

Newton's law and Force

Purpose: Study Newton's first law.

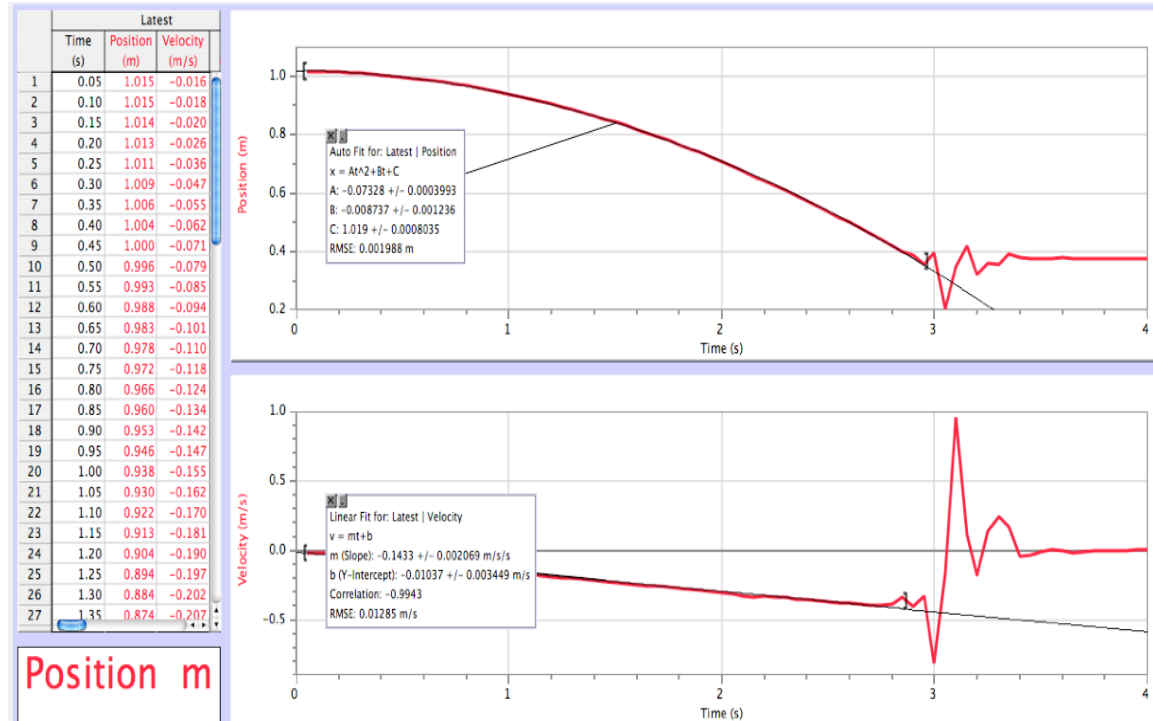
Background: To manipulate force and mass by changing the speed of the cart with the high and low setting, by adding and subtracting weight and measure acceleration using the equation $g \cdot \sin \theta$. We record all of the data using a radar machine and computer.

Materials: Cart, 506g weight, ramps, sail, radar, computer, logger pro.

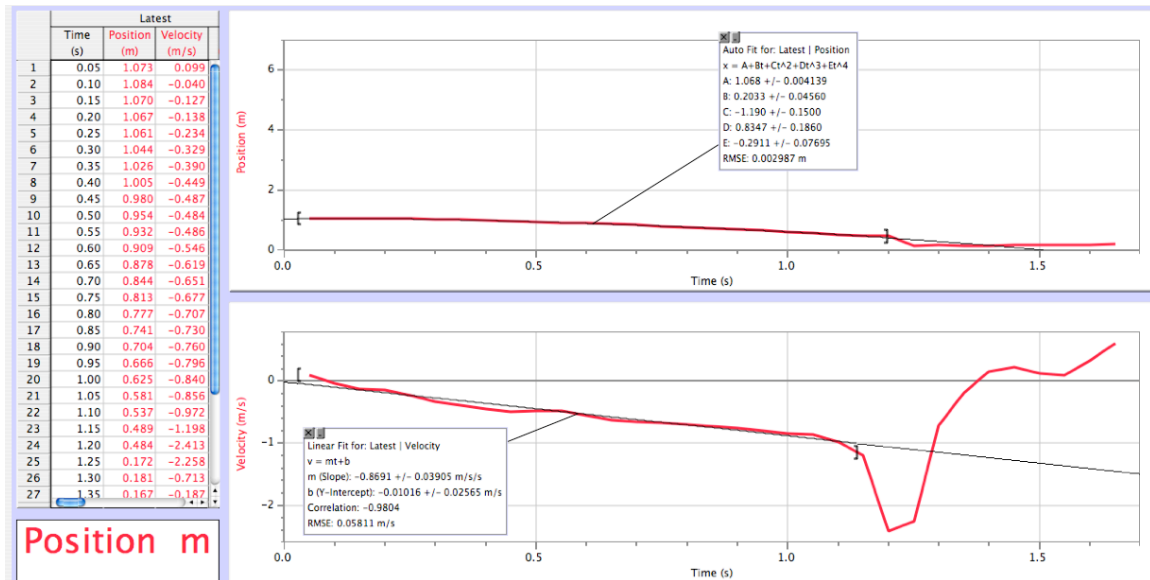
Procedure:

1. Setup cart and radar machine.
2. Measure the position, velocity, and acceleration with the fan on low and high settings.
3. Measure with the weight on the cart on low and high.
4. Measure the cart with the ramp on high and low angles.

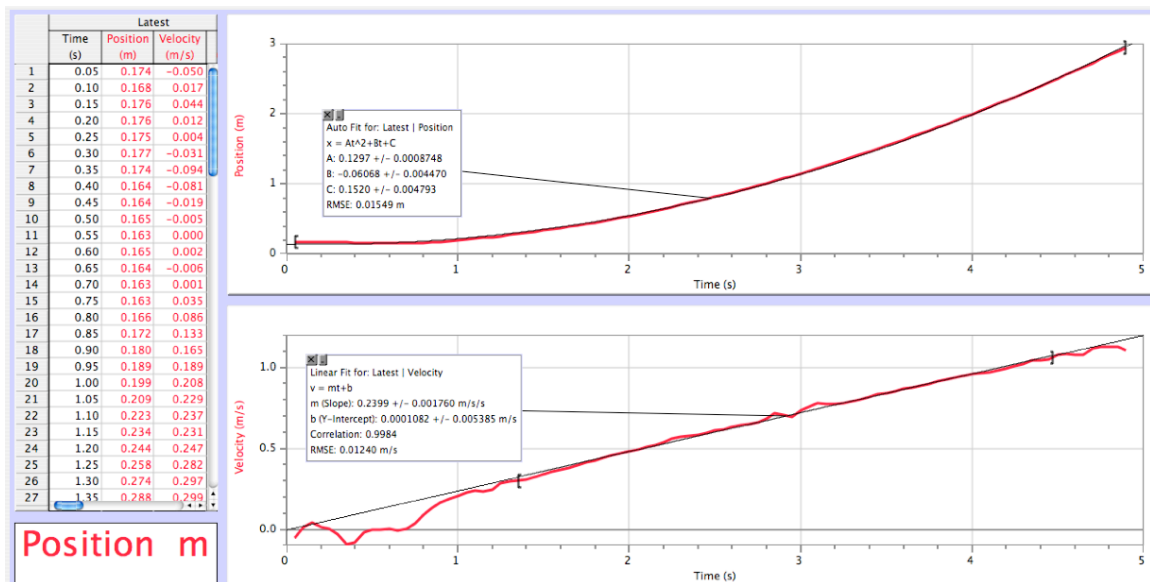
Data:



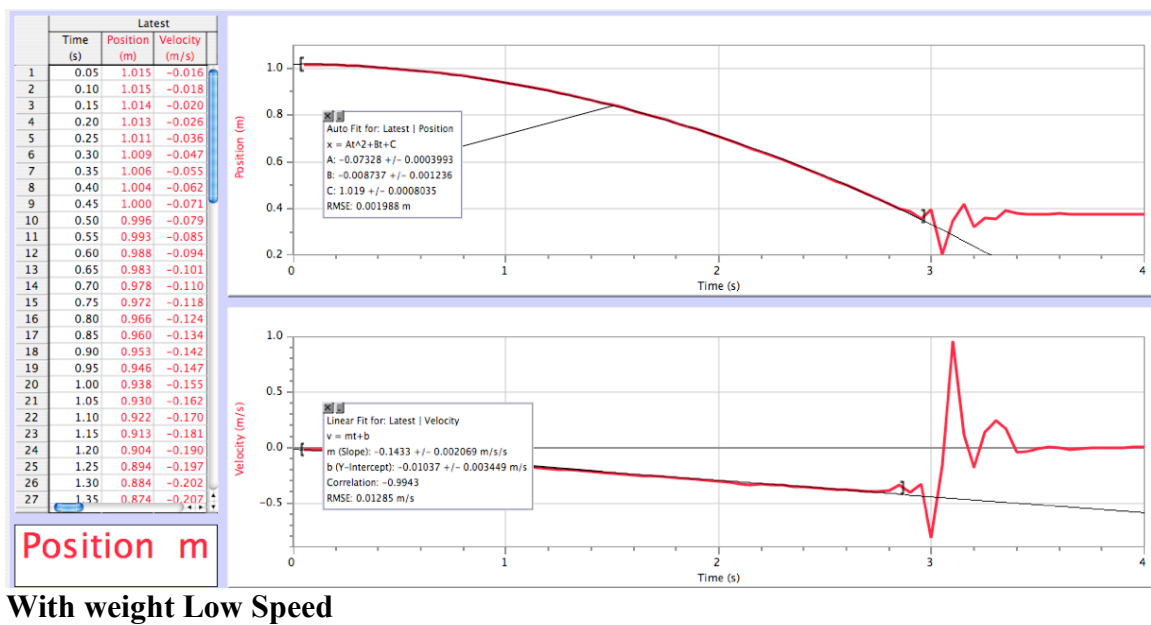
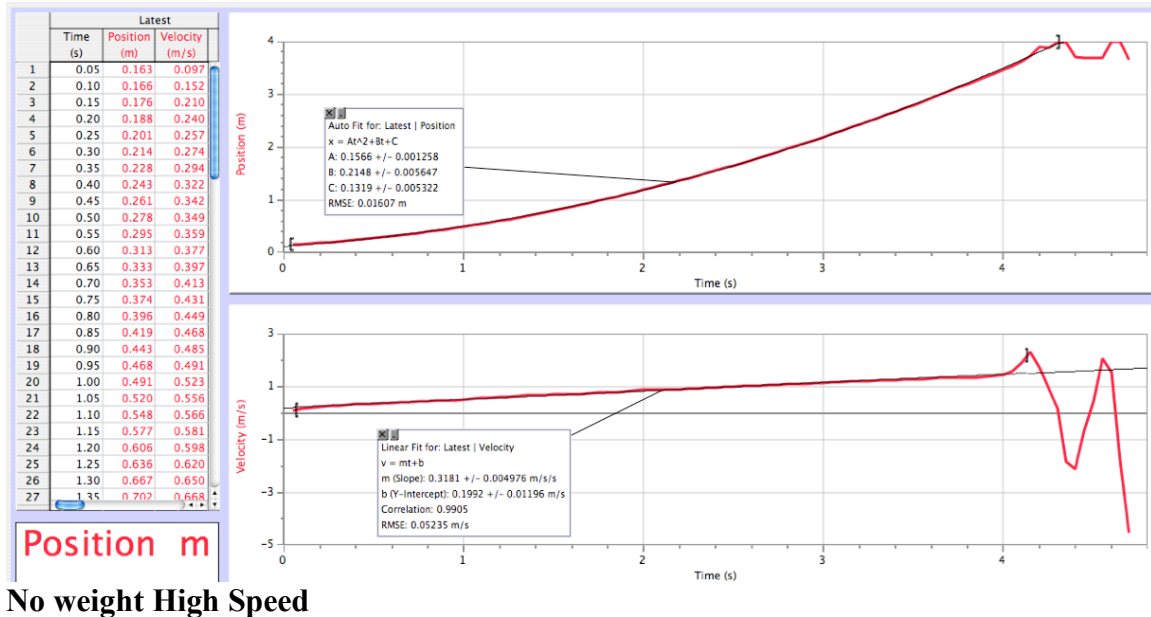
Low Speed Ramp

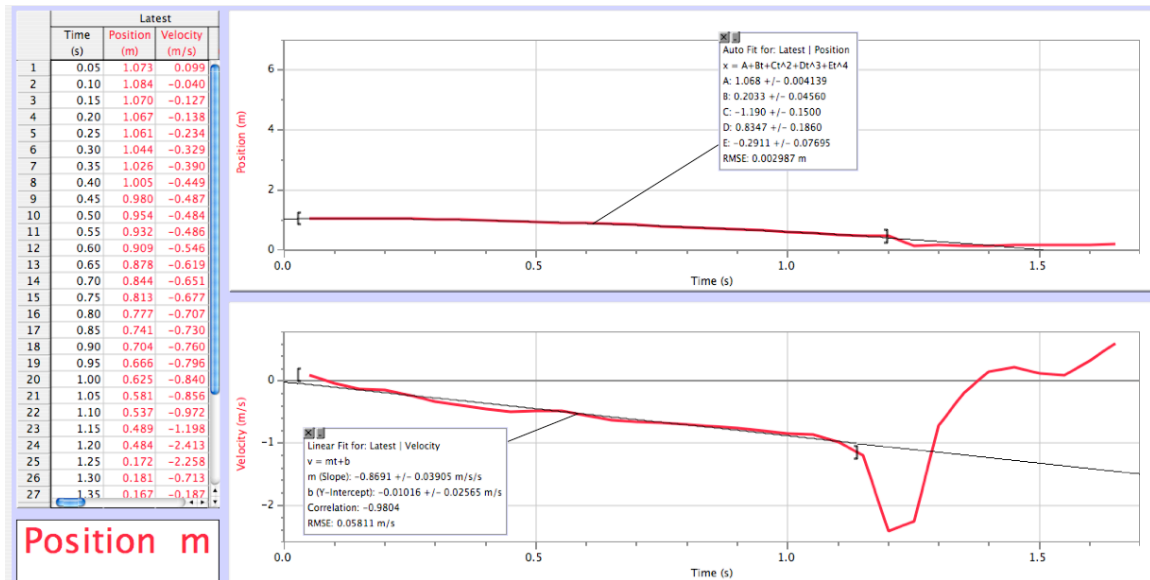


High Speed Ramp



No weight Low Speed





With weight High Speed

Observations: Make sure you keep the cart in good alignment with the radar in order to catch good data, and also the radar will not collect the data if the cart got too close. Logger pro would only record for 10 seconds so prepare fast! Never start the cart until you have a "cushion" to stop it with.

Analysis: We used Newton's second law $F=MA$ to setup the lab. To find the acceleration we derived the coefficient from the quadratic curve fit using the formula $S=1/2ab^2$ and then double-checked our answer using with the linear equation $y=mx+b$ with m being the acceleration.

Conclusion: Our data was pretty accurate. Some of the curve fits did not match as well as I would have liked them to match. The thing that affected our graphs the most was stopping the cart because the sail usually fell off. But all in all I believe we proved Newton's first law.