Suggested problems
Chapter 09

The quiz questions will be same or very similar to the following text-book problems.
Refer to the course website for the latest version of this document.
You are encouraged to seek the help of your instructor during his office hours.

5. What are (a) the x coordinate and (b) the y coordinate of the center of mass for the uniform plate shown in Fig. 9-38 if L =5.0 cm?

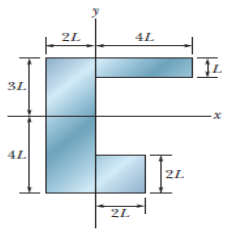

Fig. 9-38 Problem 5.

Answer: (a) – 0.45 cm ; (b) – 2.0 cm

13. A shell is shot with an initial velocity of $\vec{v}_0 = 20$ m/s, at an angle of $\theta_0 = 60°$ with the horizontal. At the top of the trajectory, the shell explodes into two fragments of equal mass (Fig. 9-42). One fragment, whose speed immediately after the explosion is zero, falls vertically. How far from the gun does the other fragment land, assuming that the terrain is level and that air drag is negligible?

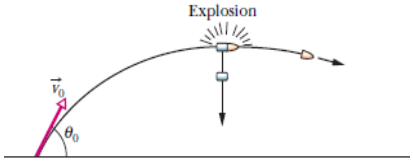

Fig. 9-42 Problem 13.

Answer: 53m

22. Figure 9-47 gives an overhead view of the path taken by a 0.165 kg cue ball as it bounces from a rail of a pool table. The ball's initial speed is 2.00 m/s, and the angle θ_1 is 30.0°. The bounce reverses the y component of the ball's velocity but does not alter the x component. What are (a) angle θ_2 and (b) the change in the ball's linear momentum in unit-vector notation? (The fact that the ball rolls is irrelevant to the problem.)

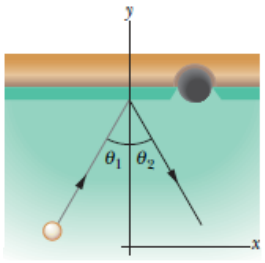

Fig. 9-47 Problem 22.

Answer: (a) 30° (b) $(-0.572\ \text{kg}\cdot\text{m/s})\,\hat{i}$

35. Figure 9-53 shows an approximate plot of force magnitude F versus time t during the collision of a 58 g Superball with a wall. The initial velocity of the ball is 34 m/s perpendicular to the wall; the ball rebounds directly back with approximately the same speed, also perpendicular to the wall.What is F_{max}, the maximum magnitude of the force on the ball from the wall during the collision?

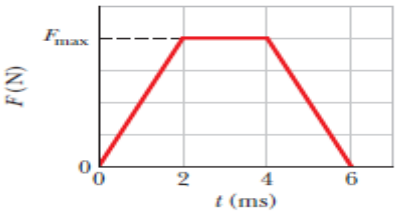

Fig. 9-53 Problem 35.

Answer: 9.9×10^2 N

64. A steel ball of mass 0.500 kg is fastened to a cord that is 70.0 cm long and fixed at the far end.The ball is then released when the cord is horizontal (Fig. 9-65). At the bottom of its path, the ball strikes a 2.50 kg steel block initially at rest on a frictionless surface. The collision is elastic. Find (a) the speed of the ball and (b) the speed of the block, both just after the collision.

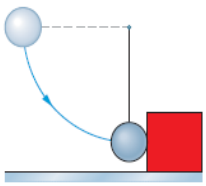

Fig. 9-65 Problem 64.

Answer: (a)– 2.47 m/s; (b) 1.23 m/s

68. In Fig. 9-67, block 1 of mass m_1 slides from rest along a frictionless ramp from height h = 2.50 m and then collides with stationary block 2, which has mass $m_2 = 2.00m_1$. After the collision, block 2 slides into a region where the coefficient of kinetic friction μ_k is 0.500 and comes to a stop in distance d within that region. What is the value of distance d if the collision is (a) elastic and (b) completely inelastic?

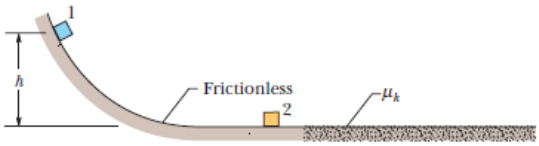

Fig. 9-67 Problem 68.

Answer: (a) d = 2.22 m; (b) d = 0.556 m (one-fourth of the part (a) answer)