ABRHS PHYSICS (CP) NAME: KEY

Projectile Motion II

1. A projectile was fired ~~horizontally~~ off a lab table. The initial height of the projectile was 1.1 meters and it landed 3.2 meters away horizontally. What was the initial speed of the projectile?

$y = -1.1\ m$

$x = 3.2\ m$

$a = -10\ m/s^2$

$v_{y_i} = 0\ m/s^2$

$y = \frac{1}{2}at^2 + v_{y_i}t$

$-1.1 = \frac{1}{2}(-10)t^2 + (0)t$

$-1.1 = -5t^2$

$t^2 = .22$

$t = 0.47$

$x = v_x t$

$3.2 = v_x (0.47)$

$v_x = 6.82\ m/s$

2. Yet another projectile was launched and landed 7 meters away on a platform that was the same height as the initial height of the projectile in 1.2 seconds. What was the initial speed of the projectile?

Need to find v_x & v_{y_i} first!

$x = 7\ m$

$t_{total} = 1.2\ s$

$x = v_x t$

$7 = v_x (1.2)$

$v_x = 5.83\ m/s$

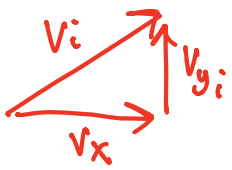
Since total time is 1.2 seconds, it only took half of that to reach its maximum height.

∴ @ Max height $v_y = 0\ m/s$ & $t = 0.6\ s$

$v_y = at + v_{y_i}$

$0 = -10(.6) + v_{y_i}$

$v_{y_i} = 6\ m/s$



Finally, Vectors!

$v^2 = v_x^2 + v_{y_i}^2$

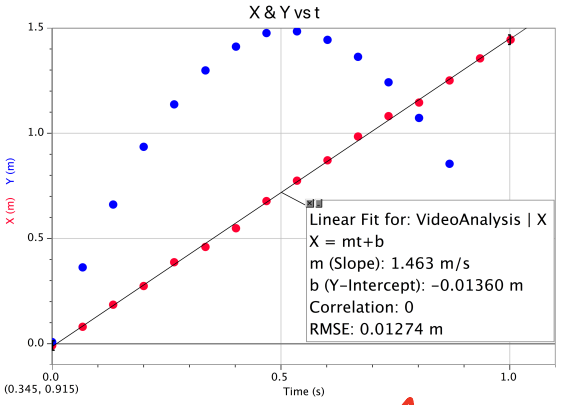
$v^2 = (5.83)^2 + (6)^2$

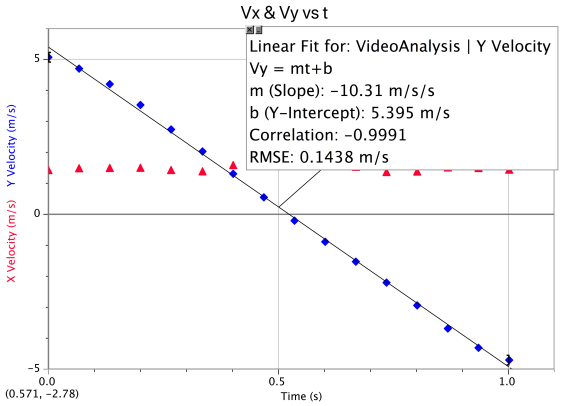
$v^2 = 70$

$v = 8.37\ m/s$

Projectile Motion II

3. This time a video was made of a projectile being launched, and after analyzing the video, the following graphs were made. What was the initial speed of the projectile?





This slope is V_x

$\therefore V_x = 1.46$ m/s

This Y intercept is V_{y_i}

$\therefore V_{y_i} = 5.40$ m/s

So

$$V^2 = V_x^2 + V_{y_i}^2$$

$$V^2 = (1.46)^2 + (5.4)^2$$

$$V^2 = 31.29$$

$$V = 5.59 \text{ m/s}$$

Answers: *1) 6.8 m/s* *2) 8.4 m/s* *3) 5.6 m/s*