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Period F

Force Lab

Purpose:
Determine the force of an empty fan cart (on high and low acceleration), a loaded fan cart (on high and low acceleration), and a cart on a low and steep incline. The purpose is to determine how the acceleration is related to gravity, how the force from the fan on low and high speeds differ, how the graphs would differ if the ramps bounced, and if the fan cart had another cart hooked to it, what it would do to the three graphs (x/t, v/t, a/t).

Background:
The experiment should show how velocity differs from accelerations, and yet how they are related. The graphs will show the movement of the cart (x) over time elapsed (time), the velocity of the cart (v) over time elapsed (t), and the acceleration (a) over time elapsed (t). Gravity is set to be 9.8, but you should see that it is not exactly that number, because of location, so the results will not show up corresponding directly to gravity equally 9.8.

Materials:
Fan cart
500 g weight
No incline plane without friction
Wind blocker
Logger pro
Sonic Ranger

Data:
See other sheet.

Observations:
All of the position graphs for the different trials look the same, or similar. They all dropped with a downward curve. The velocity and acceleration graphs look very different for all of the trials. As do the acceleration graphs. In the graphs, it looks as though the cart accelerated fastest, when it was on low, without a weight. Then second fastest when it was on high, with a weight. Then it accelerated faster when it was on low, with a weight, than when it was on high, without a weight. The cart at a high angle accelerated much faster than the cart at a low angle due to gravity.

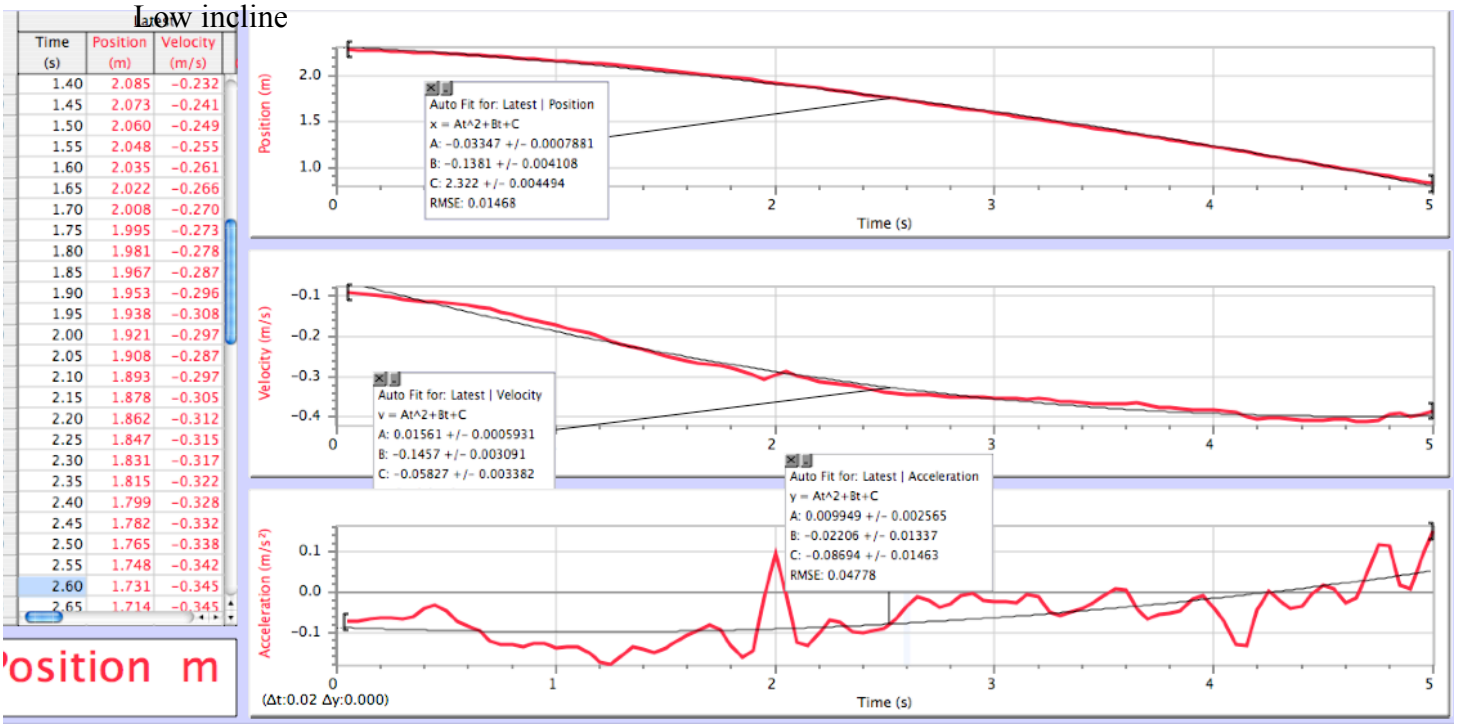
Analysis:
The total mass of the cart was 796.44 grams. The cart on high, without weight had had acceleration of 0.48187m/s?, and a force of 38.37. The cart on high, with a weight had had acceleration of 0.0732m/s? and a force 58.30. The cart on low, without a weight had an acceleration of 0.10264m/s? with a force of 81.75. The cart on low, with a weight had had acceleration of 0.07348m/s? and a force of 58.52. The cart on a low incline had acceleration of 0.06694 m/s? and a force of 53.31. The cart on a high incline had acceleration of 0.2094 m/s? with a force of 166.77. Also the incline of the low incline was 6cm, making it raised at

Conclusion:
The acceleration of the cart can be found by acceleration = gravity times sine of theta for the carts at an angle. By For all of these trials the acceleration can be found by using the formula $Y = Ax^2 + Bx + C$ and taking ?A? using the logger pro analysis and multiplying ?A? by 2. And by taking the total Acceleration can also be found

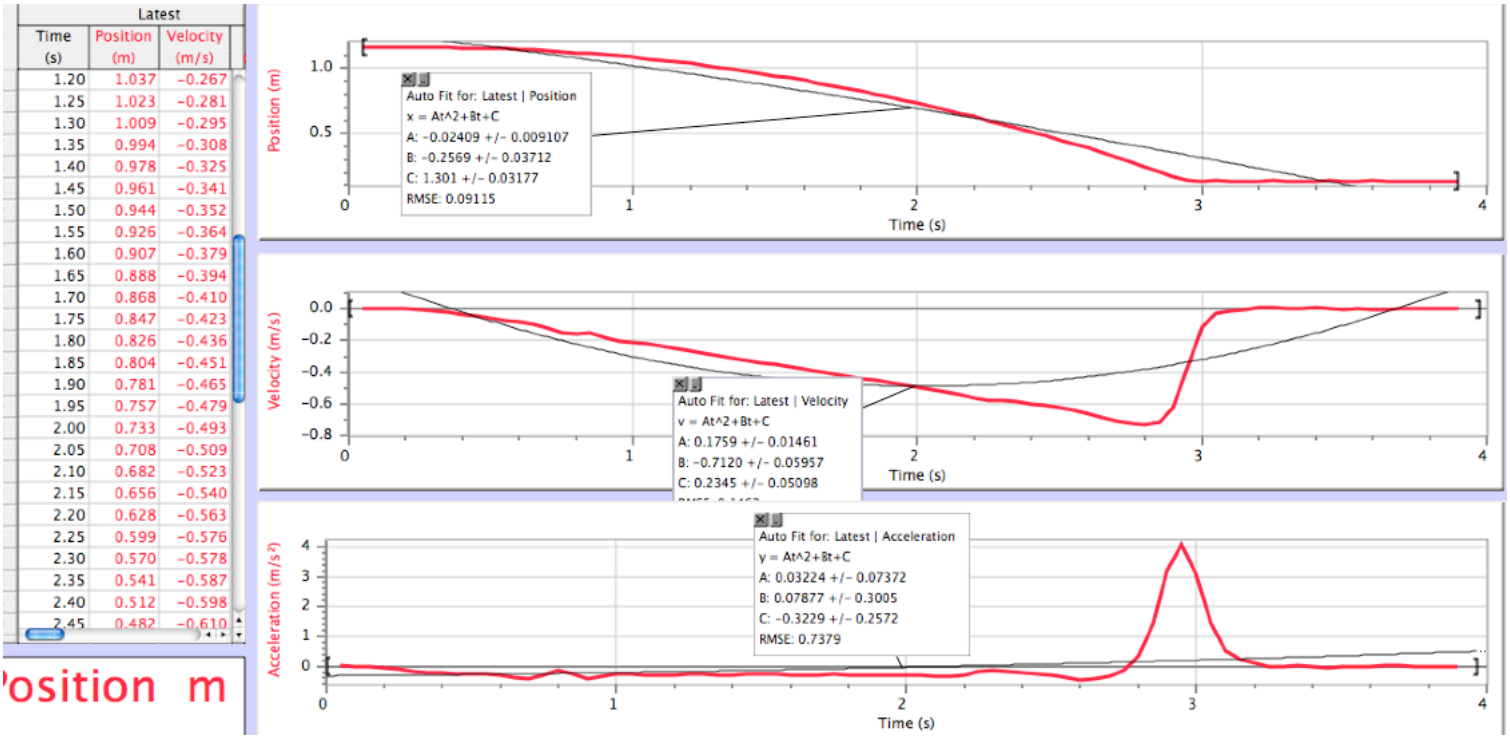
by finding the slope of the velocity graph. It can also be found by evaluating the graph of acceleration, which shows the acceleration of the cart. Force can be found by using the formula Force=Mass times Acceleration. And force can be found by taking the objects mass and multiplying it by its acceleration. In this lab, many things should have been done differently, first of which, must be to create a level, consistent ground, from which to use the carts. Because the ground was inconsistent, the carts acceleration and velocity suffered, making the data highly inaccurate. Also I would have set it to time the carts all at equal times, so when u look at the graphs, it would be easier to tell which trial did what. Lastly, I would have made sure to have to have the cart starting, and the sonic ranger start at the same time. Because that slight delay can cause an unwanted shift in data.

#1 The acceleration of the inclined cart is related to gravity because gravity is equal to 8.7 but gravity is actually 9.8
#2 The force from the fan on low is 40.87 The force from the fan on high is 83.39
#3 If the ramp was allowed to bounce the v/t graph would, going from positive to negative in a wave like motion, and gradually getting less and less.
#4 If there were another cart attached to the fan cart the x/t curves would look less curved, because the cart wouldn?t accelerate as fast, but it would reach a higher point over time, because the added weight allows it to go faster. The v/t curve would look like more of a straight line. The a/t curve would look like a lower straight line

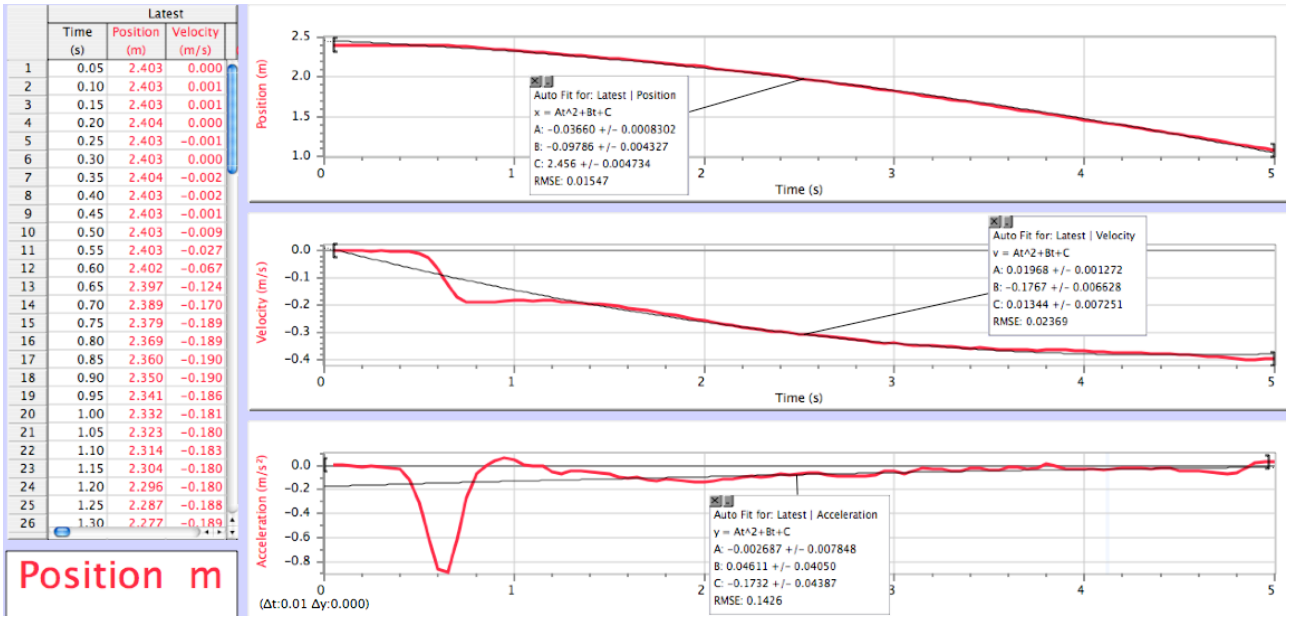
Low incline



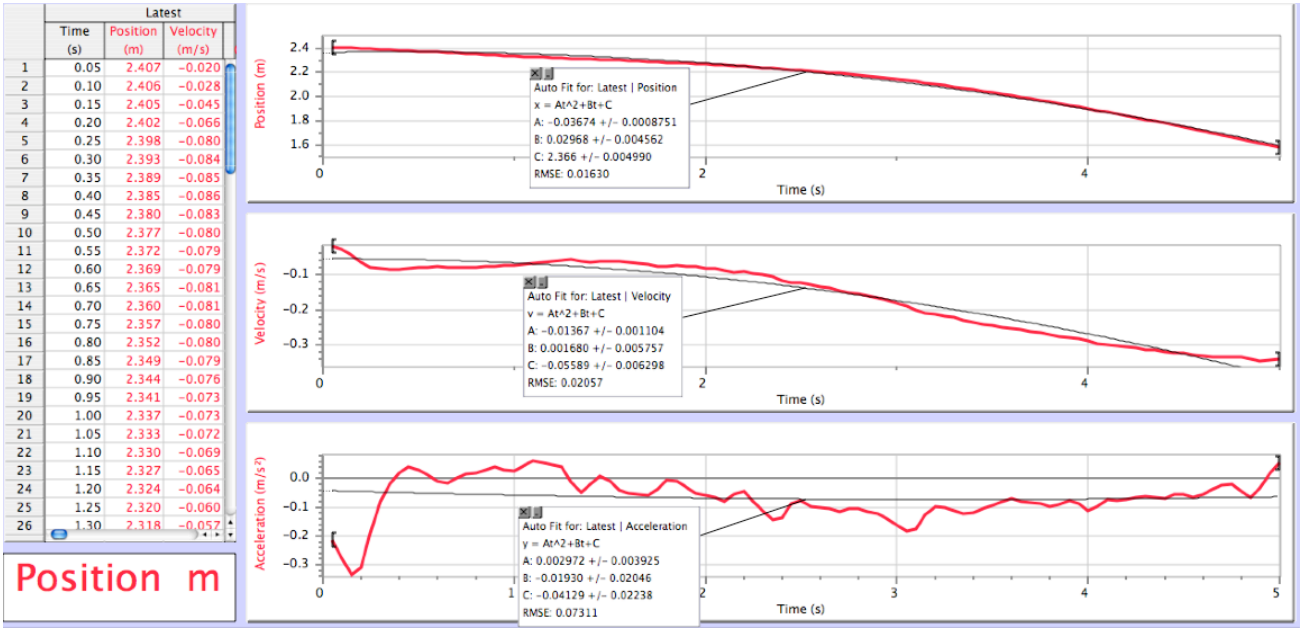
High no weight



High with weight

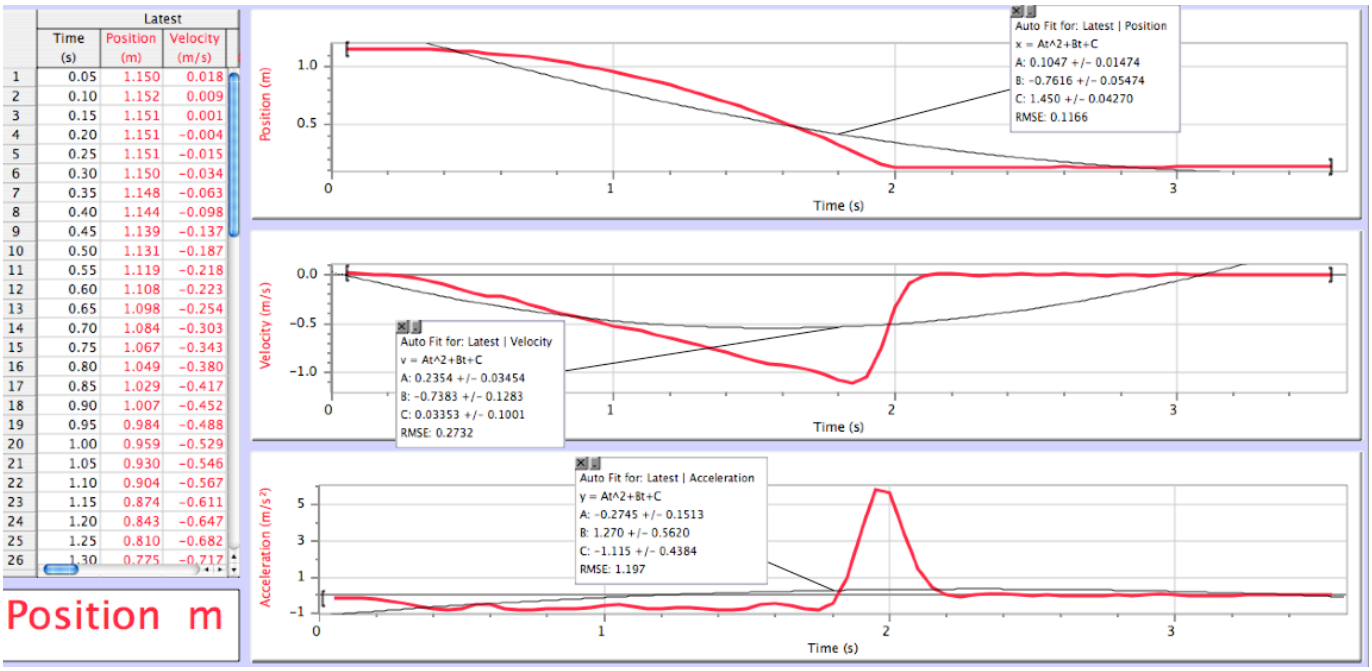


Low with weight



	Time (s)	Position (m)	Velocity (m/s)
1	0.05	2.407	−0.020
2	0.10	2.406	−0.028
3	0.15	2.405	−0.045
4	0.20	2.402	−0.066
5	0.25	2.398	−0.080
6	0.30	2.393	−0.084
7	0.35	2.389	−0.085
8	0.40	2.385	−0.086
9	0.45	2.380	−0.083
10	0.50	2.377	−0.080
11	0.55	2.372	−0.079
12	0.60	2.369	−0.079
13	0.65	2.365	−0.081
14	0.70	2.360	−0.081
15	0.75	2.357	−0.080
16	0.80	2.352	−0.080
17	0.85	2.349	−0.079
18	0.90	2.344	−0.076
19	0.95	2.341	−0.073
20	1.00	2.337	−0.073
21	1.05	2.333	−0.072
22	1.10	2.330	−0.069
23	1.15	2.327	−0.065
24	1.20	2.324	−0.064
25	1.25	2.320	−0.060
26	1.30	2.318	−0.057

High incline



Low no weight