

Recitation 2.2 Shooter Project

Objective: Review the basics of projectile motion while working together as a team to build a “shooter”

Given: Materials to build a “shooter”.

Tasks:

0. Separate into teams. Get to know your team members. Record their names and emails here:

Name	e-mail	Other info (e.g. Facebook, etc)

1. Build a shooter that can be used for shooting plastic golf balls.

2. Determine the initial velocity of the plastic golf ball for the shooter. To do this, lay the shooter flat on the table so it shoots horizontally. Measure the height from the bottom of the plastic golf ball to the floor. Based on this height, calculate the time it would take the ball to drop to the floor (vertical motion). Based on this time and the measured distance the ball travels, determine the initial velocity. Make at least three trials to get an average horizontal distance. Develop some method so the shooter can be shot consistently each time.

height = _____ *distance* = _____

calculated time = _____ *velocity* = _____

3. Set your shooter on the table so that it has an angle of 30° with respect to the table.

A. Measure the height from which the golf ball will be shot. $h =$ _____

B. Calculate the horizontal distance the ball should travel before hitting the floor. $x_{theoretical} =$ _____

C. Shoot the ball five times, measure where the ball hits, and calculate an average value.

$x_1 =$ _____

$x_{average} =$ _____

$x_2 =$ _____

$x_3 =$ _____

$x_4 =$ _____

$x_5 =$ _____

D. What is the percent error? $((\text{theoretical} - \text{actual}) / \text{theoretical}) * 100\%$

% error = _____

4. Prepare for the contest.

- A. Based on dimensions given to you in recitation (height and location of target), make preliminary calculations on what you need to do to get the golf ball in the target (angle and speed of launch).

angle = _____

speed = _____

- B. Practice with your shooter so that you are prepared for the competition, making any necessary adjustments to your shooter. Hint: Winning shooters are ones that are consistent.

5. Competition:

You will have two minutes to get your plastic golf ball into the target as many times as possible. You are only allowed one golf ball, and you cannot steal others team's golf ball or block other shots. Record your results.

Number of shots taken _____ Number of shots made _____

High scoring teams will move to the championship round to determine section winners.

Bonus Points: 10 pts for winning team; 5 pts for second place.

6. Complete the web form. To do this you must have the information from above. Your information should match that of your team members.