Cornell Notes

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Topic: Physics - Projectile Motion | Class/Subject: Fragoso Per 4

11:20

*Homework:

Computer Lab - An Investigation of Projectile Motion worksheet

- Finish worksheet

Cornell Notes

Name

Date

Topic

Class
Subject

Name, Date, Period_____

An Investigation of Projectile Motion

Introduction

In this activity, you will be acting as an artillery sergeant for the United States Army. Your commanding officer has assigned you the task of identifying and explaining the factors that affect artillery fire. These factors include the object being fired, angle of fire, and the initial velocity of the fired object. In this activity, you will use a computer simulation to investigate the variables of projectile motion.

The main objective of this activity is to:

- Investigate the launch angle, initial velocity, and size & shape of a projectile in order to explain how these variables affect the projectile's motion.

Materials

- Computer
- Writing Utensil
- Brain

Methods

a) **What do you think?** Think about a ball flying through the air, a cannon ball fired from a cannon, or any form of projectile motion. There are many possible things that affect the trajectory (motion) of the projectile. The most important of these factors are the angle, the initial velocity, and the size & shape of the object being fired. Think about each variable and describe how it may affect a projectile in motion.

b) **Now Experiment and Record Observations.** Go to the PHET website http://phet.colorado.edu, click on "Simulations," scroll down, and select the "**Projectile Motion**" simulation. You will investigate how the three variables from part a) affect projectile motion. You want to focus particularly on the maximum height and maximum range of the projectile.

NOTE: Set the following parameters. These parameters will be known as the "DEFAULT PARAMETERS."

Object = "tankshell"
Angle (degrees) = 80°
Initial Speed (m/s) = 18 m/s
Altitude (m) = 0 m
Air Resistance should not be checked

All other parameters should be controlled by the simulation. DO NOT change them!

Launch the projectile by clicking 'Fire' and record the measurments for:
Range_____
Height_____
Time_____

1. How do you think changing the angle will affect projectile motion?

2. Change the angle option to read 15° and then click fire, and observe the resulting motion path. When it finishes, repeat the instructions, but use angles of 30°, 45°, 60°, 75°. Determine the trend of the data. That is, compare the motion paths of each angle, and write your observations below.

3. How does initial velocity affect projectile motion? Reset the parameters to DEFAULT conditions specified above and click the "Erase" button (this should erase all your motion paths from above). Now change the initial velocity to 15 m/s and click fire, and observe the resulting motion path. When it finishes, repeat the instructions, but use 18 m/s, 21 m/s, 24 m/s, 27 m/s, and 30 m/s. Determine the trend of the data, and write your observations below.

4. How does size & shape affect projectile motion? Reset the parameters to DEFAULT conditions and click on the "Erase" button. Now change the object to a baseball, click on fire, and observe the motion path. Repeat the instructions for a bowling ball, adult human, piano, and Buick. What do you notice about the motion paths?

5. How does size & shape affect projectile motion? Reset the parameters to default and click on the "Erase" button. Now repeat part 3, but check the air resistance box. Observe the motion paths and record your observations below. Be sure to think about the size, shape, and weight of each object.

Please use this space to make any additional notes and write your conclusions about what you learned from this virtual lab.