Projectile Practice Problems

For this sheet, you will need to show your work on a separate sheet of paper—there is not enough room to properly show your work. For each problem, be sure to write out all the necessary variables, both known and unknown, as well as draw a picture with the appropriate variables labeled. Please write your final answers on this sheet, however, and do not forget to have units with every number needing units!

**Problem 1**

Sharon Steady and Al Wayskachon won South’s recent egg toss contest held during Homecoming week. In their winning toss, Sharon gave the egg an underhand toss, releasing it with a velocity of 8.06 m/s at an angle of 30° to the horizontal. To the pleasure of the crowd, Al caught the egg at the same height as the toss without even a fracture to its shell.

a. Calculate the horizontal and vertical components of the initial velocity.

b. Calculate the time for the egg to reach the midpoint of the trajectory.

c. Calculate the total time the egg is in the air.

d. Calculate the horizontal distance which the egg traveled from Sharon to Al.

e. Calculate the height of the egg (relative to the release point) when it was at the peak of its trajectory.

**Problem 2**

Li Ping Phar, the famous Chinese ski jumper, leaves the ramp with an initial velocity of 34.9 m/s at an angle of 35°.

a. Determine the total time of flight.

b. Determine the horizontal displacement.

c. Determine the peak height (relative to the starting height). Assume that Li lands at the same height as the top of the ramp and that Li is a projectile.

**Problem 3**

A tennis player stretches out to reach a ball that is just barely above the ground and successfully 'lobs' it over her opponent's head. The ball is hit with a speed of 18.7 m/s at an angle of 65.1 degrees.

a. Determine the time that the ball is in the air.

b. Determine the maximum height which the ball reaches.

c. Determine the distance the ball travels horizontally before landing.

**Problem 4**

On New Year’s eve of 2007, Robbie Maddison set the world record for the longest motorcycle jump, traveling 98.3 m through the air from ramp to ramp. (The record has since been broken several times by Maddision himself.) Assuming a launch angle of 45°, insignificant air resistance and a landing location at the same height as the launch height, determine the speed with which Maddison left the ramp.

**Problem 5**

Mr. Udadi takes his three children to the park for some summertime recreation. Olive Udadi is enjoying swinging and jumping. On one jump, Olive leaves the swing at a 30° angle to the horizontal with a speed of 2.2 m/s. She lands on the ground a horizontal distance of 1.09 m from the launch location.

a. Determine the horizontal and the vertical components of the initial velocity.

b. Determine the time which Olive is in the air.

c. Determine the vertical height (relative to the landing location) from which Olive jumps from the swing.

**Problem 6**

In an apparent effort to earn an appearance on the Destroyed in Seconds show, Caleb attempts a bicycle maneuver in which he jumps between two ramps whose elevated edges are located a distance of 1.8 meters apart. The ramps are angled at 35° and located at the same height. Determine the speed (in m/s and mi/hr) that Caleb must acquire to accomplish this stunt. (Given: 1.00 m/s = 2.24 mi/hr)

**Problem 7**

Albert is South’s star punter for the varsity football team. His best hang time this past season was for a punt which he kicked at 74° above the horizontal. The punt had a 6.2 second hang time.

a. Determine the speed at which the ball was punted.

b. Determine the horizontal distance which the ball traveled.