D 4. Which of the following has the largest momentum?
   a. A large truck parked in a parking lot
   b. A tightrope walker crossing Niagara Falls
   c. The science building at your school
   d. A pickup truck traveling down the highway
   e. A dog running down the street

D 5. A freight train rolls along a track with considerable momentum. If it were to roll at the same speed but had twice as much mass, its momentum would be
   a. zero.
   b. unchanged.
   c. quadrupled.
   d. doubled.

D 6. A car traveling along the highway needs a certain amount of force exerted on it to stop. More stopping force may be required when the car has
   a. less stopping distance.
   b. more momentum.
   c. more mass.
   d. all of the above
   e. none of the above

A 7. A cannon fires a cannonball. The speed of the cannonball will be the same as the speed of the recoiling cannon
   a. if the mass of the cannonball equals the mass of the cannon.
   b. because momentum is conserved.
   c. because velocity is conserved.
   d. because both velocity and momentum are conserved.
   e. none of the above

B 8. A moving freight car runs into an identical car at rest on the track. The cars stick together. Compared to the velocity of the first car before the collision, the velocity of the combined cars after the collision is
a. zero.
b. one half as large.
c. the same.
d. twice as large.
e. More information is needed to say.

B 9. Suppose an astronaut in outer space wishes to toss a ball against a very massive and perfectly elastic concrete wall and catch it as it bounces back. If the ball is as massive as the astronaut, then
a. the astronaut's time between catches will decrease as the game progresses.
b. the astronaut will never catch the first bounce.
c. the astronaut will catch one bounce only.
d. none of the above

A 10. Superman is at rest in space when he throws an asteroid that has more mass than he does. Which moves faster, Superman or the asteroid?
a. Superman
b. The asteroid
c. They both move at the same speed.

B 11. A ball is moving at 6.0 m/s and has a momentum of 24.0 kg·m/s. What is the ball's mass?
a. 0.3 kg
b. 4.0 kg
c. 24.0 kg
d. 144.0 kg
e. none of the above

E 12. The reason padded dashboards are used in cars is that they
a. look nice and feel good.
b. decrease the impulse in a collision.
c. increase the force of impact in a collision.
d. decrease the momentum of a collision.
e. increase the time of impact in a collision.

A 13. The momentum of an object is defined as the object's
a. mass times its velocity.
b. force times the time interval.
c. force times its acceleration.
d. mass times it acceleration.
e. velocity times the time interval.

C 14. A 2-kg ball is thrown at 3 m/s. What is the ball's momentum?
a. 2 kg·m/s
b. 3 kg·m/s
c. 6 kg·m/s
d. 9 kg·m/s
e. none of the above

Name: _____ ID: A

Problem

15. An 8.0 kg blob of clay moving horizontally at 2.0 m/s hits a 3.0 kg blob of clay at rest. What is the **momentum** of the two blobs stuck together immediately after the collision?

$$m_1 V_{1i} + m_2 V_{2i} = (m_1 + m_2) V_f$$

Final momentum

$$(8.0\text{kg})(2.0\text{m/s}) + (3.0\text{kg})(0) = P_f$$

$$P_f = \boxed{16 \text{ kg m/s}}$$

16. A linebacker leaps through the air to tackle another player heading toward him, also in the air. If the 120.0 kg linebacker is heading to the right at 9.0 m/s and the 50.0 kg player is heading toward the left at 2.0 m/s, what is the **speed and direction** of the tangled players?

$$m_1 V_{1i} + m_2 V_{2i} = (m_1 + m_2) V_f$$

$$(120.0\text{kg})(9.0\text{m/s}) + (50.0\text{kg})(-2.0\text{m/s}) = (170.0\text{kg}) V_f$$

$$V_f = \boxed{5.8 \text{ m/s right}}$$

17. What is the decrease of **kinetic energy** from before and after the collision between the two football players?

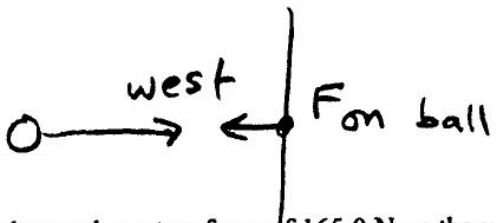
$$KE_{initial} = \tfrac{1}{2}(120.0\text{kg})(9.0\text{m/s})^2 + \tfrac{1}{2}(50.0\text{kg})(2.0\text{m/s})^2$$

$$= 4960 \text{ J (2 s.f.)}$$

$$KE_{final} = \tfrac{1}{2}(170.0\text{kg})(5.8\text{m/s})^2 = 2859.4 \text{ J} \quad (2 \text{ s.f.})$$

$$\Delta KE = KE_f - KE_i = \boxed{2100 \text{ J}}$$

Name: _____ ID: A



18. An baseball(1.1 kg) flies 30.0 m/s west into a window and exerts a force of 165.0 N on the window in a matter of .40 seconds. a) what is the **final speed** of the baseball? b) what **happened** with the baseball and window?

$mv_f - mv_i = Ft$

$(1.1kg)v_f - (1.1kg)(30.0\ m/s) = (-165.0N)(.40s)$

$v_f = -30.\ m/s$ or $\boxed{30.\ m/s\ East}$

b) The baseball bounced off window

19. If the average person weighs 65 kg and the Earth(5.98×10^{24} kg) has 6.707×10^9 people on it, how much would the rotational **speed** of the Earth change if everyone started running West at 4.5 m/s?

$m_1v_{1i} + m_2v_{2i} = m_1v_{1f} + m_2v_{2f}$

$m_{population} = (65kg)(6.707 \times 10^9) = 4.4 \times 10^{11}\ kg$

$0 + 0 = (4.4 \times 10^{11}kg)(-4.5\ m/s) + (5.98 \times 10^{24}kg)(v_{2f})$

$v_{2f} = \boxed{3.3 \times 10^{-13}\ \frac{m}{s}\ East}$

Other

20. Bonus. Suppose energy costs **$.14** per kilowatt-hour. How much would it **cost** to keep a 40.5-watt porch light on all night long (10.5 hours)?

$\#\ kw \cdot hr = (.0405kw)(10.5h) = .425kWh$

$(.425kWh)(\$.14) = \boxed{\$.060}$