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Period F
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Projectile Motion

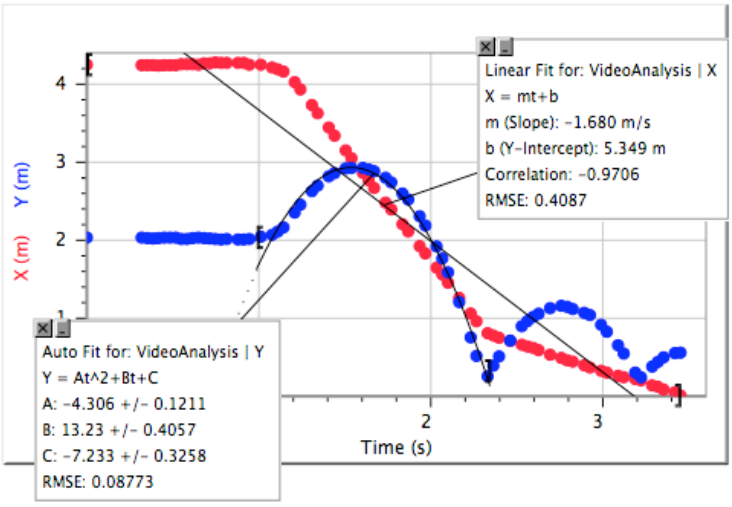
Purpose:
Analyze projectile motion using a computer video analysis.

Background:
Projectile motion is the path an object follows through space. It is motion without air resistance, friction, but under the influence of gravity. The formula for projectile motion is range=(Vo^2/g)sin2theta.

Materials:
Laptop with camera
Logger pro
Meter stick
Ball
Ball thrower (partner)

Procedure:
1. Set up meter stick to have a measuring reference in the film.
2. Make lap top facing target, using logger pro's film program.
3. Throw the ball.
4. Make sure the ball stays within the screen the entire time.
5. Record the ball being thrown using logger pro, mark the dots in the film following the path of the ball.
6. Use measuring stick as a reference by measuring it with the ruler tool.
7. Analyze graph made for you by logger pro.

Data:



VideoAnalysis

	Time (s)	X (m)	Y (m)	Vx (m/s)	Vy (m/s)
1	0	4.249	2.034	-0.017	-0.011
2	0.3183	4.244	2.034	-0.018	-0.021
3	0.3517	4.244	2.028	-0.012	-0.094
4	0.3850	4.244	2.022	-0.047	0.000
5	0.4167	4.238	2.028	0.000	0.107
6	0.4500	4.244	2.034	0.054	0.065
7	0.4833	4.244	2.034	0.055	-0.035
8	0.5167	4.244	2.034	0.135	-0.182
9	0.5483	4.255	2.016	0.125	-0.152
10	0.5817	4.255	2.016	0.035	0.084
11	0.6150	4.255	2.028	0.005	0.154
12	0.6483	4.249	2.034	0.137	0.015
13	0.6817	4.267	2.028	0.206	-0.124
14	0.7150	4.267	2.022	0.165	-0.162
15	0.7467	4.279	2.016	0.077	-0.139
16	0.7800	4.273	2.010	-0.028	-0.037
17	0.8133	4.273	2.016	-0.025	-0.016
18	0.8783	4.273	2.010	-0.066	0.000
19	0.9117	4.273	2.010	-0.249	0.128
20	0.9450	4.249	2.016	-0.262	0.332
21	1.012	4.249	2.046	-0.342	0.470
22	1.077	4.214	2.069	-0.585	0.776
23	1.110	4.191	2.111	-0.953	1.485
24	1.143	4.161	2.164	-1.696	2.348
25	1.208	4.026	2.355	-2.304	2.747
26	1.242	3.932	2.456	-2.785	2.665
27	1.308	3.733	2.628	-2.966	2.389
28	1.342	3.627	2.700	-2.951	1.964

Observations:

The ball was easiest to see when thrown with a lighter background. It would have been easier to see in the movie if the ball was brightly colored. The graph's velocity shows as a negative because the movie is shown to throw the ball from right to left, which is the negative direction. The first and second bounces are fairly similar in their slopes because they are directly relation to one another.

Analysis:

It was very hard to keep the ball in the screen, especially while having it with a light background (so the black ball would show up in the video.) We were also having a problem with people walking in front of the computer while we were filming. If I were to do this again I would have the camera at a greater range, and have a higher quality camera source so that it would not cut out some of the frames. I would also have a brighter or lighter colored ball in order to have a better vision perspective of it in the video.

The data shown by the graph of the red line represents the horizontal motion over time, while the blue graph shows the vertical motion over time. The blue graph appears as a parabola, showing the equal up at down motion caused by gravity, and the velocity will be the same at the beginning and the end, but slow down during the top

because of gravity. The shape of each of the parabolas will be the same because of the vertical versus horizontal motion stays the same because of the original velocity and constant air friction.

Conclusion:

We have successfully used video analysis to analyze projectile motion. We traced the ball, using logger pro with conveniently made the graph and points, while also finding the slope of it. If I were to do this again I would use better equiptment.