St John Baptist De La Salle Catholic School, Addis Ababa

Grade 11 Physics Midterm Examination Solution

3rd Quarter

March 15, 2024

Multiple Choice Questions(Each Question is Worth 1.5 Points)

1. The x and y coordinates of the center of mass of the three-particle system; $6kg$ at $(1m, 3m)$, $4kg$ at $(0, 0)$,and $5kg$ at $(3m, 2m)$ is
   A. 0, 0 B. 2.4m, 3.6m C. 1.5m, 2.9m D. 1.4m, 1.9m E. None of the above
   Answer: D

2. Mass A is initially moving with a velocity of $2m/s$ in the $+x-$direction. Mass B is initially moving with a velocity of $6m/s$ in the $x-$direction. The two objects have equal masses. After they collide, mass A moves with a speed of 4 m/s in the $-x$-direction. What is the final velocity of mass B after the collision?
   A. 6m/s in the $+x$ direction B. 4m/s in the $+x$ direction C. 0 D. 6m/s in the $-x$ direction E. 4m/s in the $+x$ direction
   Answer: C

3. Two objects, A and B, have equal mass. Prior to the collision, mass A is moving 10 m/s in the +x-direction, and mass B is moving 4 m/s in the $+x$-direction. Which of the following results represents an inelastic collision between A and B?
   A. After the collision, mass A is at rest, and mass B moves 14 m/s in the $+x$-direction.
   B. After the collision, mass A moves 4 m/s in the $-x$-direction, and mass B moves 18 m/s in the $+x$-direction.
   C. After the collision, the two masses stick together and move 7 m/s in the $+x$-direction.
   D. After the collision, mass A moves 4 m/s in the $+x$-direction, and mass B moves 10 m/s in the $+x$-direction.

   Answer: C

4. A child bounces a superball on the sidewalk. The linear impulse delivered by the sidewalk is 2.00 N·s during the $\frac{1}{800}$s of contact. What is the magnitude of the average force exerted on the ball by the sidewalk?
   A. 1.60×10^3 N B. 1.40×10^3 N C. 1.20×10^3 N D. 1.00×10^3 N E. None of the above.
   Answer: A

5. Suppose a child drives a bumper car head on into the side rail, which exerts a force of 4000 N on the car for 0.200 s. What is the final velocity of the bumper car if its initial velocity was 2.80 m/s and the car plus driver have a mass of 200 kg? (assume there are no external forces)
   A. -1.2 m/s B. -2 m/s C. 2 m/s D. 1.90 m/s E. None of the above
   Answer: A

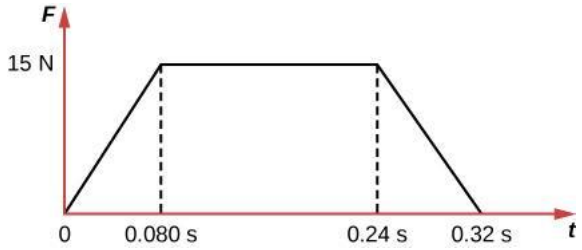
6. A 70.0-kg lacrosse goalie, originally at rest, catches a 0.150-kg ball slapped at him at a velocity of 35.0 m/s. Suppose the goalie and the ice puck have an elastic collision and the puck is reflected back in the direction from which it came. What would their final velocities be in this case?
   A. -20 m/s, 0.08 m/s B. 20 m/s, -0.08 m/s C. -34.9 m/s, 0.150 m/s D. -34.9 m/s, -0.150

m/s E. None of the above
Answer: C

7. A 0.240-kg billiard ball that is moving at 3.00 m/s strikes the bumper of a pool table and bounces straight back at 2.40 m/s. The collision lasts 0.0150 s. What percent of the original energy is left?
A. 32 % B. 64 % C. 96 % D. 50 % E. None of the above
Answer: B

8. A 1.0-kg ball of putty is released from rest and falls vertically 1.5 m until it strikes a hard floor, where it comes to rest in a 0.045-s time interval. What is the magnitude and direction of the average force exerted on the ball by the floor during the collision?
A. 39 N, up B. 120 N, up C. 120 N, down D. 240 N, down E. None of the above
Answer: B

9. The graph in the figure below represents the force exerted on a particle during a collision. What is the magnitude of the change in momentum of the particle as a result of the collision?



A. 1.2 kgm/s B. 2.4 kgm/s C. 3.6 kgm/s D. 4.8 kgm/s E. None of the above
Answer: C

10. How much of a single-stage rocket that is 100,000 kg can be anything but fuel if the rocket is to have a final speed of $8.00 km/s$, given that it expels gases at an exhaust velocity of $2.20 \times 10^3 m/s$?
A. 1.95×10^3 kg B. 2.63×10^3 kg C. 4.51×10^3 kg D. 3.77×10^3 kg E. None of the above.
Answer: B