

# LAB #3 INVESTIGATING PROJECTILE MOTION

## PHYS 1110 CONCEPTUAL PHYSICS

Instructor: \_\_\_\_\_  
 Results: \_\_\_\_\_ (20 pts max)

Name: \_\_\_\_\_  
 Date: 02/20/20

### GETTING STARTED

- Open Google Chrome or other compatible browser and disable all browser pop-up blockers.
- Go to <https://phet.colorado.edu/en/simulation/legacy/projectile-motion>
- Click Play symbol "▶" and select "OK" in the pop-up dialog box.



### OBJECTIVES

- Predict how varying conditions will effect the path of a projectile and explain your reasoning.
- Use the PhET simulation to confirm or disprove your predictions.
- Explain why your predictions were correct or incorrect.

### DATA COLLECTION

1. Look at the "height" box at the top. What kinematics term does it actually stand for, and what point is it relative to? (Hint: shoot the cannon once and watch the number closely). Explain your reasoning.  
It stands for displacement above initial point where the objects are fired.

2. Fire the projectile launcher straight upwards (angle = 90°) at 18 m/s. Using kinematics, determine:

a. the time it should take the projectile to reach maximum height

$$+y \quad \downarrow a = -9.8 \text{ m/s}^2$$

$$\updownarrow \quad v_i = 18 \text{ m/s}$$

$$-y \quad \uparrow v_f = 0$$

$$t = ?$$

$$d = ?$$

$$v_f^0 = v_i + at_{\text{up}}$$

$$\frac{-v_i}{a} = t_{\text{up}} = \frac{-(18 \text{ m/s})}{-9.8 \text{ m/s}^2} = 1.84$$

$$t_{\text{total}} = 2t_{\text{up}} = \boxed{3.7 \text{ s}}$$

b. the maximum height reached by the projectile

$$v_f^0 = v_i^2 + 2ad$$

$$\frac{-v_i^2}{2a} = d = \frac{-(18 \text{ m/s})^2}{2(-9.8 \text{ m/s}^2)} = 16.5 \text{ m}$$

height above cannon's level →  
 height above ground = 16.5 m + 1.2 m =  $\boxed{17.7 \text{ m}}$

c. Now, using the measuring tape, measure the actual height reached by the projectile (remember to measure from the little plus sign at the base of the cannon). Was your answer to (b) the same as this measurement? If it wasn't, check your math over and find your mistake.

If the calculations + measurements were done correctly it should be the same.

# Projectile Motion Simulation Lab Answers

**Judd E. Hollander**



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