Projectile Motion Extra Practice

1. Billy stands on the Talahatchee Bridge kicking stones into the water below. (a) If Bill kicks a stone with a horizontal velocity of 3.5 m/s, and it lands in the water a horizontal distance of 5.40 m from where Bill is standing, what is the height of the bridge? (b) If the stone had been kicked at 6 m/s, how would this affect the time it would take to fall?

2. Tad drops a cherry pit out the car window 1.0 m above the ground while traveling down the road at 18 m/s. (a) How far, horizontally, from the initial dropping point will the pit hit the ground? (b) Where will the car be in relation to the pit when it lands?

3. Ferdinand the frog is hopping from lily pad to lily pad in search of a good fly for lunch. If the lily pads are spaced 2.4 m apart, and Ferdinand jumps with a speed of 5 m/s, taking 0.6 s to go from lily pad to lily pad, at what angle must Ferdinand make each of his jumps?

4. At her wedding, Jennifer lines up all the single ladies in a straight line away from her in preparation for the tossing of the bridal bouquet. She stands Kelly at 1.0 m, Kendra at 1.5 m, Mary at 2.0 m, Kristin at 2.5 m, and Lauren at 3.0 m. Jennifer turns around and tosses the bouquet behind her with a speed of 3.9 m/s at an angle of 50º from the horizontal, and it is caught at the same height 0.6 s later. (a) Who catches the bridal bouquet? (b) Who might have caught it if she had thrown it more slowly?

5. Jack be nimble, Jack be quick, Jack jumped over the candlestick with a velocity of 5.0 m/s at an angle of 30º to the horizontal. Did Jack burn his feet on the 0.25 m high candle?

6. Esther dives off the 3 m high springboard and initially bounces up with a velocity of 8.0 m/s at an angle of 80º to the horizontal. (a) How high does she go? (b) How long does it take her to hit the pool? (c) What is her range? (d) What other angle could she have jumped at to achieve the same range?

7. The Essex county sheriff is trying to determine the speed of a car that slid off a small bridge on a snowy New England night and landed in a snow pile 4.0 m below the level road. The tire tracks in the snow show that the car landed 12.0 m horizontally from the bridge. How fast was the car going when it left the road?

8. Superman is said to be able to "leap tall buildings in a single bound." How high a building could Superman jump over if he were to leave the ground with a speed of 60.0 m/s at an angle of 75º?

9. Len is running to school and leaping over puddles as he goes. From the edge of a 1.5 m long puddle, Len jumps 20 cm high off the ground with a horizontal velocity of 3.0 m/s in an attempt to clear it. Does Len make it over the puddle without getting wet?

10. You are on a building with a snowball. You see your favorite Physics teacher walking by about 10 m away from you. How fast must you throw the snow ball to hit him (assume you hit him on the foot and you throw the snow ball horizontally from a height of 5.5 m).

11. A baseball is hit horizontally. It leaves the bat with a speed of 40 m/s. The batter hit the ball at a height of 1 m above the ground. What distance does it travel before it hits the ground?

12. Mubarak jumps and shoots a basketball from the end of the court into the basket at the other end, a distance of 27.6 m. The ball is given an initial velocity of 17.1 m/s at an angle of 40º from a height of 2.0 m above the ground. What is its velocity (magnitude and direction) as it hits the basket 3.0 m above the ground?

13. An astronaut stands on the edge of a lunar crater and throws a half-eaten Twinkie horizontally with a velocity of 5.00 m/s. The floor of the crater is 100.0 m below the astronaut. What horizontal distance will the Twinkie™ travel before hitting the floor of the crater? (The acceleration of gravity on the moon is 1/6th that of the Earth).