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Honor Physics
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Title: Projectile motion

Purpose: To analyze projectile motion using video analysis

Background: Projectiles are defined as object moving:

1. under the force of gravity
2. no propulsion
3. no wings
4. in ideal situations, we ignore air resistance
5. when graphed over time, it creates a parabolic curve of the form $y = Ax^2$

Materials:

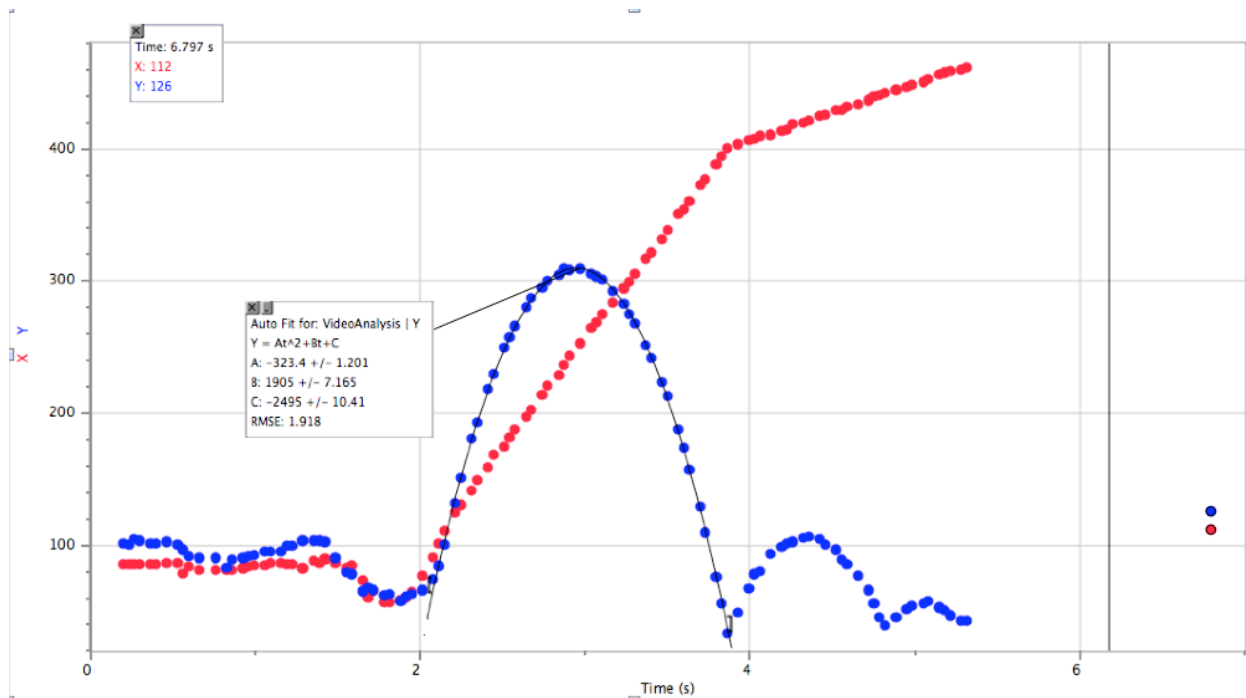
- logger pro
- video capture device
- tennis ball
- thrower
- Marking cones

Procedure:

1. choose ball
2. setup camera, including meter stick for calibration
3. start camera capture
4. throw ball
5. stop camera, analyze
6. using logger pro, track with dots
7. Analyze the graphs

Data:

	VideoAnalysis				
	Time (s)	X	Y	Vx	Vy
1	0.2000	86	102	0.000	3.379
2	0.2333	86	101	0.000	29.569
3	0.2667	86	105	0.000	22.810
4	0.3000	86	104	0.629	-12.779
5	0.3650	86	102	2.242	-13.718
6	0.3983	86	102	2.517	-3.895
7	0.4650	87	103	-9.091	-19.204
8	0.5300	87	101	-46.287	-54.233
9	0.5633	79	97	-32.809	-94.167
10	0.5967	84	92	5.756	-54.393
11	0.6617	82	91	-4.788	-25.387
12	0.7617	82	91	-0.697	-26.862
13	0.8267	82	83	1.258	-5.155
14	0.8600	82	89	9.905	38.225
15	0.9267	83	91	17.915	31.590
16	0.9583	84	92	23.571	33.471
17	0.9917	85	93	15.890	33.934
18	1.058	85	96	16.941	27.797
19	1.092	87	96	13.108	17.028
20	1.157	87	96	-4.188	35.077
21	1.190	86	100	-12.032	48.717
22	1.223	86	100	-11.893	38.807
23	1.288	83	104	14.960	26.678
24	1.355	89	104	27.284	-0.014
25	1.388	87	104	12.708	-39.994
26	1.422	90	103	-8.960	-122.14
27	1.487	87	91	-38.399	-153.14
28	1.553	83	79	-47.965	-136.15
29	1.585	85	78	-102.94	-130.15
30	1.652	74	65	-171.10	-92.262



Observation:

1. The ball was thrown to the air, then approached to the highest point
2. The ball fell down, and bound up for several times.

Analysis:

1. When the ball gets to the highest point, the velocity of the ball is 0.
2. The red line is X-t graph(distance and time), and the blue line is Y-t graph(position and time).
3. If every dot is one second, then we can know the velocity of the ball from the distance between the dot.
4. We should throw the ball higher, so we can see the velocity of each second the ball move. So it can be more accurate.
5. When we made the movie, we shouldn't face the sun. Because the video will get fuzzy.
6. We should use the ball which has the better elasticity.
7. Next time we should use better camera so we can see how fast the ball is going from the graph.

Conclusions:

1. This lab lead us to learn the Projectile motion, the movement of the ball.
2. Because of the gravity, the ball will drop down.

3. When the ball drops on the ground, it will bound a few time, but they will never be higher than the first time if there is gravity.
4. When the ball bounds on the ground, the Newton third law, there will be a force that let the ball bound up to the air.