

### **Purpose**

Purpose of this lab is to study about acceleration. From Newton's second law ' $F=ma$ ', One would manipulate Force and Mass to get different variables for acceleration. And by manipulating the angle of ramp we can manipulate gravity as an independent variable.

### **Background**

Newton's law says Force equals Mass times Acceleration. This means any object with mass will accelerate at constant rate if there is force acting upon it. If one manipulate Force acting upon object when mass is constant then the acceleration changes at same rate force is changing. And when Force is constant one can manipulate the acceleration by changing the mass of the cart.

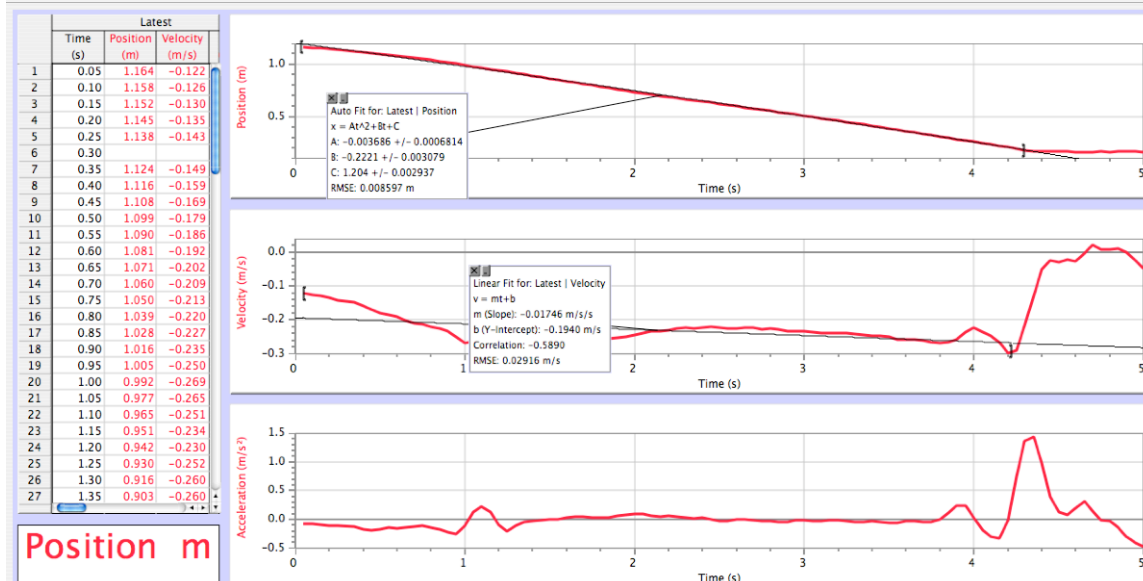
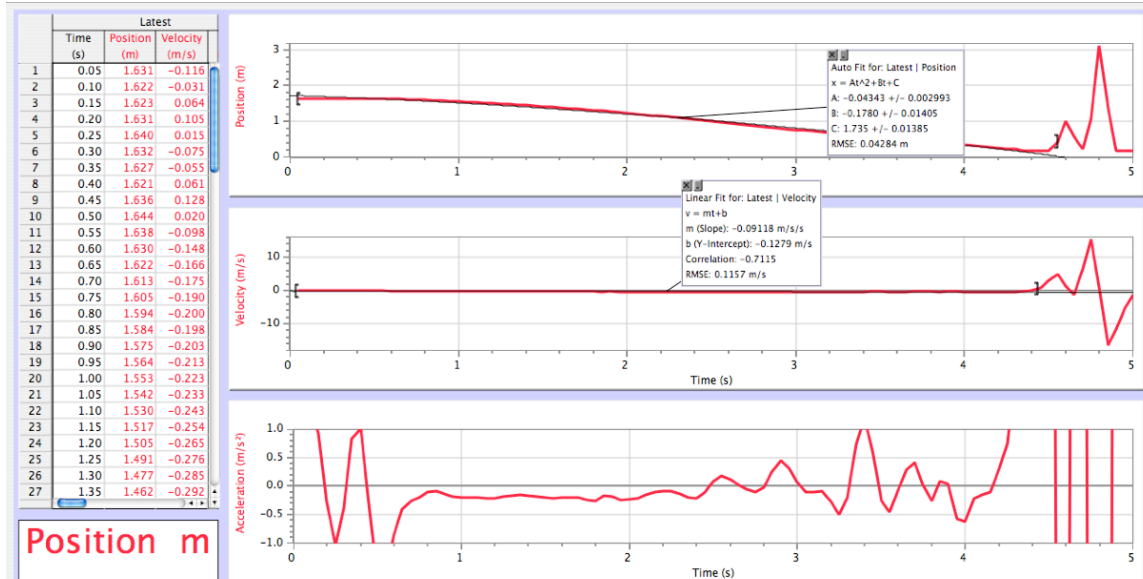
### **Materials**

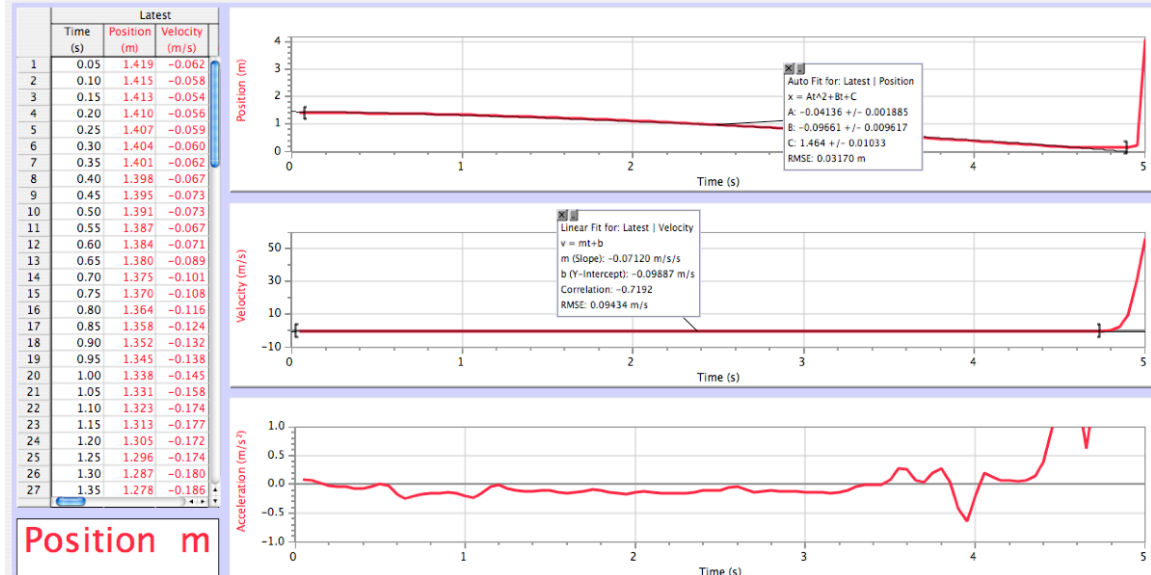
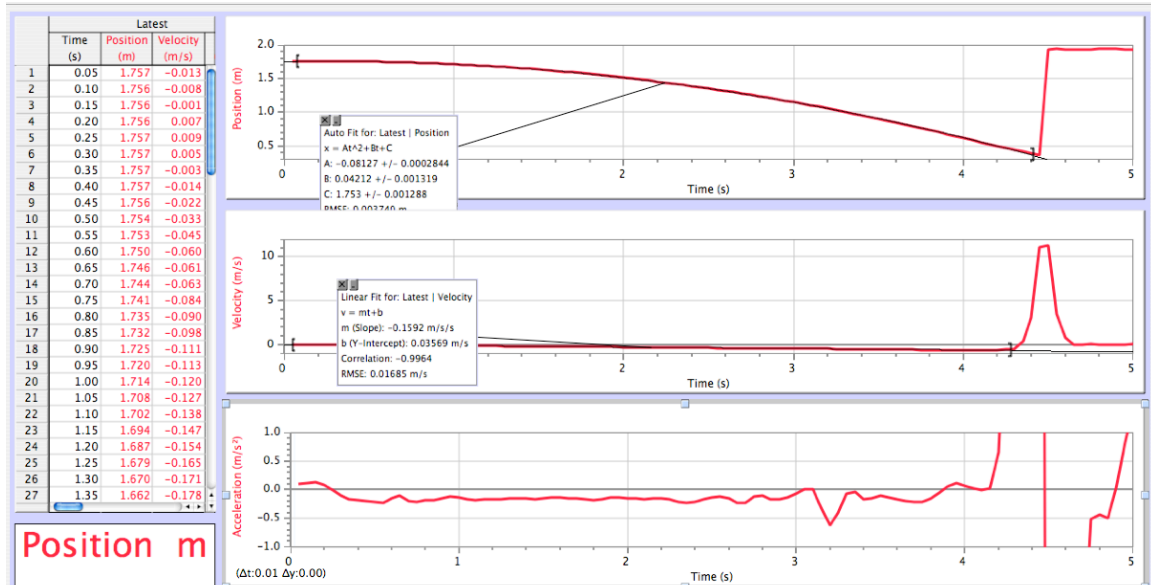
- Sonic ranger
- Electronic balance
- Battery
- Fan cart
- Weights
- Ramp

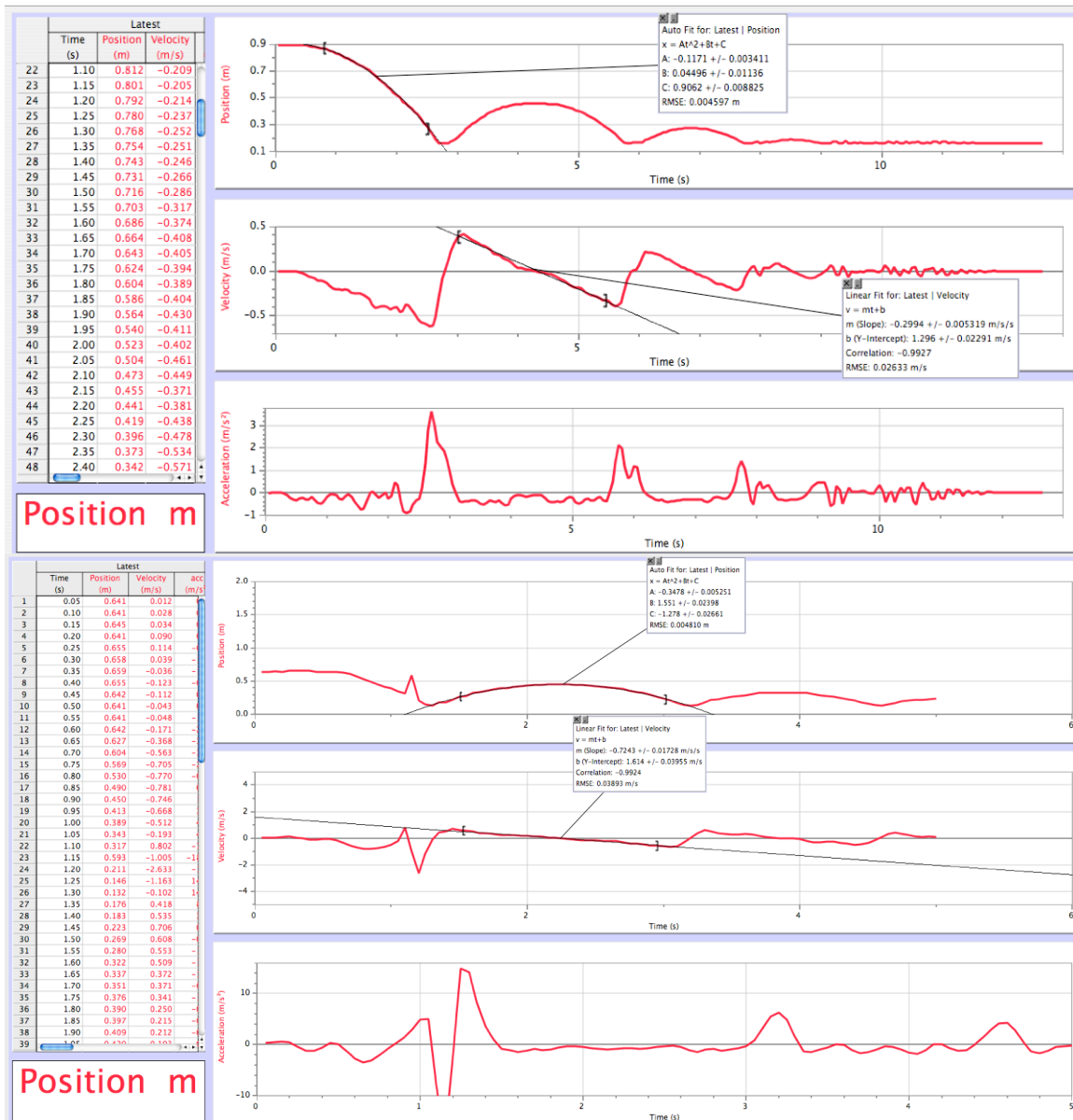
### **Procedure**

1. Make sure that one is clearly understood the purpose of the lab
2. Have all materials prepared
3. Set up the sonic ranger connected with computer.
4. Have logger pro ready to record the fan cart.
5. Set up fan cart about 3ft(.9m) away from sonic ranger and make sure it is lined up
6. Start the fan cart with 4 different conditions.
  - a. Low
  - b. Low with weights
  - c. High
  - d. High with weights
7. Have all the data in picture by using apple computer (apple+shit+4)
8. Analyze the data and discuss with your partners

### **Data**







## Observation

The fan cart goes off the tangent when it starts. So I set up the track with meter stick, which will keep the fan cart under control. As soon as Fan cart gets on the track one should push down on meter stick so Fan cart is not moving the meter stick as it goes off tangent. It was pretty accurate. Experiment was done in same condition as much as possible. Block was used for measurements of acceleration.

## Analysis

There might've been error because of friction and air-resistance. But it was real small amount so it's negligible. Also the Low without weights showed that  $-0.081$  from  $x/t$  graph. If it was multiplied by 2 it's approximately  $-0.159$ , which was showed in  $v/t$  graph. This shows that graphs and data were pretty accurate. One can clearly see that it is actually happening in our real life not only from the book.

## **Conclusion**

It was done how it was expected to be. It showed that the acceleration varies by manipulating the force or weights. The numbers showed that the position/time graph correlates to the velocity/time graph and acceleration/time graph. Next time I could've done a better and more accurate experiment by calculating the  $\mu$  (frictional coefficient) and air resistance. But the concept of  $F=ma$  is more tangible and clearly understood.