Title: Graph Matching

Problem: Can I analyze my motion across three meters and interpret a distance vs time and a velocity vs time graph?

Background: One of the most effective ways to analyze and describe motion is through the use of graphs including displacement/distance, velocity/speed and acceleration. Graphical representation makes it possible to determine in which direction an object is moving, its rate, how far it has traveled and whether it is speeding up or slowing down.

Definitions: Define the following terms

Velocity

Acceleration

Distance

Displacement

Vector quantity

Scalar quantity

Hypothesis: Write in this space an educated guess to what the outcome of the experiment will be and the reason why. Hint, phrase it so that it answers the question in the **_problem section_** up top. (yes, you can use "If I then" wording that is taught to you in Bio Envir or other science classes)

Variables: (Replace this with the Control, Manipulated and Responding Variables for the experiment). Identify the **Control** (the one that never changes), **Manipulated** (the one that is changed on purpose) and the **Responding** (the one

that is affected by the change or basically what you trying to find or get as an answer.

SO, FOR THIS LAB:

Control: Distance mapped out or three meters

Manipulated: Your motion

Responding: Figure it out!

Materials: (Replace this with a list of all materials used in this experiment).

SO, FOR THIS LAB:

Stopwatch

Tape measure

Student

Procedure: (Replace or write in this part exactly how you performed the experiment. You must write a set of instructions step by step as if you were going to give this to a complete stranger who has never done the lab and should be able to follow your instructional guide and reproduce your results).

For this lab you are to mark off (use tape, don't mark up your floor) 3 meters (figure out the conversion to feet) on the floor in total length or distance. Label each meter so that you can clearly see it. Now, take your stopwatch (use your cell phone) and time your motion from start to finish the entire 3 meters walking **forward** first. Repeat this three times and record the time for each trial (write it down after each time). Now do the same exact thing except walk ***backwards*** (be careful not to trip or hurt yourself). Repeat this three times and record your time for each backwards trial. Last, run or jog **forward** the entire three meters. Repeat this three times and record your time for each trial.

Observations: (Replace this or write in this part a description of everything used. Also include in this section all measurements, charts and other recorded data.)

SO, FOR THIS LAB THIS IS WHERE ALL THE TIMES GO. LABEL EACH TRIAL AND THE TIME.

Analysis: (Replace or write in this part all of your mathematical equations, including conversions, averages, all formulas used, graphs, best fit lines when used, medians, percent error, etc.)

SO, FOR THIS LAB; Show the conversion from meters to ft and inches, find the average time for each of the different motions, walking forward, walking backwards and running/jogging. Should have 3 different average times.

Now, create a distance vs time graph and a velocity vs time graph for each of the 3 different situations (walking forward, walking backwards and running/jogging forward). Use the average time and 3-meter distance. You have to label the **X and Y axis. Go easy and go by half meters and seconds. Make sure you put the time on the X and the distance on the Y. Velocity also goes on the Y axis when you make those graphs.** You will have to calculate your velocity using $V=d/t$. *Time is the average time you calculated. It is rounded to the nearest hundred. Distance is the 3 meters. I would go by halves or .5m/s for the velocity axis.*

*You should have 6 total graphs at the end. 2 for each situation.

Conclusion: (Replace this or write in this part whether or not your hypothesis stated earlier was correct or incorrect and the reason why. You should always start this by restating the question in the Problem section. For ex, "In this lab we were asked to …")

SO, FOR THIS LAB; follow the stuff above on whether or not your hypothesis was correct or not and why. Also write out and answer the following questions;

For the *d vs t graphs:*

1) What type of motion is occurring when the slope is zero?

2) What type of motion is occurring when the slope is constant?

3) What type of motion is occurring when the slope is changing?

For the *v vs t graphs:*

1) What type of motion is occurring when the slope is zero?