Projectile Motion Lab

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Honors Physics F

Purpose: To analyze the projectile motion using the laptop video analysis

Background: The projectile motion is defined as motion without wings, propulsion, friction under the influence of gravity (formula: Range= $V_o{}^2/g \sin(2\theta)$)

Materials:
-Laptop computer with camera
-Logger Pro
-Meter stick
-Ball
-Cone
-Hat

Procedure:
1) Set up the meter stick (use the cone to stabilize it.)
2) Put a hat on top of the meter stick, so you can see the meter stick
3) Set up laptop facing the throw
4) Throw the ball while starting the video capture
5) Retrieve the ball
6) On logger pro, put dots on the graph
7) Analyze the graph, x velocity and y velocity gravity from $s=1/2at^2$

Data:
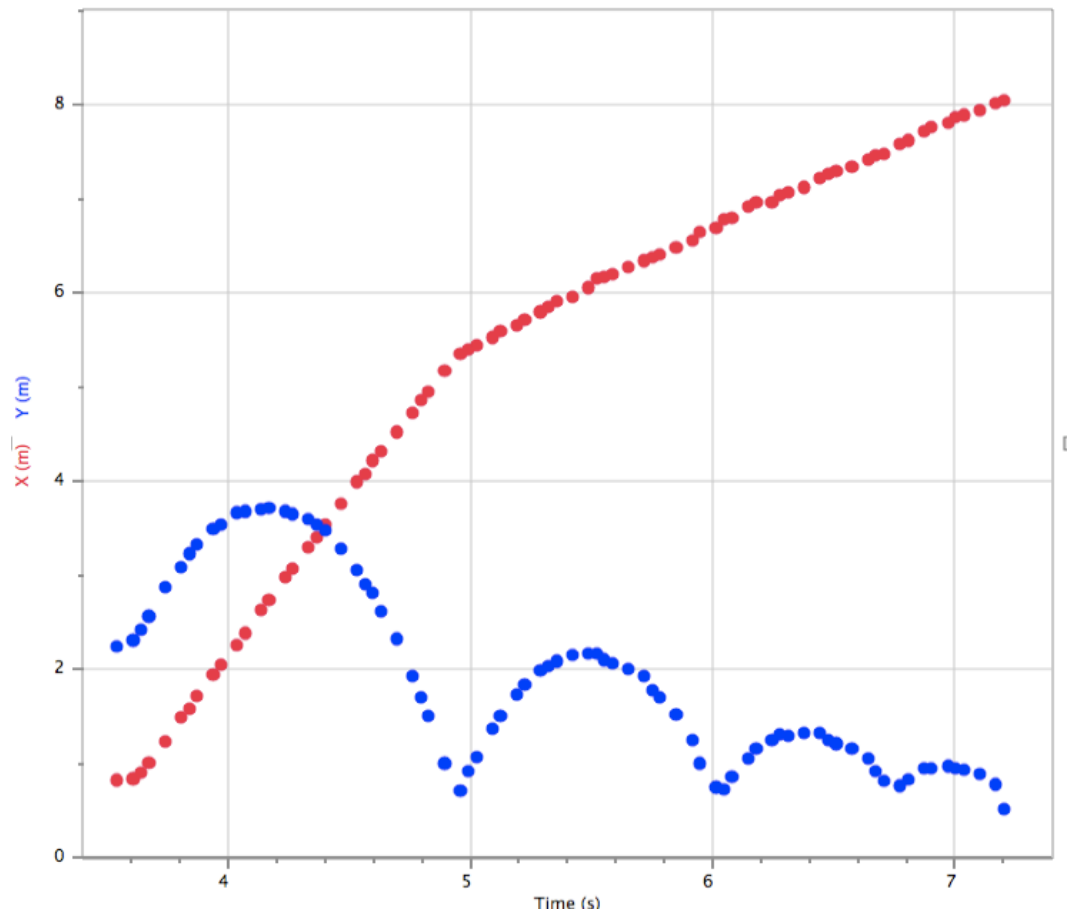
	VideoAnalysis				
	Time (s)	X (m)	Y (m)	Vx (m/s)	Vy (m/s)
1	3.540	0.8246	2.249	0.628	1.483
2	3.607	0.8405	2.313	1.232	2.232
3	3.640	0.9043	2.426	2.469	3.569
4	3.672	1.016	2.571	3.231	4.147
5	3.738	1.239	2.878	3.503	3.933
6	3.805	1.495	3.087	3.518	3.646
7	3.838	1.590	3.233	3.477	3.431
8	3.870	1.718	3.329	3.487	2.668
9	3.937	1.941	3.491	3.377	2.164
10	3.970	2.053	3.539	3.340	1.761
11	4.035	2.261	3.668	3.457	1.308
12	4.068	2.388	3.684	3.660	0.571
13	4.135	2.643	3.700	3.565	0.255
14	4.167	2.739	3.716	3.439	-0.172
15	4.233	2.978	3.684	3.358	-0.568
16	4.267	3.074	3.652	3.314	-0.851
17	4.332	3.298	3.604	3.402	-1.241
18	4.365	3.409	3.539	3.522	-1.944
19	4.398	3.537	3.475	3.500	-2.628
20	4.465	3.760	3.281	3.465	-3.146
21	4.530	4.000	3.055	3.351	-3.579
22	4.563	4.079	2.910	3.371	-3.807
23	4.597	4.223	2.813	3.451	-4.460
24	4.628	4.319	2.620	3.183	-4.965
25	4.695	4.526	2.329	3.184	-5.359
26	4.762	4.734	1.926	3.286	-6.030
27	4.795	4.861	1.701	3.341	-6.409
28	4.827	4.957	1.507	3.170	-6.364
29	4.893	5.180	1.007	2.889	-4.854
30	4.958	5.356	0.7168	2.344	-1.323
31	4.992	5.404	0.9265	1.666	3.284

Observations: During the couple times that we experimented on throwing the ball, the majority of the time it would roll down the hill. When it was thrown I saw the acceleration and the velocity of the ball increased. Our ball bounced a couple times slowly before rolling, the velocity decreased during that time.

Analysis: Our graph did show what we were trying to find, we were able to graph the movement of the ball, the velocity and acceleration kept changing. One of the

errors that we may have had in our graph was that we had a hat over our meter stick which could have altered the real measurements by a bit. Also having logger pro on our dorm computers may have helped because then we wouldn't have had to rush while making the graphs.

Conclusion: In this experiment we were able to find the acceleration and velocity of the ball's movement using the laptop camera. Using logger pro, we were able to find the x and the y axis of the movement of the ball by marking its movement. In the future it would have helped if we could of seen our meter stick, so that we don't have to put a hat on top of the meter stick. Other than that our only problem was getting the ball after rolling down the hill.