

Position, Velocity, and Acceleration Activity

Overview

One of the most effective methods of describing motion is to plot graphs of **position**, **velocity**, and **acceleration** versus time. From these graphical representations it is possible to determine in what direction an object is moving, how fast an object is traveling, how far an object has traveled, and whether it is speeding up or slowing down. In this activity, students create data tables for motion scenarios provided and predict and verify the shape of the position, velocity and acceleration vs. time graphs.

Objectives

Students will:

- Describe and analyze the motion of a moving object.
- Understand and explain motion using graphs.
- Interpret the motion of an object based on the slope of a position vs. time graph

Standards (TEKS)

IPC 4A

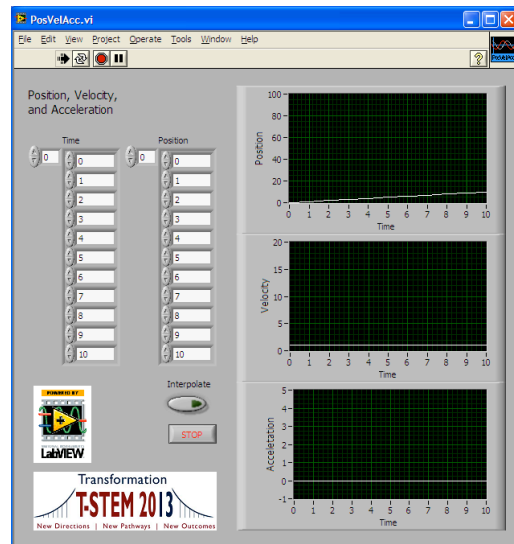
Physics 4AB

Activity

- 1) Open the VI.
- 2) Enter the following values into the data table, where a position of “0” represents an object at the origin and a position of “9” represents an object 9 meters from the origin:

| Time | Position |
|------|----------|
| 0 | 0 |
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |
| 10 | 10 |

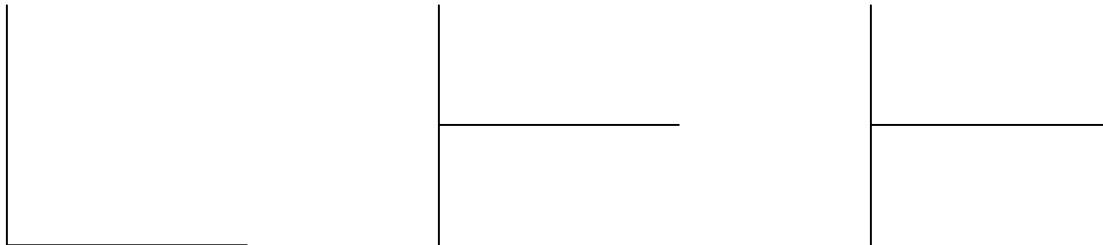
- a) Run the VI.



- 6) Create a data table for the following scenario:
 Start at the 2-meter position. Walk forward 2m in 4 seconds. Wait 3 seconds.
 Walk backwards 4 meters in 4 seconds.

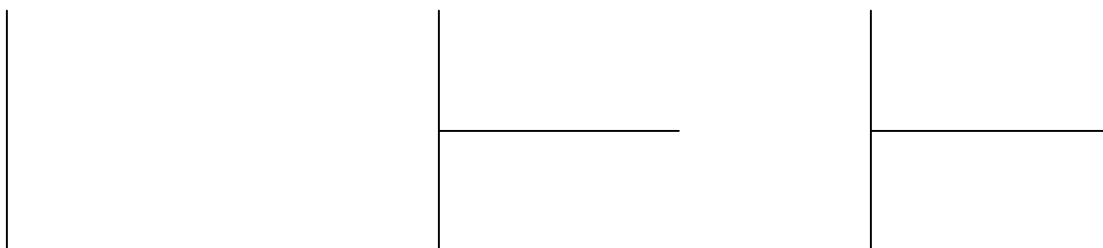
| Time | Position |
|------|----------|
| | |
| | |
| | |
| | |
| | |
| | |

- a) Enter your values in the VI.
- b) Delete empty cells:
 - i. Right-click each cell.
 - ii. Select **Data Operations»Delete Element**.
- c) Run the VI.
- d) Sketch and label the three graphs generated in the space provided.

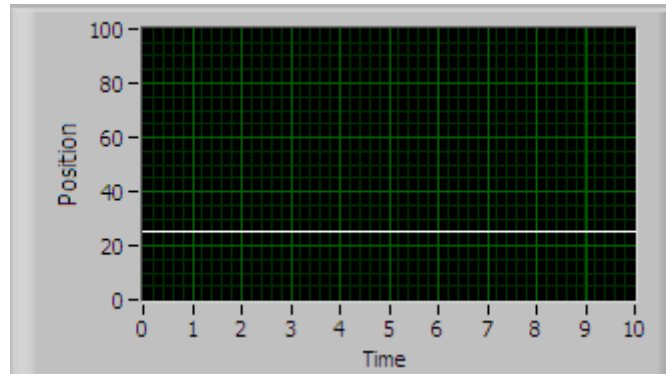


- 7) Write a motion scenario similar to that in question #6. Create a data table for your scenario and sketch the graphs. Verify your graphs by entering the data in the VI.

| Time | Position |
|------|----------|
| | |
| | |
| | |
| | |
| | |
| | |



8) How do you create a horizontal line (slope = 0) on a position vs. time graph?



9) How do you create a horizontal line (slope = 0) on a velocity vs. time graph?

10) Describe the motion for a position vs. time graph that has a downward curve.