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APPB
B_Wiecking

Title: Projectile Motion

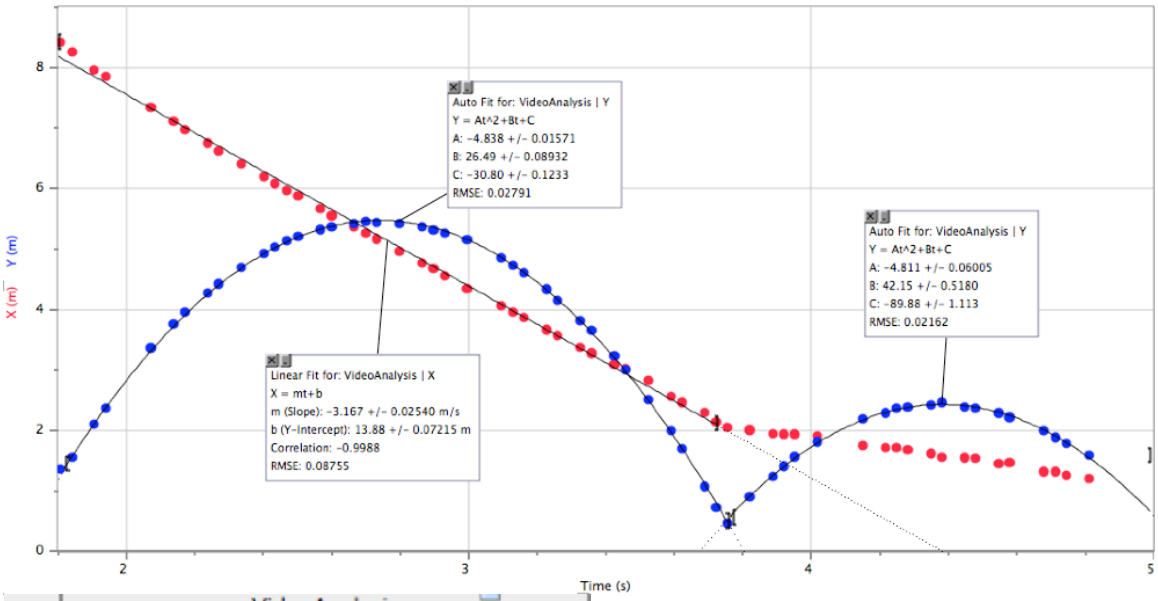
Purpose: To analyze projectile motion using video analysis.

Background: Projectiles are defined as object moving:
- Under the force of gravity
- No propulsion
- No wings
- In ideal situations, air resistance is ignored
- A parabolic curve is of y= Ax2 when graphed over time

Material:
- Logger Pro 3.5
- Computer with video camera
- Meter stick
- Ball
- 2 Markers / cones

Procedure
- Set up the computer and open Logger Pro 3.5.
- Select an open field and set up the meter stick. Place a marker or cone at the ends of the meter stick.
- Start the video and throw the ball. Make sure the ball and the thrower are within the camera frame.
- Stop the camera.
- Use the tracking dots in Logger Pro 3.5, track the path of the ball's move.
- Auto graph the graphs.
- Analyze the graphs with the quadratic formula of y=mt+b.

Data



	VideoAnalysis				
	Time (s)	X (m)	Y (m)	Vx (m/s)	Vy (m/s)
1	1.808	8.422	1.364	-4.630	6.602
2	1.842	8.265	1.552	-4.458	7.562
3	1.907	7.965	2.103	-4.145	7.872
4	1.940	7.851	2.364	-3.873	7.492
5	2.072	7.336	3.365	-3.770	6.996
6	2.138	7.108	3.757	-3.709	6.189
7	2.172	6.965	3.960	-3.625	5.420
8	2.237	6.751	4.279	-3.507	4.749
9	2.270	6.622	4.424	-3.439	4.264
10	2.335	6.408	4.700	-3.318	3.855
11	2.402	6.194	4.932	-3.295	3.446
12	2.435	6.079	5.033	-3.309	3.043
13	2.468	5.965	5.135	-3.107	2.516
14	2.502	5.879	5.207	-3.118	1.945
15	2.567	5.665	5.323	-3.203	1.569
16	2.600	5.551	5.367	-3.073	1.127
17	2.665	5.365	5.425	-2.977	0.799
18	2.698	5.265	5.454	-2.990	0.231
19	2.732	5.165	5.439	-2.998	-0.275
20	2.798	4.965	5.425	-3.016	-0.619
21	2.863	4.765	5.367	-2.999	-1.054
22	2.897	4.679	5.309	-3.153	-1.495
23	2.930	4.551	5.265	-3.190	-1.893
24	2.995	4.351	5.149	-3.026	-2.489
25	3.095	4.065	4.859	-3.006	-3.014
26	3.128	3.951	4.729	-3.023	-3.629
27	3.160	3.865	4.613	-2.954	-4.101
28	3.227	3.665	4.337	-2.966	-4.631
29	3.260	3.565	4.148	-2.919	-5.103

Observations:

In the video, it can bee seen that Sam's hand goes slightly out of screen as she gets ready for the underhand throw. The dot tracking starts only after the ball comes back into the screen.

Analysis:
The low error maybe even lower if we had used the tip of the cone as the ends of the meter stick instead of the base of the cone. Also, the error value could be lowered even more if the camera frame rate has been higher so the the dot tracking could be smoother and appear more a a curve as it did. Then if a bigger ball had been used, a center point would have been marked and used as the center for the dot tracking.