

Quiz No. 07 (2014 Summer)

PHYS 203A: College Physics

Date: 2014 Jul 17

(Name)

(Signature)

1. **(10 points.)** A cue stick strikes a stationary pool ball, with an average force of 50 N over a time of 10 ms. If the ball has a mass 0.20 kg, what speed does it have just after impact?
2. **(20 points.)** A 5.0 g bullet is fired into a 2.5 kg pendulum bob initially at rest and becomes embedded in it. If the pendulum rises a vertical distance of 4.0 cm, calculate the initial speed of the bullet.
3. **(10 points.)** What fraction of kinetic energy is lost in a completely inelastic collision involving two particles of masses m and M for the case when the mass M is initially at rest? The fraction of kinetic energy lost is defined as

$$\frac{K_i - K_f}{K_i}, \quad (1)$$

where K_i is the initial total kinetic energy and K_f is the final total kinetic energy. Show all the algebraic steps clearly for full credit. Express your answer in terms of m and M .

4. **(20 points.)** A moving object having a kinetic energy of 150 J and a momentum with a magnitude of 30.0 kg-m/s collides with another object of mass 2 kg initially at rest.
 - (a) Determine the mass and speed of the moving object before collision.
 - (b) After collision the two objects stick together. Find the final speed of the two objects.
5. **(20 points.)** Object A is moving due West, while object B is moving due North. They collide and stick together in a completely inelastic collision. Momentum is conserved. Object A has a mass of $m_A = 17.6$ kg and an initial velocity of $v_A = 7.12$ m/s, due West. Object B , however, has a mass of $m_B = 28.9$ kg and an initial velocity of $v_B = 5.30$ m/s, due North. Find (the magnitude and direction) of the velocity of the two-object system after the collision.
6. **(20 points.)** A ball moving at constant speed of 5.13 m/s strikes a block initially at rest on a horizontal frictionless surface. Air resistance is negligible, and the collision is elastic. The masses of the ball and block are, 1.7 kg and 2.41 kg, respectively.
 - (a) Find the velocity (magnitude and direction) of the ball after the collision.
 - (b) Find the velocity (magnitude and direction) of the block after the collision.