Fan Car Acceleration Lab

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Honors Physics F
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Purpose: The purpose of this lab is to graphs for the fan car's accelerations in different situations, such as a cart with the weight, without the weight, high sloped, and low sloped with different speed.

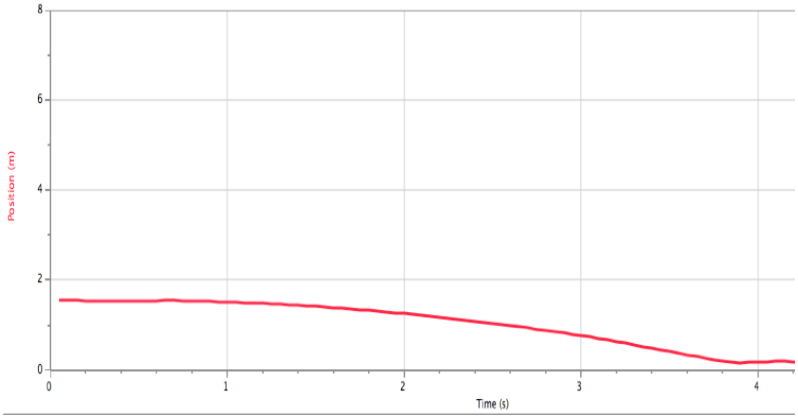
Background: The Newton's Theory says that when constant force is applied for an object, the object will move on constant speed. We are using the fan power to apply the constant force to a car, and we will measure the data with sonar system to find out that heavier weighted object or light weighted object will move faster.

Materials:
Laptop computer with camera attached
Logger pro software
Fan Cart
Stapler for weight use
Sonar system
Inclined Plane
Floor
Sound Reflector

Procedure:
1. Use a flat floor, and place the car with sound reflector on the car
2. Turn the fan on to low and use the sonar system to get the data.
3. Repeat these processes for data collection for the high speed, low speed with and without the weight.
4. Use a inclined plane to get a good slope.
5. Use the sonar system to measure and collect the data when you let go of the car from the inclined slope.
6. Repeat this process with higher inclined data.

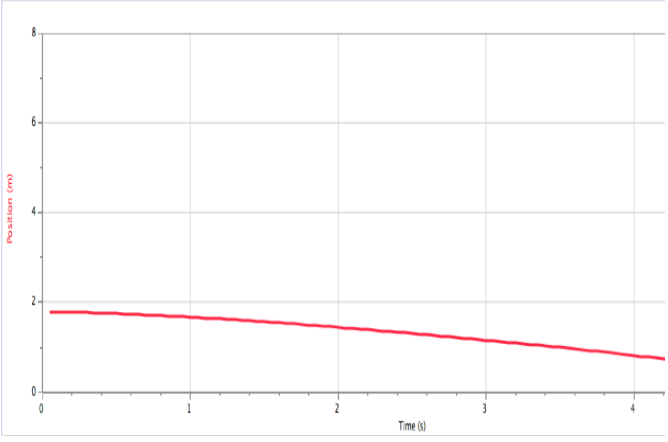
Data:

	Latest		
	Time (s)	Position (m)	Velocity (m/s)
1	0.05	1.548	−0.011
2	0.10	1.547	−0.011
3	0.15	1.548	−0.025
4	0.20	1.545	−0.034
5	0.25	1.544	−0.034
6	0.30	1.541	−0.030
7	0.35	1.541	−0.014
8	0.40	1.540	0.001
9	0.45	1.540	0.025
10	0.50	1.544	0.025
11	0.55	1.544	−0.004
12	0.60	1.540	0.020
13	0.65	1.547	0.026
14	0.70	1.545	−0.016
15	0.75	1.545	−0.051
16	0.80	1.541	−0.101
17	0.85	1.534	−0.124
18	0.90	1.528	−0.129
19	0.95	1.521	−0.136
20	1.00	1.514	−0.146
21	1.05	1.507	−0.163
22	1.10	1.498	−0.174
23	1.15	1.489	−0.173
24	1.20	1.482	−0.194
25	1.25	1.469	−0.217
26	1.30	1.459	−0.223
27	1.35	1.447	−0.233
28	1.40	1.435	−0.228
29	1.45	1.424	−0.221
30	1.50	1.415	−0.246
31	1.55	1.400	−0.287
32	1.60	1.385	−0.304
33	1.65	1.369	−0.302
34	1.70	1.355	−0.304
35	1.75	1.339	−0.317
36	1.80	1.323	−0.333
37	1.85	1.306	−0.342



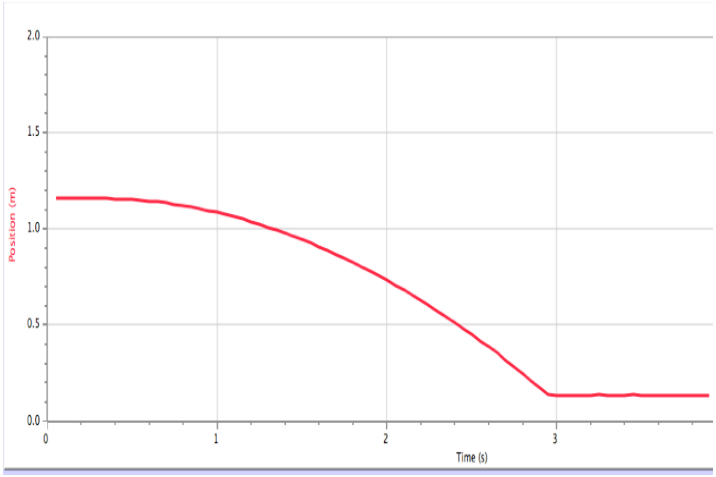
Fast Speed with Weight

	Latest		
	Time (s)	Position (m)	Velocity (m/s)
1	0.05	1.792	−0.106
2	0.10	1.784	−0.064
3	0.15	1.788	−0.068
4	0.20	1.778	−0.082
5	0.25	1.777	−0.056
6	0.30	1.776	−0.083
7	0.35	1.769	−0.102
8	0.40	1.764	−0.097
9	0.45	1.760	−0.105
10	0.50	1.754	−0.126
11	0.55	1.747	−0.137
12	0.60	1.740	−0.145
13	0.65	1.732	−0.149
14	0.70	1.725	−0.152
15	0.75	1.717	−0.158
16	0.80	1.709	−0.162
17	0.85	1.701	−0.163
18	0.90	1.693	−0.170
19	0.95	1.684	−0.178
20	1.00	1.675	−0.182
21	1.05	1.666	−0.184
22	1.10	1.657	−0.191
23	1.15	1.647	−0.199
24	1.20	1.637	−0.205
25	1.25	1.626	−0.208
26	1.30	1.616	−0.209
27	1.35	1.606	−0.214
28	1.40	1.594	−0.223
29	1.45	1.583	−0.225
30	1.50	1.572	−0.230
31	1.55	1.560	−0.239
32	1.60	1.548	−0.241
33	1.65	1.536	−0.245
34	1.70	1.524	−0.253
35	1.75	1.510	−0.255
36	1.80	1.498	−0.257
37	1.85	1.485	−0.263



Slow Speed with Weight

	Latest		
	Time (s)	Position (m)	Velocity (m/s)
1	0.05	1.160	0.000
2	0.10	1.159	0.001
3	0.15	1.160	0.000
4	0.20	1.160	−0.003
5	0.25	1.159	−0.003
6	0.30	1.160	−0.011
7	0.35	1.159	−0.025
8	0.40	1.157	−0.035
9	0.45	1.155	−0.045
10	0.50	1.152	−0.059
11	0.55	1.149	−0.072
12	0.60	1.145	−0.084
13	0.65	1.141	−0.099
14	0.70	1.136	−0.123
15	0.75	1.129	−0.152
16	0.80	1.119	−0.158
17	0.85	1.112	−0.150
18	0.90	1.106	−0.179
19	0.95	1.094	−0.206
20	1.00	1.084	−0.210
21	1.05	1.074	−0.223
22	1.10	1.062	−0.238
23	1.15	1.050	−0.253
24	1.20	1.037	−0.267
25	1.25	1.023	−0.281
26	1.30	1.009	−0.295
27	1.35	0.994	−0.308
28	1.40	0.978	−0.325
29	1.45	0.961	−0.341
30	1.50	0.944	−0.352
31	1.55	0.926	−0.364
32	1.60	0.907	−0.379
33	1.65	0.888	−0.394
34	1.70	0.868	−0.410
35	1.75	0.847	−0.423
36	1.80	0.826	−0.436
37	1.85	0.804	−0.451



Low Inclined Slope

	Latest		
	Time (s)	Position (m)	Velocity (m/s)
1	0.05	1.548	−0.011
2	0.10	1.547	−0.011
3	0.15	1.548	−0.025
4	0.20	1.545	−0.034
5	0.25	1.544	−0.034
6	0.30	1.541	−0.030
7	0.35	1.541	−0.014
8	0.40	1.540	0.001
9	0.45	1.540	0.025
10	0.50	1.544	0.025
11	0.55	1.544	−0.004
12	0.60	1.540	0.020
13	0.65	1.547	0.026
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26	1.30	1.459	−0.223
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36	1.80	1.323	−0.333
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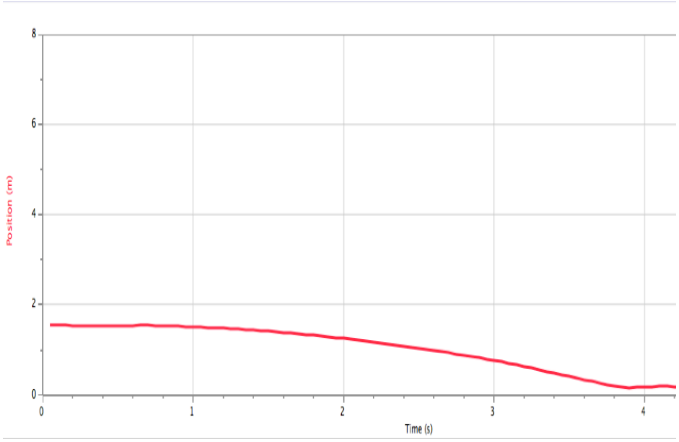
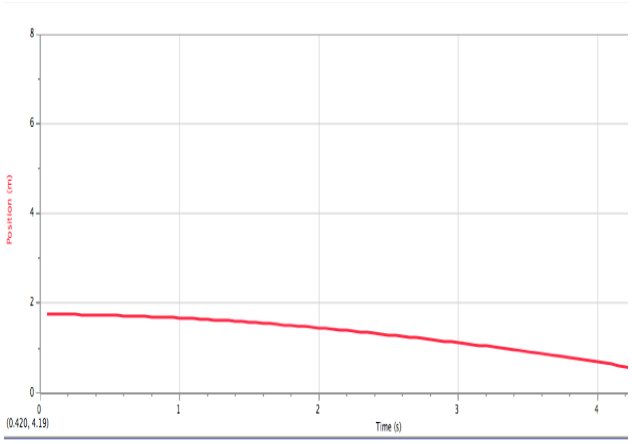


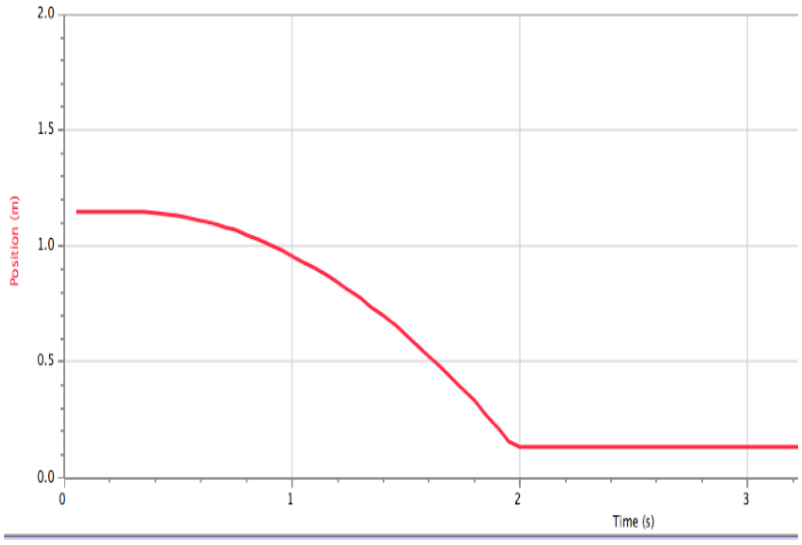
Fast Without the Weight

	Latest		
	Time (s)	Position (m)	Velocity (m/s)
1	0.05	1.759	-0.026
2	0.10	1.758	-0.031
3	0.15	1.756	-0.038
4	0.20	1.754	-0.045
5	0.25	1.752	-0.051
6	0.30	1.749	-0.058
7	0.35	1.746	-0.065
8	0.40	1.742	-0.069
9	0.45	1.739	-0.076
10	0.50	1.735	-0.084
11	0.55	1.730	-0.091
12	0.60	1.726	-0.097
13	0.65	1.721	-0.102
14	0.70	1.716	-0.109
15	0.75	1.710	-0.116
16	0.80	1.704	-0.120
17	0.85	1.698	-0.126
18	0.90	1.692	-0.135
19	0.95	1.684	-0.148
20	1.00	1.676	-0.154
21	1.05	1.669	-0.157
22	1.10	1.661	-0.163
23	1.15	1.653	-0.169
24	1.20	1.644	-0.175
25	1.25	1.635	-0.183
26	1.30	1.626	-0.190
27	1.35	1.616	-0.199
28	1.40	1.606	-0.214
29	1.45	1.594	-0.222
30	1.50	1.583	-0.225
31	1.55	1.572	-0.233
32	1.60	1.560	-0.242
33	1.65	1.548	-0.246
34	1.70	1.536	-0.257
35	1.75	1.522	-0.271
36	1.80	1.508	-0.278
37	1.85	1.494	-0.279



Slow Without the Weight

	Latest		
	Time (s)	Position (m)	Velocity (m/s)
1	0.05	1.150	0.018
2	0.10	1.152	0.009
3	0.15	1.151	0.001
4	0.20	1.151	-0.004
5	0.25	1.151	-0.015
6	0.30	1.150	-0.034
7	0.35	1.148	-0.063
8	0.40	1.144	-0.098
9	0.45	1.139	-0.137
10	0.50	1.131	-0.187
11	0.55	1.119	-0.218
12	0.60	1.108	-0.223
13	0.65	1.098	-0.254
14	0.70	1.084	-0.303
15	0.75	1.067	-0.343
16	0.80	1.049	-0.380
17	0.85	1.029	-0.417
18	0.90	1.007	-0.452
19	0.95	0.984	-0.488
20	1.00	0.959	-0.529
21	1.05	0.930	-0.546
22	1.10	0.904	-0.567
23	1.15	0.874	-0.611
24	1.20	0.843	-0.647
25	1.25	0.810	-0.682
26	1.30	0.775	-0.717
27	1.35	0.738	-0.752
28	1.40	0.699	-0.788
29	1.45	0.659	-0.828
30	1.50	0.617	-0.877
31	1.55	0.571	-0.907
32	1.60	0.525	-0.921
33	1.65	0.479	-0.947
34	1.70	0.431	-0.978
35	1.75	0.382	-1.019
36	1.80	0.330	-1.075



High Inclined Slope

Weight: 198 grams
Car weight: 255 grams

Observation: When we were using high speed without weight, the cart accelerate faster than when it had a weight on. However, our data did not show for long term of seconds, so we could not find out that if the object with heavy weight will accelerate faster for the long term run. Higher inclined slope goes faster than the low sloped.

Analysis: Our data that we had were pretty accurate, except that there were some errors in the car. You could see that with high inclined sloped, the acceleration was increasing in gradually, and eventually when it reached the bottom of the ground, the acceleration decreased.

Conclusion: We had few errors while we were experimenting this lab. First, the car did not have good batteries so that the low speed was just as powerful as high speed. Also the ground was not totally flat and had few bumps that could have affected the experiment data. Our car also did not decent wheel, so the car did not move in the straight line. To fix all these errors for next time, make sure that your car is in good condition and the batteries are fully charged. Also make sure that you use the flat surface to experiment the lab.