

Experiment in Physics Lab: Projectile Motion

Name _____

Objective

1. Learn to analyze the projectile motion of an object when only gravity is influencing the motion.
2. Use PhET interactive simulation tool.

Equipment

PhET interactive simulation tool

<https://phet.colorado.edu/en/simulation/projectile-motion>

Procedures

1. Click the above http link, you will see



2. Click ▲, then click on Intro you will see



You notice that the range or the position of target, the angle of cannon and the speed of projectile can all be changed by clicking and dragging on each of them.

Procedure 1

- Choose a height of 10 m for cannon and initial angle θ_i equal to zero degree. Keep adjusting the initial velocity V_i of the shell and hit the red button until the shell hits right in the middle of the target. Do this for the target positions listed in table 1. Using the kinematic equations, compute the value of V_i for each case and find the percent error between the computed value and the accepted value provided by Phet simulation.
Percent error = $\left[\frac{(\text{computed value} - \text{accepted value})}{(\text{accepted value})} \right] \times 100\%$
- Submit your calculations for V_i for target positions 10 m and 30 m in the calculation section at end of this report along with screenshot of corresponding Phet situation.

Table 1

Initial angle	Height of cannon	Target position X	Accepted V_i	Computed V_i	Percent error
0	10 m	10.0 m			
0	10 m	15.7 m			
0	10 m	19.8 m			
0	10 m	24.2 m			
0	10 m	30 m			

Procedure 2

- a) Choose a height of 12 m for cannon and vary the initial angle θ_i as shown in the below table 2. For each case, read the position X where the shell hits the target and list it in the table. Using the kinematic equations, compute the value for X for each angle and find the percent error between the computed value and the accepted value provided by Phet simulation.

$$\text{Percent error} = \left[\frac{(\text{computed value} - \text{accepted value})}{(\text{accepted value})} \right] \times 100\%$$

p.s your error should not be larger than 10%

- b) Show your calculations for the target position X for all three angle in the calculation section at end of this report along with screenshot of corresponding simulation.

Table 2

Initial angle V_i	Height of cannon	Accepted X	Computed X	Percent error
-20° below horizontal	12 m			
+40° above horizontal	12 m			
+60° above horizontal	12 m			

Calculation

- 2) Show your calculations for the target position X for all three angles, and attach corresponding phet screenshots.

Conclusion