Physics 12

Assignment #10

Projectile Motion

Due Friday, June 2nd, 2017

1. Trailing by 2 points, and with only 1.5 seconds left on the clock in a high school basketball game, Stretch Jones throws up a jump shot at an angle of 55° at a velocity of 8.0m/s. The release point is 2.55m above the floor and the basket is 3.05m. He hits the shot. a) How much time is left on the clock when the basket is made? b) If the 3-point line is at a radius of 6.02m from the basket, did he tie the game or win the game?

2. A hunter aims a rifle directly at a squirrel on a branch of a tree. The squirrel sees the flash of the rifle's firing. Should it stay where it is or drop from the branch in free fall at the instant the rifle is fired? Explain.

3. A stunt rider is attempting to jump her motorcycle over a line of buses parked end to end by driving up a 32° ramp at a speed of 30m/s. How many buses can she clear if the top of the takeoff ramp is at the same height as the bus tops and the buses are 20.0m long?

4. A football is kicked at 52° from the ground level and travels 60 yards before hitting the ground.   a) What was the initial velocity? b) How long was the ball in the air? c) How high did it go?

PRACTICE QUESTIONS

5. A girl throws a water-filled balloon at an angle of 50° above the horizontal with a speed of 12.0 m/s. The horizontal component of the balloon's velocity is directed toward a car that is approaching the girl at a constant speed of 8.00 m/s. a) If the balloon is to hit the car at the same height at which it leaves her hand, what is the distance the car can be from the girl when the balloon is thrown? b) What is the maximum height of the ball? **(29.94m, 4.31m)**

6. You are playing tennis and get a little under the ball and hit it over the fence, which is 4.8 meters high. The ball lands at a distance of 12.4m away from the fence. You throw the ball back towards the court with an initial velocity of 12.1m/s at an angle of 55°. The ball is 1.05m high when you release it. Did the ball go over the fence, hit the fence or land before the fence? **(Hits the fence)**

7. A small airplane is traveling with a velocity 270mph at an altitude of 10 000ft when the plane's wheel falls off. How far will the plane travel before the wheel hits the ground? **(1.87miles)**

8. A baseball player hits a baseball at an initial velocity of 30.0m/s at an angle of 50°. Immediately after the ball is hit an outfielder runs at 4.0m/s toward the infield and catches it at the same height as it was hit.(1.5m) (a) Find the time it takes to get to maximum height. b) Find the maximum height that the object reaches above the ground. c) When is the ball caught? d) How far away was the outfielder from the batter initially? **(2.345sec, 28.44m, 4.69s, 109.2m)**

9. A girl, standing on top of a small building 4.00 m high throws a Molotov cocktail with an initial velocity of 15.0 m/s at an angle of 25° with the ground.   (a) Find the maximum height that the object reaches above the ground. (b) Find the total time it is in the air. (c) Find the range of the Molotov cocktail. **(6.05m, 1.758s, 23.90m)**

10. A ball is hit at 20m/s at 60° towards a fence that is 30m away and is 8m high. If the ball is hit from a height of 1m will it clear the fence? **(yes)**

11. A football kicker kicks a successful field goal from a distance of 40 yards away from the goal post. Find the initial velocity of the football if he kicks it an angle of 40° and it clears the crossbar by 5ft. The height of the crossbar is 10ft. State your answer in ft/s.