Unit 2 Worksheet 4: Projectile Motion Problems

1. In 1945, the Enola Gay, a B-29 bomber, dropped the atomic bomb from a height of 9450 m over Hiroshima, Japan. If the plane carrying the bomb was traveling with a horizontal velocity of 67 m/s, (a) how far horizontally would the bomb have traveled between the point of release and the point where it exploded which was 513 m above the ground? (To avoid being above the bomb when it exploded, the Enola Gay turned sharply away after the bomb's release.) (b) How would your answer to (a) change if the plane was moving slower?

2. Billy Joe stands on the Talahatchee Bridge kicking stones into the water below. (a) If Billy Joe kicks a stone with a horizontal velocity of 3.50 m/s, and it lands in the water a horizontal distance of 5.40 m from where Billy Joe is standing, what is the height of the bridge? (b) If the stone had been kicked harder, how would this affect the time it would take to fall?

3. Jack be nimble, Jack be quick, Jack jumped over the candlestick with a velocity of 5 m/s at 30° above the horizontal. Did Jack burn his feet if the candle is 0.25 m high?

4. Superman is said to be able to "leap tall buildings in a single bound." (a) How high a building could Superman jump over if he were to leave the ground with a speed of 60 m/s at a 75° angle above the horizontal? (b) If the angle was decreased how would that change your answer to (a)? Explain how you know.

5. Len is running to school and leaping over puddles as he goes. From the edge of a 1.5 m long puddle, Len jumps 0.20 m high off the ground with a horizontal velocity component of 3.0 m/s in an attempt to clear it. Determine whether or not Len sits in school with wet socks.

6. You want to kick a soccer ball as far as possible. A) If you can kick it with a velocity of 12.0 m/s, what is the best angle to throw the ball (30°, 45°, or 60°)? Prove your answer by showing work. B) which angle will make the ball go the highest? C) Which angle will cause the ball to be in the air the least amount of time?

7. While skiing, Jack encounters an unexpected icy bump, which causes him to leave the ground with a velocity of 12 m/s at a 36° to the horizontal. What will be the range (how far horizontally) of his jump if he lands a distance 7.0 m below his original height?

8. During a family reunion you decide it would be fun to launch water balloons during picture time. You can get a maximum release velocity of 15 m/s at a 35° angle and the balloon releases 2.0 m above the ground. A) What is the maximum height the balloon will reach? B) What is the range the balloon will cover? C) What will be the overall velocity of the balloon when it hits the ground?