Graphing Motion Lab:
Position-Time Graphs of Your Motion

Name_____ Date_____ Period_____

Purpose: To observe your motion on a position-time graph.

Important Reminder: EVERYONE IN YOUR GROUP WILL WALK EACH SECTION OF THE LAB AND RECORD THEIR OWN GRAPHICAL RESULTS.

Introduction
In this investigation you will use a motion sensor to plot a position-time graph of your motion. As you walk (or jump, or run), the graph on the computer screen displays your position with respect to the sensor.

The motion sensor detects the closest object directly in front of it (including your arms if you swing them as you walk). It will not correctly measure anything closer than 0.5 meters. As an approximation, 3 floor tiles equals approximately 1 meter.

Procedure (Your teacher will demonstrate how to do this)

1. Plug in the **USB link** and **Motion sensor** into your computer.
2. Open "**PASCO PASPortal**" from the dock. The icon looks like this ---------->
3. Launch "**EZ-Screen.**" The icon looks like this ---------->
4. You should now have a graph on the screen. Follow the directions below.

Launch EZ-SCREEN
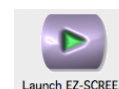
Activity 1—Making Position-time Graphs

a. When you are ready to begin creating your graph stand **facing the motion sensor** so you can watch the graph being created on the computer screen as you walk backwards. Make sure you are about .5 meters away from the motion sensor.

b. Have your lab partner press the **Start button** while you walk backward (facing the computer screen). Observe your motion on the computer screen. When you are finished, have your lab partner press the **Stop button**.

c. Make the following position-time graphs. Be sure to draw smooth lines (**ignore spikes**), drawing only the section of the graph where you were following the instructions. Each person in the group should walk and make their own graph.

|	
Start at the .5 meter mark and make a position-time graph,walking **away from the motion sensor** (zero position) **slowly and steadily**.	Start at the .5 meter mark and make a position-time graph,walking **away from the motion sensor** (zero position) **medium fast and steadily**.

Position (m)

Time (s)

Position (m)

Time (s)

Make a position-time graph, walking **toward the motion sensor** (zero position) **slowly and steadily**.

Position (m)

Time (s)

Make a position-time graph, walking **toward the motion sensor** (zero position) **medium fast and steadily**.
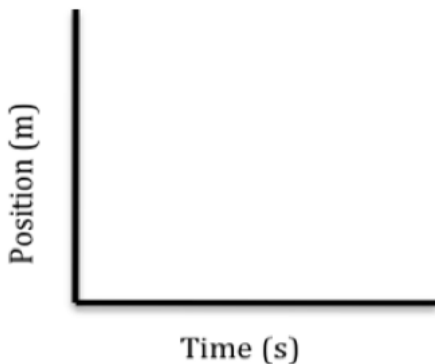
Position (m)

Time (s)
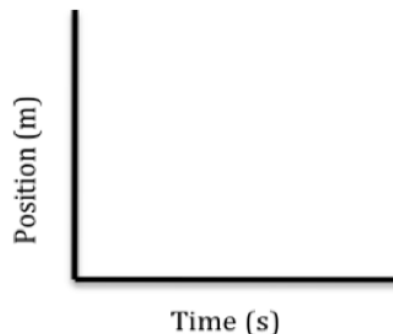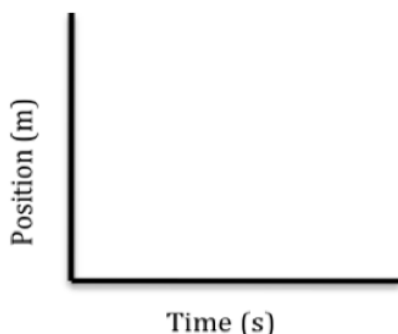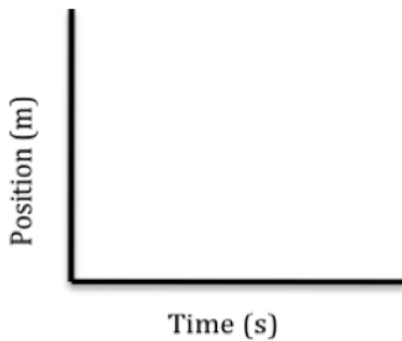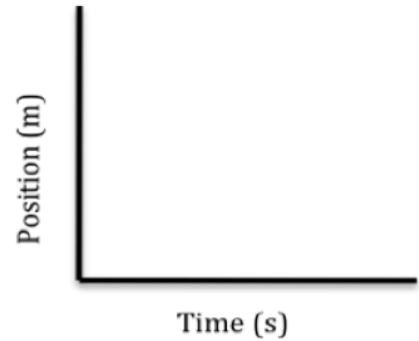
Questions

1. Describe the difference between the graph you made by **walking away slowly** and the one made by **walking away quickly**.

2. Describe the difference between the graph you made by **walking toward** the motion sensor and the one made **walking away** from the motion sensor.
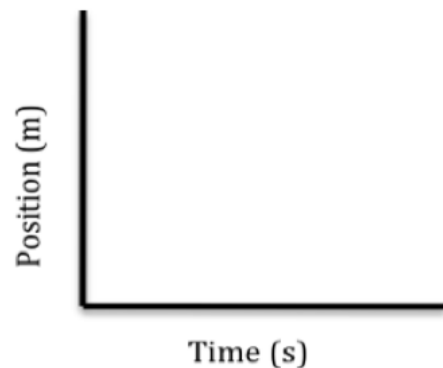
Prediction

Predict the graph produced when a person starts at the 1-meter mark, walks away from the sensor slowly and steadily for 4 seconds, stops for 4 seconds, then walks toward the sensor quickly for 2 seconds. Draw your prediction using a dotted line on the following graph below. Compare your predictions with the rest of the group. Draw the graph your group agrees on with a solid line. Choose one person to "walk" the line. Move in the way described above and graph your motion. When you are satisfied with your graph, draw the final result below.

PREDICTION

Position (m)

Time (s)

FINAL RESULT

Position (m)

Time (s)

1. Is your prediction the same as the final result? What was the most difficult part of making the graph look like the prediction.

**Activity 2—Matching a Position-time Graph**
Select the following graph from the lower right hand side of the screen. Now walk it. You must try to duplicate it EXACTLY by walking it. Use pencil to show what your graph looked like.
After you try to math the graph **record your score**._____
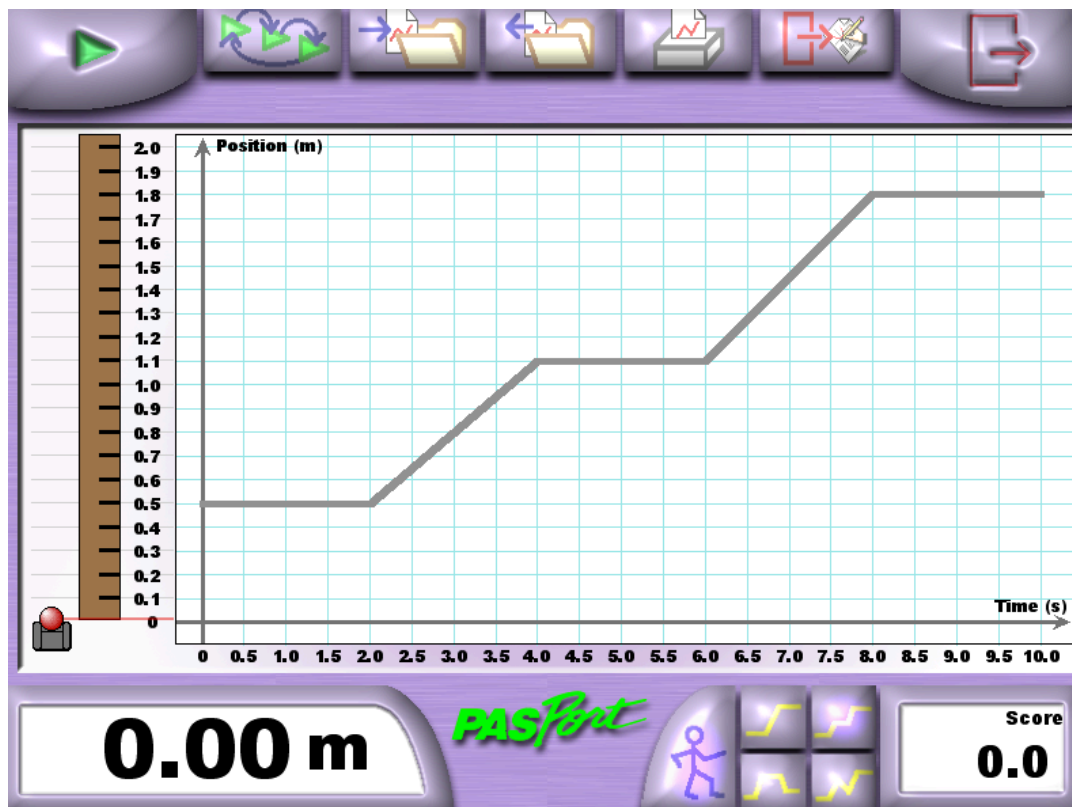
What was the difference in the way you moved to produce the different parts of the graph you just matched? Explain how you walked each part.

Activity 3—Other Position-time Graphs

Select the following graph from the lower right hand side of the screen. Now walk it. You must try to duplicate it EXACTLY by walking it. Use pencil to show what your graph looked like.
After you try to math the graph **record your score.**_____
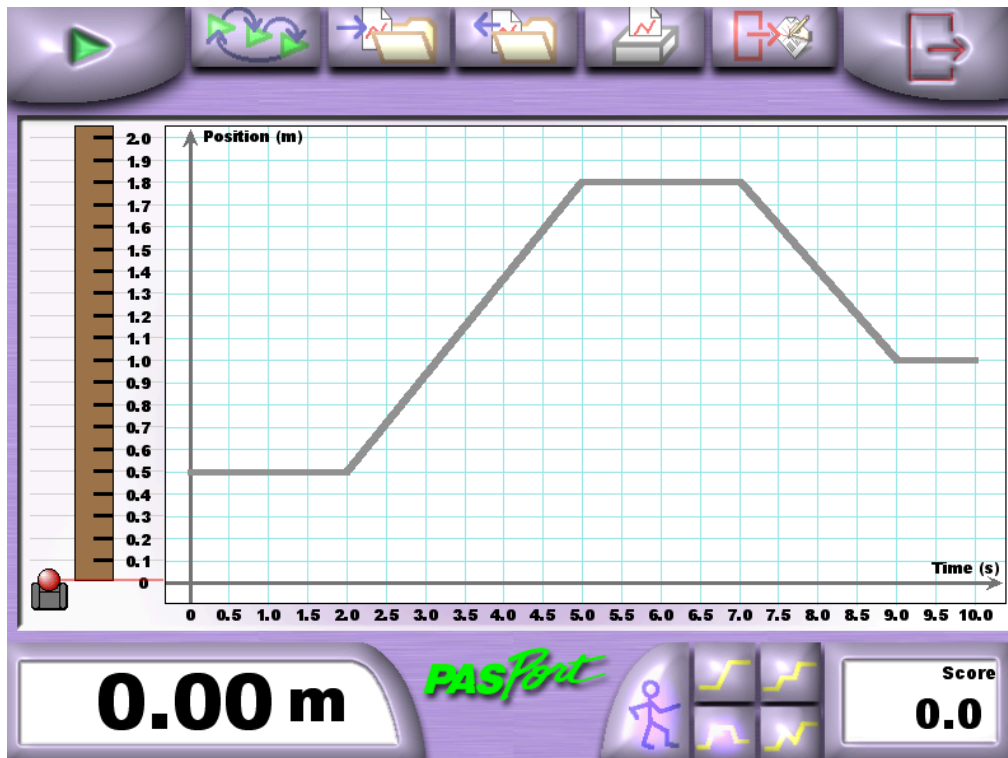
What was the difference in the way you moved to produce the different parts of the graph you just matched? Explain how you walked each part.

Follow-up Questions
Use complete sentences to answer the following questions.

What does the slope of a position-time graph mean?

What is the difference between a steep and a shallow slope?

What does a negative slope mean?