Lab 1

Motion diagrams

Rectangle Repulsed Researchers
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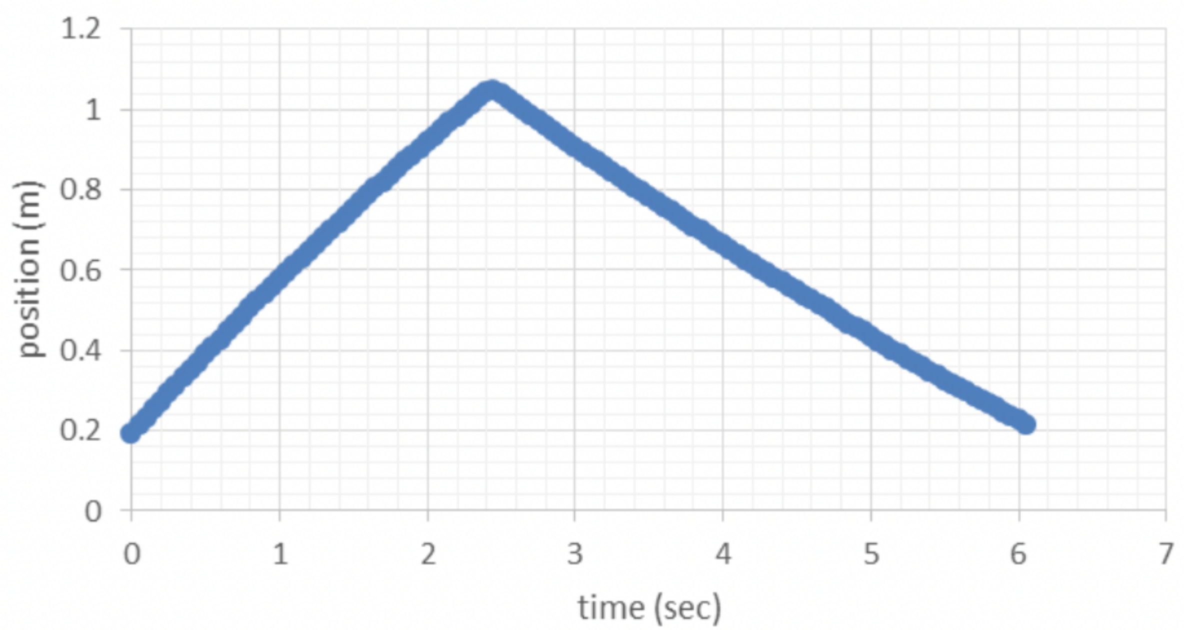
Part 3: Matching Position vs. Time and Velocity vs. Time Graphs

Graph 1



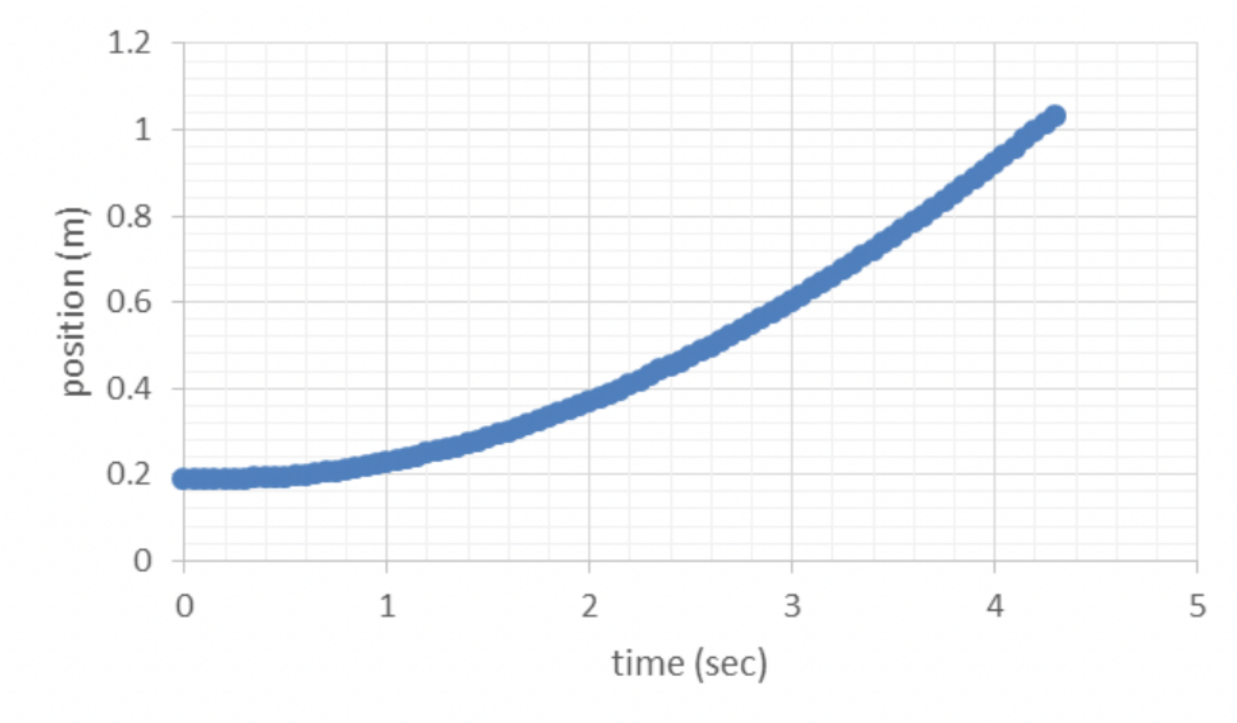
Graph Analysis

Graph one describes the position vs. time graph of a collision. The graph itself directly depicts that the object's position from the sensor increases, then at $t \approx 2.4s$ it's position begins decreasing. The derivative of a position vs. time graph gives the velocity. From the slope of the graph, one can conclude that the velocity over the interval $t\epsilon[0s, 2.4s)$ is constant and positive. Then from $t\epsilon(2.4s, 6s]$ the velocity becomes negative. With this information, we can deduce the object of interest was given an initial velocity and began moving in the positive direction, then it encountered a barricade and reversed direction, continuing the same magnitude of velocity

$$\forall\ t\epsilon[0s, 2.4s)\ \frac{d}{dt}[s(t)] = v(t) \approx 0.35m/s$$
$$\forall\ t\epsilon(2.4s, 6s]\ \frac{d}{dt}[s(t)] = v(t) \approx -0.35m/s$$

Setup
The equipment setup we choose to recreate Graph 1 consisted of a level track with a magnetic bumper mounted 60cm from the *PASCO Motion Sensor II*. We pushed and released the cart towards the bumper and used the *PASCO Universal 850 Interface* to track the motion using sonar. We consider friction and drag negligible.

Graph 2



Graph discription:
Graph 2 depicts an object speeding up at a constant rate. We know this because the object's position is increasing and the velocity is positive and increasing.
Setup:
Our setup consisted of a track at an downward incline. We released the cart from the top of the track and let it slide to the bottom. We consider friction and drag negligible.

Graph 3:
Graph discription:
Graph 3 depicts an object in freefall that hits the ground and stays there. We know this because the object's position starts from an increased height
Setup:
Our setup consisted of a the sensor positioned updward. We dropped a large beach ball.

Graph 4:
Graph discription:
Graph 4 depicts an object moving down an incline. It comes in contact with somethinhg at the bottom and changes direction. As it changes direction it slows down. Then at $t = 2.6s$ its velocity becomes negaiive but the acceleration staus positive where it is slowing down
Setup:
Our setup consisted of a the sensor positioned at the biotton of an incline plane. We released the cart from the top
Graph 5:
Graph discription:
Graph 5 depicts an object that starts from rest then is that ts pushed then slows to a stop. We know this because the graph depicts the initial velocity as 0m/s, then the velocity rapidluy increases and the acceleration is posiyive. It the acceleratyion goes to zero and he velocity is constant
Setup:
Our setup consisted a flat plane and w pushed the cart away from the sensor
Graph 6:
Graph discription:
Graph 6 depicts an object which is pushed and released up a hill. Eventually gravity slows it down and it returns down the hill
Setup:
Our setup consisted of a incline plane. We gave the cart a push and let it go up the hill then return down
Graph 6:
Graph discription:
Graph 6 depicts an object moving up and swown on a spring.
Setup:

Our setup consisted of an downward incline. The bumper was positioned $60cm$ away from the sensor.