WPI | Department of Physics

Worksheet for Lab 3: One- and Two-Dimensional Motion

Name: Vinh Tran
Section: A14

Partner: Ananya Gopalan
Date: Sept 19,2019

Use this sheet to enter and submit your answers to the questions asked in the gray boxes on the Lab Instructions document. When you have completed this worksheet, save this file as a .pdf and upload the pdf to the canvas assignment associated with this lab. If you have any trouble converting to a pdf, please ask you Lab Instructor or Lab Assistant.

Remember to use complete sentences and that these text boxes will increase in size as you add more content.

a.

The graph will be inverted if the direction isn't reversed

b.

By placing the ball 15 cm away, the sensor can get a more accurate reading from a consistent starting position.

c. Check with your lab instructor to make sure your data is acceptable before you continue.

d.

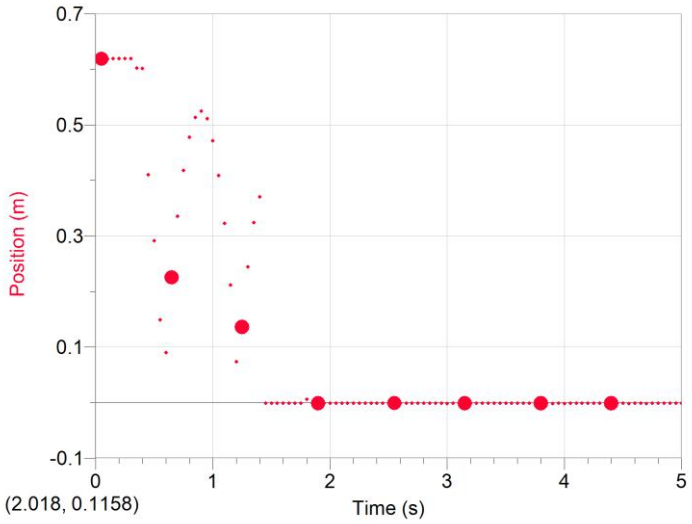

Figure 1: Position Over Time Graph of Dropped Tennis Ball

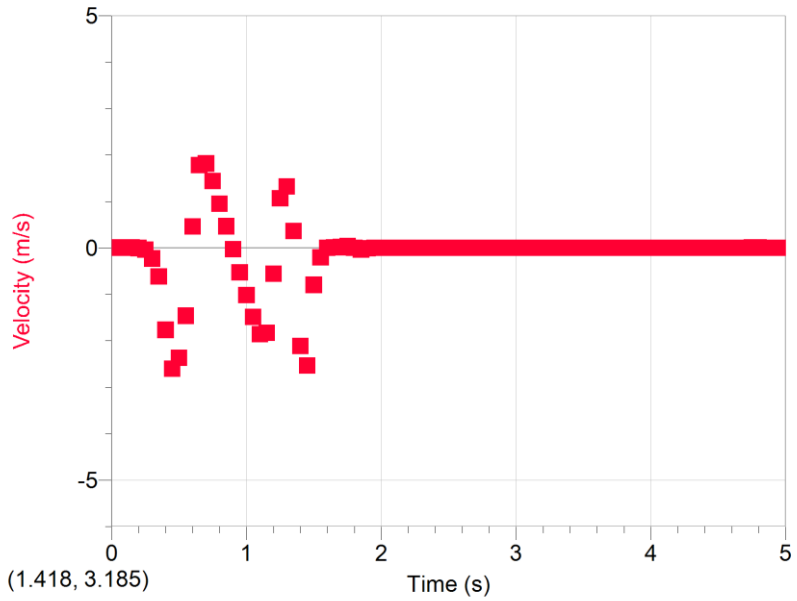

Figure 2: Velocity Over Time Graph of Dropped Tennis Ball

e.

The slope with uncertainty is -9.1 ±.01

f.

The slope represents negative acceleration.

g.

Our result, -9.1±.01 m/s^2, is slightly less than the known acceleration of 9.8 m/s^2 , meaning it is not within the uncertainty of the known value.

h.

The graph relates to the equation x = ½(a)t^2, where a=g.

i.

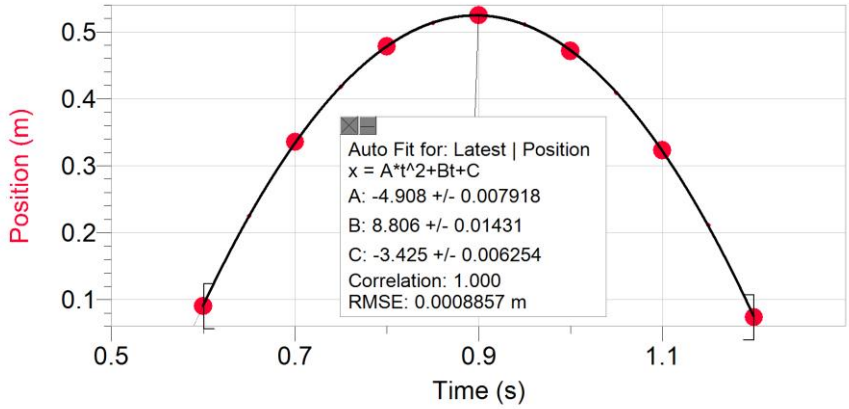

Figure 3: Position Over Time Graph With Curve Fit

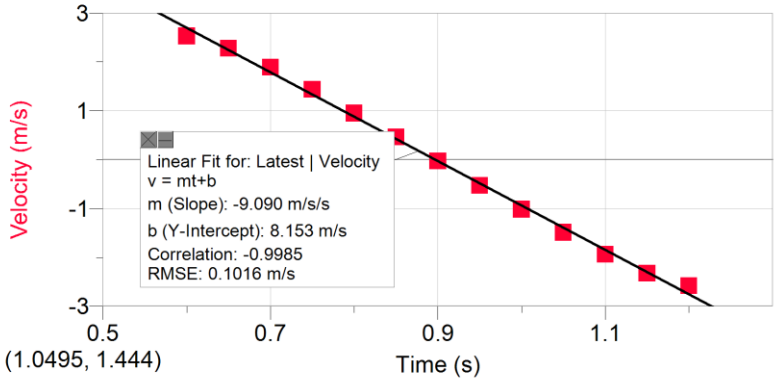

Figure 4: Velocity Over Time Graph With Linear Fit

When looking at graphs Figure 3 and 4, the fits of the graphs intersect with the points collected.

2-D Graphs

j.

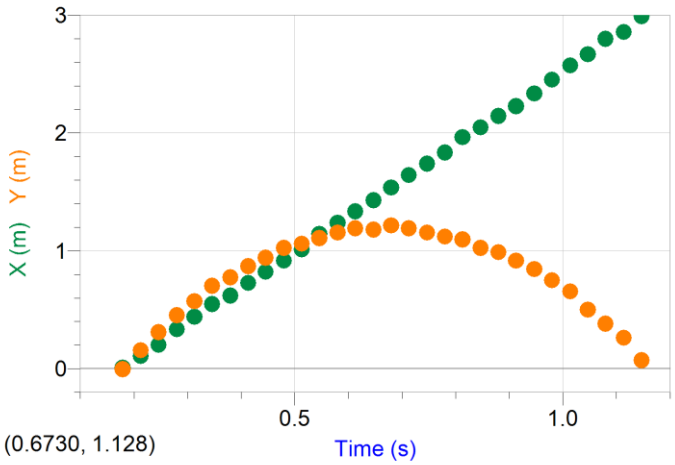

Figure 5: X and Y Position of Basketball Over Time

Experimental Method

- **Zeroing and calibrating the sensor before experiment in order to acquire accurate data.**
- **Record data from the correct experimental setup to answer the experimental question with relevant data.**
- **Remove unnecessary data points from the graph in order to analyze only relevant points of the experiment.**
- **Include proper lines of fit to show the accuracy of our data.**
- **Include proper captions of graphs and describe collected data in order to communicate results.**

Results

1D experiment

1. Only in the Y direction, the ball was released above the ground with a constant gravitational acceleration and no initial velocity.
2. The acceleration of the ball was always -9.8 m/s^2 throughout the motion, except at the point it collided with the floor. The velocity was initially at zero and increased in the negative y direction, but after it hit the floor, the velocity changed towards the positive y direction

2D experiment

1. As the ball left the persons hand, it created a negative parabolic motion, where the acceleration was constant throughout the movement.
2. In the x-direction, the velocity was constant and the acceleration was zero.
3. In the y-direction, the velocity starts in the positive y-direction and then reverses direction at its max height. The acceleration is negative and constant through the entire motion. The limit of the Y motion would be the max height when the velocity reaches zero.

Conclusion

The similarities between each motion are as follows: the velocity vs time graph is the derivate of the position vs time graph, and similarity the acceleration vs time graph is the derivative of the velocity vs time graphs. The graphs were different, as they were different curves from the varying motion of the balls.

Graph and Data Checklist You should have six graphs with the appropriate title labels and a complete caption and answered all of the questions highlighted by the gray boxes.