Physics 122
Projectiles – Problems

1. Fizzicks jumps off a diving board with a horizontal velocity of +3.1 m/s and lands in the water 1.8 s later. How high was the diving board and how far from the edge of the board did he land? (16 m, 5.6 m)

2. A ball bearing traveling with constant speed rolls off a lab bench that is 0.928 m high. If it hits the ground 0.422 m from the edge of the bench, how fast was the ball bearing rolling across the table initially? (0.970 m/s)

3. Johnny shoots a stone horizontally with a velocity of +25 m/s from his slingshot while standing on the roof of a building on his father's farm. When he dropped an identical stone from the same spot, it took 1.85 s to hit the ground. What was the height of the building? (16.8 m)

4. A stone is thrown horizontally from a cliff 15.0 m high.
    a) The initial velocity is +24.0 m/s. How far from the base of the cliff does the stone strike the ground? (42.0 m)
    b) What is the final vertical velocity of the stone just before the stone hits the ground? (-17.1 m/s)
    c) Calculate the velocity of the stone just before the stone hits the ground? (29.5 m/s, 35.5^o S of E)

5. A cannon ball is fired from a cannon. If the initial horizontal and vertical components of the velocity are +32 m/s and +27 m/s respectively, at what angle was the cannon ball launched and at what speed was it fired? (40^o to the horizontal, 42 m/s)

6. A projectile fired at an angle remains in the air for 8.42 s after it is fired. The initial horizontal component of its velocity is +150 m/s.
    a) How far forward did the projectile move forward before it hit the ground? (1.26×10^3 m)
    b) How long after being fired did it reach its maximum height? (4.21 s)

7. A ball is thrown from the top of one building toward the wall of a second taller building 15.2 m away. The ball is thrown with an initial velocity of 6.10 m/s at an angle of 40.0^o to the horizontal. How far below its original position does the ball hit the second building? (39.1 m below its original position)

8. A baseball player throws a ball from center field to home plate with a velocity of 35.0 m/s at an angle of 30.0^o with the ground. Assuming the ball is caught at the same height at which it was thrown, calculate the horizontal distance traveled by the ball before it is caught. (108 m)

9. A projectile is fired with an initial velocity of 75.2 m/s at an angle of 34.5^o above the horizontal along a long flat firing range. Determine the
    a) maximum height reached by the projectile (92.7 m)
    b) range of the projectile (539 m)
    c) speed of the projectile 1.50 s after being fired (68.0 m/s)

LEVEL 1

10. A hockey player hits a puck with his hockey stick and the puck is launched at an angle of 45^o to the ice surface. The puck hits the ice 35 m down the length of the rink. Find the velocity of the puck when it left the hockey stick. (19 m/s at 45^o to the horizontal)
11. Text, Page 549 PP #14.