

Physics 151 Class Exercise: Projectile Motion

1. A golfer tees off on level ground, giving the ball an initial speed of 52 m/s and in initial direction of 32° above the horizontal.

a) Make a drawing of the golfer and the ball's trajectory. Clearly indicate the origin and the direction of the x and y axes.

b) Calculate the initial velocities in the x and y directions.

c) Calculate the length of time it takes the ball to reach the peak of its trajectory?

Known:

Solve:

Not Involved:

d) Calculate the total length of time the ball is in the air.

e) Calculate the distance from the tee where the ball lands.

f) Check this value by recalculating it using the Horizontal Range formula.

2. An artillery officer is practicing on a firing range on a flat stretch of ground. She endeavors to hit a target 885m away with an artillery shell. The artillery gun fires shells with a muzzle velocity of 96.1 m/s.

a) At what **angles** can she orient the gun. (Hint: Consider the angles/quadrants where two angles have the same sin value.)

b) What is the difference in “time to impact” for the two trajectories.

c) What is the difference in “peak height” for the two trajectories.

Known:

Solve:

Not Involved:

d) Draw a crude sketch of the gun, target, and the two trajectories in the space below.