Physics Matching Motion Lab

To be completed in your lab notebook

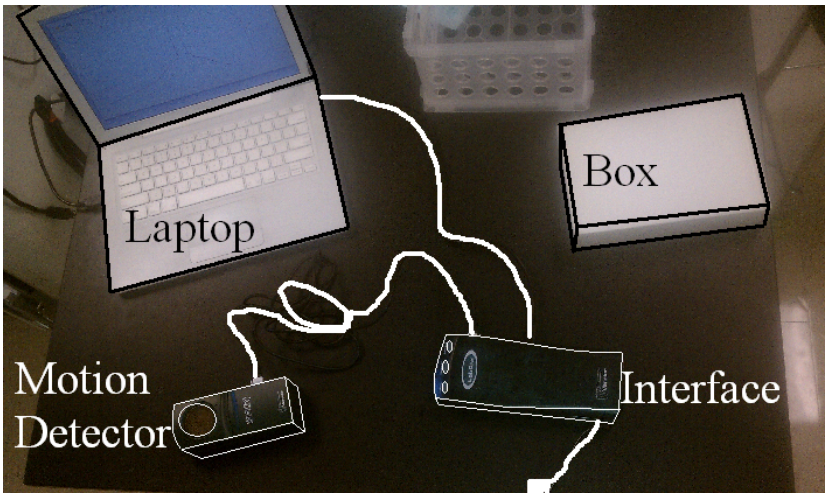
Pre Lab:

- On a fresh piece of paper in your lab notebook write today's date and the title of the lab.
- Don't forget to continue the page numbers in your lab notebook.
- Don't forget to add this lab and its page number to your Table of Contents.

1. *Copy these statements and fill in the blanks:*
   a. The slope of a position to time graph represents the object's _____.
   b. The slope of a velocity to time graph represents the object's _____.

Purpose: Using a computer, probes and software, model motion and analyze the Position-Time, Velocity-Time and Acceleration-Time graphs.

Materials:
Loggerpro probeware
Laptop (with Loggerpro software)



Procedure:

1. Connect all the lab probes and wires to the computer as instructed.

2. Open the Loggerpro software and you should immediately see three graphs.
   a. *If not,* go to "File" and Click "Open."
   b. Within the "Experiments" folder, open the folder "Probes & Sensors."
   c. Open "Motion Detector" and click on the experiment labeled "Motion Detector."

3. Find the green "Collect" button and click it.

4. Move your hand towards and away from the motion detector and then click the stop button to view your first trial. *If your data collection ends before you click "stop," ask the teacher about extending the time sample.*

5. Experiment with your motion detector so that you can easily model moving forwards, backwards, speeding up and slowing down. *Use the Motion Detector box in front of you*

for consistent readings.

6. Go to "File," and click "Open." Within the "Motion Detector" folder, click on "Position Match #1."
7. Try to match the motion. Once you have created an identical graph, answer questions #2.
8. Repeat step #6 and 7 for "Position Match" #2-4, and 7. Answers questions #3-6.
9. Repeat step #6 and 7 for "Velocity Match." Answer questions #7.
10. Go to "File," and click "Open." Within the "Motion Detector" folder, click on the "Motion Detector" experiment as you did in the beginning and you should see three graphs again (Distance-Time, Velocity-Time and Acceleration-Time).
11. Create a graph that shows a positive acceleration; answer question #8 and 9.
12. Create a graph that shows a negative acceleration; answer question #10 and 11.

Observations:
✍*Underneath your title, write "Observations" and you will answer the questions below in complete sentences. Don't forget to number your answers!*

2. Describe the motion you made that matched Position Matching Graph 1.
3. Describe the motion you made that matched Position Matching Graph 2.
4. Describe the motion you made that matched Position Matching Graph 3.
5. Describe the motion you made that matched Position Matching Graph 4.
6. Describe the motion you made that matched Position Matching Graph 7.
7. Describe the motion you made that matched Velocity Matching.

Analyzing:
✍*Underneath your Observations, write "Analyzing" and you will answer the questions below in complete sentences. Don't forget to number your answers!*

8. Sketch a Velocity-Time and Acceleration-Time graph that shows your positive acceleration.
9. What did you notice about the Velocity-Time graph when you created a positive acceleration?
10. Sketch a Velocity-Time and Acceleration-Time graph that shows your negative

acceleration.

11. What did you notice about the Velocity-Time graph when you created a negative acceleration?

12. As you moved towards the motion detector sensor, did the computer interpret that as positive or negative displacement?

13. Was it possible to show a negative position with your lab set-up? Why or why not?